

An analysis of expenditure on HIV/AIDS patients in Zambia

By

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DECLARATION

This research is my original work and has not been submitted for any academic and/or examination purposes at any other university. Each significant contribution and quotation from the work or works of other people has been attributed, cited and referenced.

Chipalo Kaliki

This research paper has been submitted for examination with my approval as a University Supervisor.

Susan Cleary

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DEDICATION

Dedicated to my late wife, **Mrs Maureen Mulenga Kaliki**.

May Her Soul Rest In Internal Peace

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LIST OF ACRONYMS

ARV	Anti-Retroviral
CBoH	Central Board of Health
CSO	Central Statistics Office
ESA	EAST and Southern Africa
ENs	Enrolled Nurses
FAMS	Financial Administration Management System
GDP	Gross Domestic Product
HAART	Highly Active Anti-Retroviral Therapy
HIPC	Highly Indebted Poor Countries
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HMIS	Health Management Information System
IPD	Inpatient day
MoFNP	Ministry of Finance and National Planning
MoH	Ministry of Health
NAC	National AIDS Council
NGOs	Non-Governmental Organisations
NHA	National Health Accounts
NHSP	National Health Strategic Plan
OPD	Outpatient department
PHR	Partnerships for Health Reform
PLWHA	People Living With HIV/AIDS
RNs	Registered Nurses
SAfAIDS:	Social and Economic Issues of HIV/AIDS in Southern Africa
STI	Sexually Transmitted Infections
TB	Tuberculosis
tTBA	trained Traditional birth attendants
UNAIDS	United Nations Programme on HIV/AIDS
USAID	United States Agency for International Development
UTH	University Teaching Hospital
WHO	World Health Organisation
ZDHS	Zambia Demographic and Health Survey

EXECUTIVE SUMMARY

According to the 2000/2001 Zambia Demographic and Health Survey (ZDHS), HIV/AIDS prevalence is 16% and is expected to be higher in the next five years. The disease is quite pervasive across all sectors of economic activity, but the impact is especially acute on the Zambian health sector, which is faced with increasing demands on healthcare for not only HIV/AIDS but other diseases such as malaria, tuberculosis, cholera, diarrhoea, to mention but a few. It is therefore essential that expenditure on HIV-related care among different health care systems be analysed so as to determine areas of relatively greater need. It is against this background that this study entitled, "*An analysis of expenditure on HIV/AIDS patients in Zambia*", was conducted.

The main objective of the study is to analyse expenditure on HIV-related care and treatment among the different health care systems and geographical localities in Zambia. The study used *utilisation data* on total and HIV-related outpatient visits and inpatient days collected from the country's facility based database called the Health Management Information System (HMIS); and *HIV-prevalence data* compiled from the Central Statistics Office's report on Epidemiological Projections. *Expenditure data* on the other hand was compiled from the National Health Accounts (NHA) report for 1999-2002 and separate data on HIV/AIDS expenditure was collected from the District Health Boards reports for 2003. Utilisation and HIV-prevalence data were then combined with expenditure data to estimate the overall utilisation of services by HIV-positive patients and the annual expenditure required to meet the burden of HIV/AIDS. Both utilisation

and expenditure statistics were analysed and compared according to different levels of healthcare and geographical localities. Data analysis was exploratory and descriptive.

Study findings indicated that there were some disparities in the utilisation of health care services among different levels of care and different provinces. Overall, hospitals offering higher levels of care (i.e. Third Level Hospitals) were more utilised than those offering lower levels of health care (i.e. First and Second Level Hospitals). According to geographical locality, urban provinces such as Lusaka and Copperbelt had higher levels of utilisation than rural provinces such as Central, Eastern, Luapula, Northern, North-Western, Southern and Western.

The potential under-utilisation of health services at lower levels of care and rural provinces might be an indication of weak referral systems and also poorer quality services provided. Therefore, the study recommends the need to improve services such as medical supplies and drugs, and to focus on encouraging the employment of more qualified medical personnel at lower levels of care. In addition, the referral system needs to be strengthened so that patients can be treated at lower levels of care as much as possible, and that only complicated cases should be sent to higher levels of care such as Third Level Hospitals.

Results of the study further showed that provinces with smaller numbers of projected AIDS deaths had relatively larger amounts of resources and those with bigger numbers of projected AIDS deaths had relatively less resources. This picture points to an inequitable allocation of resources. The study therefore recommends that projected numbers of AIDS

deaths is an important indicator of need that could be used as a guide in resource allocation for HIV-related care.

Study results show that expenditure estimates for HIV/AIDS, together with utilisation figures by provinces and at different levels of care can provide important information for program managers, planners and policy makers as they give an indication of the likely cost of the increasing number of HIV/AIDS patients and also provide an overview of which provinces and health facilities are more or less utilised. If used appropriately, these analyses can have the potential to encourage greater efficiency in the allocation of resources, as well as development of more appropriate responses to the epidemic.

Finally, the study notes that greater efficiency and equity in the allocation of health care resources can be achieved if there is political will. Therefore, health officials need to encourage political leaders to strengthen the referral system and redirect resources to populations with relatively greater need. In this way the Zambian health sector reform vision of *“providing equity of access to cost-effective, quality health care services as close to the family as possible”* will be realised.

CHAPTER 1: BACKGROUND TO THE STUDY

Chapter overview: This chapter provides the background to the study. The Chapter also outlines research problem, study justification and its objectives.

1.1 Introduction

Many countries in Africa are increasingly pressured to expand their health care services to combat a growing burden of disease-and to do this as limited, and even declining and unreliable public funding, forces rationalisation of service delivery. As many countries continue to struggle and population keep growing, the challenges of providing health care services to all increase. In East and Southern African (ESA) countries in general and Zambia in particular, this situation is exacerbated by additional demands placed by the HIV/AIDS epidemic and associated increases in opportunistic infections such as tuberculosis, on the health services (Loewenson and Whiteside, 1997).

Zambia has one of the highest HIV prevalence among the Sub-Saharan African countries. With an HIV prevalence of 16% (CSO, 2003), the epidemic has not only resulted in high morbidity and mortality among the population but it has also posed complex challenges because resources are limited, costs of health care are high and the number of cases continue increasing (MoH/CBoH, 2003). The economic impact of HIV/AIDS is quite pervasive with virtually all sectors of economic activity and segments of society affected by the disease. Health, education, labour force, defence, agriculture and transport are among the sectors of economic activities affected. According to a report by UNAIDS/WHO (1999), in the majority of African countries, internal contributions to the

financing of activities against HIV/AIDS are still minimal and that available resources do not always get allocated to areas of greatest need.

In order for the country to put in place a comprehensive response to HIV/AIDS pandemic and to ensure that available resources are allocated to areas of greatest need, this study analyzed expenditure on HIV/AIDS by using utilization data on total and HIV-related outpatient visits and inpatient days collected from the country's facility based information system called the Health management Information System (HMIS).

The study analyzed the estimated annual expenditure on HIV-related care in different geographical localities and at different levels of care, and compared the expenditure to estimates of need. A proxy indicator of need for HIV-related care was derived from projected numbers of deaths attributable to HIV/AIDS in each province.

It is hoped that this information would contribute to the identification of challenges and opportunities for a public health problem that shares and competes with other health care needs such as malaria, cholera, tuberculosis, dysentery, diarrhea, pneumonia, to mention only a few.

1.2 Research Problem

Zambia is undergoing an HIV/AIDS epidemic of the utmost gravity. The impact on the collective health and socio-economic well being of the Zambian people is potentially stunning. With an HIV/AIDS prevalence rate of 16%, there is no way the country and its entire health care system can avoid the tragic and grim consequences of the epidemic.

Due to the limited nature of government resources and the unlimited nature of public needs, HIV/AIDS services and their delivery must be selected to fit, among other things, within the context of available resources.

The limited funds allocated to the health sector in the country towards HIV-related treatment can be utilised more efficiently and effectively if the likely expenditure on HIV/AIDS patients is known, to guide evidence-based decision-making.

1.3 Study objectives

1.3.1 General objective

The study analysed expenditure on HIV-related care and treatment among the different health care systems and geographical localities in Zambia.

1.3.2 Specific Objectives

- (i) To estimate the cost per *outpatient visit* and *inpatient day* at different levels of health care;
- (ii) To calculate *outpatient visits* per capita and *inpatient days* per capita in different provinces;
- (iii) To estimate annual HIV-related expenditure for *outpatients* and *inpatients* by different levels of care;
- (iv) To estimate the projected expenditure for HIV-related care by geographical localities.

1.4 Rationale/Justification

Zambia, like any other developing country, is faced with inadequate resources in its quest to implement a number of programs including those to do with HIV/AIDS. The tightening of government budgets compounded by growing competition for donor funds has increased the concerns associated with the funds required for the smooth operation of most health facilities.

Given the overall impact of HIV/AIDS on the Zambian society, the Government of the Republic of Zambia developed and implemented several national strategic plans such as the 1994-1998 Second Medium Term Plan, the 2001-2003 National Strategic Framework, the 2000 National HIV/AIDS Strategic Plan for 2001-2005. The overall objective of these national strategic plans was to coordinate and support the development of the multi-sectoral response to HIV-related illnesses such as tuberculosis, which is a proxy indicator of the disease (MoH/CBoH, 1999).

An analysis of expenditure on HIV/AIDS among different levels of health care and different provinces would assist program managers and policy makers in addressing issues related to the disease.

1.5 Outline of the remaining chapters

The remaining Chapters have been organised as follows:

Chapter Two discusses the demographic and economic background of Zambia. It also presents a brief discussion on the Zambian health sector reforms in general with

particular emphasis on different health care systems, the problem of HIV/AIDS and government response to it. The Chapter ends by providing an overview of some constraints in the delivery of HIV/AIDS services in the country.

Chapter Three reviews the literature on HIV/AIDS expenditure, National Health Accounts and cost and cost-effectiveness analyses. It provides an overview of previous studies conducted by focusing on the methods used in estimating some output measures.

Chapter Four examines the methodology used in the study, data collection methods, data sources and how data were analysed.

Chapter Five presents results of the study. Unit cost per *inpatient day* and *outpatient visit* at different levels of health care is presented. It also provides an estimate of HIV/AIDS expenditure per capita and projected annual expenditure, according to geographical localities.

Chapter Six discusses study results with particular focus on key selected indicators. It discusses summary findings compared by different provinces and at different levels of care.

Lastly, **Chapter Seven** makes some concluding remarks on study results; outlines study limitations and makes some policy recommendations.

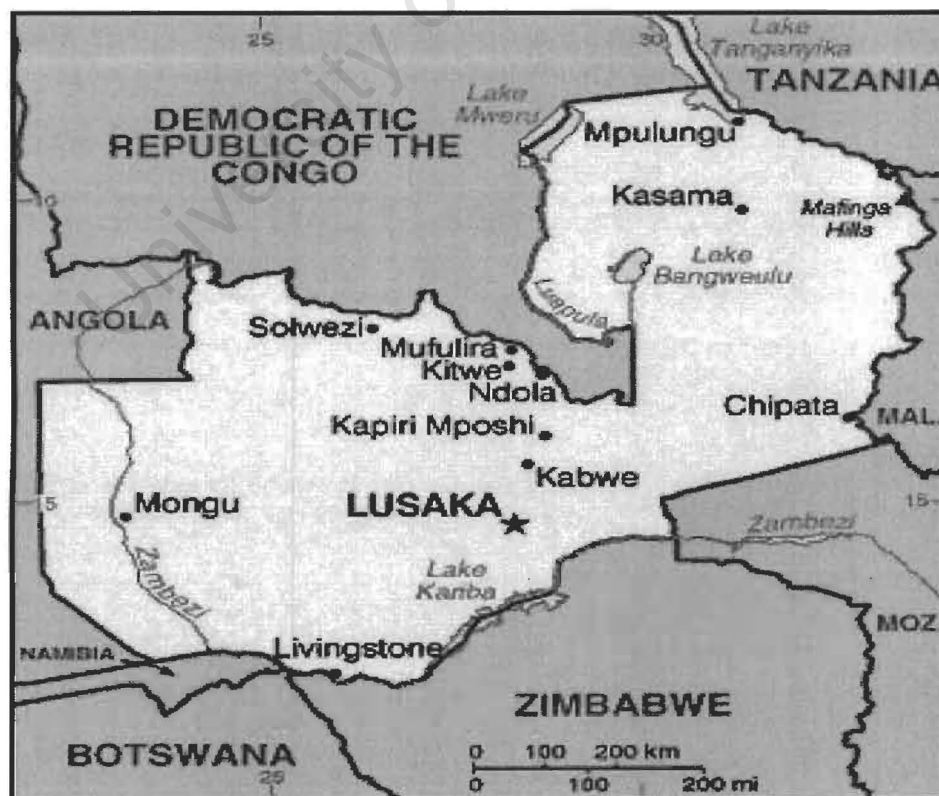
CHAPTER 2: COUNTRY PROFILE

Chapter overview: This chapter provides an overview of the geography, demographics and macro-economic indicators of the country. It also outlines different health care systems in Zambia, the problem of HIV/AIDS and government response to it.

2.1 Background

Zambia is a land-locked country covering an area of 752,612 square kilometers (about 2.5 percent of Africa) and shares borders with the Democratic Republic of Congo (DRC) and Tanzania in the north, Malawi and Mozambique in the east; Zimbabwe and Botswana in the south, Namibia in the southwest and Angola in the west (CSO,2000).

Figure 1: Map of Zambia showing neighbouring countries



Source: CSO, 2000

2.2 Demographics

The 1963, 1980, 1990, and 2000 national censuses reported total populations of 3.5 million, 5.7 million, 7.8 million and 9.9 million respectively.

According to the 2000 Census of Population and Housing, 65 percent of the population live in rural areas, while 35 percent live in urban areas. Zambia's population grew at an average annual rate of 3.1 percent between 1969-1980, 2.7 percent between 1980-1990, and finally 2.4 percent during the period 1990-2000. The country's average population density is 13 people per square kilometer, with the highest population density occurring in Lusaka province, with 64 people per square kilometer (CSO, 2000).

2.3 Administration

Lusaka is the capital of Zambia. Administratively, the country is divided into nine provinces. Of the nine provinces, two are predominantly urban, namely Lusaka and Copperbelt provinces. The remaining provinces - Central, Eastern, Northern, Luapula, North Western, Western and Southern - are predominantly rural provinces. The country is further divided into 72 districts, 150 Constituencies and 1,286 wards (*ibid*).

2.5 Economy

Prior to 1993, the economy had been in decline for more than a decade with falling imports and growing foreign debt. Economic difficulties stemmed largely from a chronically depressed level of copper production and weak copper prices, generally ineffective economic policies and high inflation. (MoFNP, 2002). However, economic reforms enacted since 1992 have helped reduce inflation, strengthened the social safety

net, and have been accompanied by GDP growth in real terms at an estimated 6.8% in 1993 and 4% in 1994. The huge external debt remains a key problem (*ibid*).

In 2001, the World Bank estimated Zambia's per capita Gross Domestic Product (GDP) at US\$350. Over the years, debt service has on average accounted for 10% of GDP, while all the social sectors together have accounted for only 5%. The debt is owed primarily to multilateral institutions. In December 2000, Zambia was approved for debt relief under the enhanced Debt Initiative for Highly Indebted Poor Countries (HIPC). Zambia's debt stock is likely to remain unsustainable even with HIPC debt relief (*Ibid*).

2.5 Health

2.5.1 Zambian Health Sector Reforms

In the past decade, many less developed countries have been attempting to improve the performance of their health delivery systems. Like other countries, Zambia was prompted by similar circumstances to embark on a national health reform program. One of the reasons for health reforms was the decline in the general health status of the population accompanied by reduced availability of resources for health (Church and Simwanza, 2000).

Because of the ensuing "health care crisis" in the country, it became necessary to find an effective way of stopping the situation from deteriorating any further. Therefore, in 1991 the Government of the Republic of Zambia came up with the current health reform

vision- "*to provide equity of access to cost-effective, quality health care services as close to the family as possible*". The key strategy in transforming this vision to reality was to transfer key health management and administrative responsibilities to the lower levels of the health structure through the process of decentralisation. By decentralising and integrating services, and by shifting the emphasis to health centres and community level interventions, it was expected that costs could be contained while improving the accessibility and quality of health care (CBoH, 2000).

2.5.2 The Basic Health Care Package

Since 1992 Zambia has implemented a series of health reforms designed to increase the affordability, accessibility and efficiency of service delivery. A key element of these reforms was the introduction, adoption and implementation of the Basic Health Care Package, a set of cost-effective interventions that address the prioritised disease burden, across the different levels of health care (MoH/CBoH, 2003).

The basic health care package was first defined in 1994/5 for services at the primary level and later revised in 1996 to include services at the secondary and tertiary levels. HIV/AIDS is among the 33 health conditions/diseases defined in the package. Against the demands for HIV/AIDS services, Zambia is increasingly concerned with allocating resources to cost-effective interventions defined in the basic health care package.

2.5.3 Different levels of health care within the Zambia public health sector

In Zambia, health service delivery is provided by Government institutions, church institutions, mining and other industrial companies. The National Health Strategic Plan (NHSP) document defines the framework within which both public and private service delivery is organized, based on the Zambia Basic Health Care Package (CBoH *et al* 2003). This package is delivered through a system which comprises the following **five** levels of health care:

(i) Third level referral hospitals

Third level hospitals also called central hospitals, are the highest referral hospitals in Zambia and there are 5 of them as indicated in *Table 1* on page 15. These hospitals cater for a catchment population of approximately 800,000 and above, and have sub-specializations in internal medicine, surgery, paediatrics, obstetrics, gynaecology, intensive care, psychiatry, training and research. Laboratory diagnosis of complicated cases of opportunistic infections such as tuberculosis is the main HIV/AIDS services offered at these levels of care. All complicated cases not attended to at second level hospitals are referred to third level hospitals.

(ii) Second level referral hospitals

Second level hospitals, also referred to as General Hospitals, are found at provincial level and there are 18 of them in the country. They are intended to cater for a catchment area of between 200,000 and 800,000 people, with services in internal medicine, general surgery, paediatrics, obstetrics and gynaecology, dental, psychiatry and intensive care services. These hospitals also act as referrals for the first level institutions, including the provision of technical back up and training functions. HIV/AIDS services offered include laboratory diagnostic testing of opportunistic infections.

(iii) First level referral hospitals

As indicated in *Table 1*, there are 74 first level hospitals in the country. They are the third largest levels of care after the Second and Third Level referral hospitals. They include all the district hospitals and serve a population of between 80,000 and 200,000 and provide services such as medical, surgical, obstetric and diagnostic services and all clinical services to support health centre referrals. Treatment and testing of HIV/AIDS patients is done at the first, second and third level of care. Medical doctors, clinical officers and nurses are the type of personnel found at this level of health care.

(iv) Health Centres

The two types of health centres in the restructured health care system in the country include the *urban health centres*, which serve a catchment population of between 30,000 to 50,000 people; and *rural health centres*, serving a catchment area of 29 km radius, or a population of 10,000. There are 1,210 health centres in the country-973 in rural areas and 237 in the urban areas (CBoH, Health Institutions in Zambia, 2003).

Health centres attend to less complicated services that do not require laboratory testing. HIV/AIDS patients counselled at the health centre level are referred to the first level hospitals for laboratory testing to determine their HIV/AIDS status. The types of personnel at this level of care include Enrolled Nurses (ENs) and/or Registered Nurses (RNs).

(v) Health Posts

The health posts are the lowest levels of health care and are built in communities far away from health centres. They cater for a population of approximately 500 households (3,500 people) in rural areas and 1,000 households (7,000 people) in the urban settings and are set up within 5km radius for sparsely populated areas. There are 20 health posts in the country (CBoH, Health Institutions in Zambia, 2003). The types of health services offered at this level are basic first aid rather than curative. In addition health posts offer counselling services for HIV/AIDS rather than treatment services. The types of personnel at health posts are Nurses with assistance from community members through the trained traditional birth attendants (tTBA), personnel trained in communities to respond to minor

diseases that do not require diagnostic skills (MoH/CBoH, 2003). There are no medical doctors at this level of health care.

2.5.4 Patient referral health care system

According to this Zambian patient health care system, patients are first seen at the health posts and if the medical personnel at this level of care say that the condition of a patient is too serious, the patient is transferred to the next higher level of care (i.e. health centre). In certain situations, patients at the health posts are transferred directly to the first level hospitals (by-passing the health centre), even before treatment is done at the lower level of care. For example, if a midwife determines strong risk factors during antenatal care, she will advise the woman to go to the hospital directly for delivery without passing through the health centre.

Although this referral system follows the flow of patients from the lower level of care to the higher one, theoretically, a patient can only approach a second level hospital (provincial hospital) if he is referred to by a first level hospital at the district, and he can only be admitted to a central hospital after referral form from a second level hospital at the province is presented. However, it is worth mentioning that in reality, several levels of health care are by-passed, especially in urban areas where distances do not hinder people from seeking care in higher-level health facilities such as third level hospitals. Mujinja (1996) notes that there is anecdotal evidence that severely sick patients of rural provinces do not go to central hospitals despite the referral system in place because of the long distance to these health facilities.

2.5.5 HIV/AIDS in Zambia

In Zambia, HIV/AIDS remains an overwhelming development challenge with women and urban residents disproportionately affected by the disease (CSO, 2003). *Table 1* shows HIV prevalence among adults in rural and urban areas and by gender. The Table shows that prevalence is higher in urban than rural settings and according to gender, it is higher among females than males.

Table 1: HIV prevalence among adults, 2002	
Population group	Percent HIV-positive
Urban	23.1
Rural	10.8
Women	17.8
Men	12.9
Total all adults	15.6
<i>Source: CSO, Demographic and Health Survey, 2003</i>	

2.5.5.1 ART program in Zambia

Recognising that Highly Active Antiretroviral Therapy (ART) can delay progress of HIV/AIDS, allowing people living with the disease to live longer, healthier and more productive lives than would be the case without it; Zambian Government made a policy decision to make ART services widely available to all its citizens. In 2003, the Zambian government allocated about US\$3million for the purchase of ARV drugs for 10,000 People Living with HIV/AIDS (PLWHA) to be provided through the public health facilities (Central Board of Health *et al*, 2004).

Zambia is one of the first countries to respond to WHO's call for countries to request for assistance to be supported with scaling-up access of ART, in the context of the WHO/UNAIDS-led global target of providing 3 million people on treatment by the end

of 2005. Zambia set a target of providing ART to 100,000 PLWHA by 2005. However, this target could not be reached due to the exclusion of public health facilities from the Antiretroviral Information System (ARTIS), a facility based system designed to collect data for patients on ART (*ibid*).

The ART program in public health facilities began in two sites at the country's two main tertiary hospitals-the University Teaching Hospitals (Lusaka) and Ndola Central Hospital (Ndola), in 2003. The program has since expanded to all the provincial and district health facilities.

Diagnosis is done at all health facilities with laboratory services such as first, second and third level hospitals. Treatment, counselling and monitoring of patients is done at almost all the public health facilities except the health posts and a few health centres.

2.5.5.2 Government response to HIV/AIDS

Since 1984, when Zambia's first AIDS case was diagnosed, it became apparent that government had to effectively address the problem of HIV/AIDS epidemic in order to reduce its impact on the population. The National AIDS Prevention and Control Programme established in 1996 was one of the programmes formed to address the problem of the epidemic. The National HIV/AIDS/STI/TB Council (NAC) established in December 2002 to coordinate the national multi-sectoral response to the epidemic was another. Several national support structures have been put in place, including a high-level Cabinet Committee on HIV/AIDS, which provides policy direction and regularly reports to cabinet on HIV/AIDS issues (MoH/CBoH, Mid-Term Review Report, 2003).

Zambia has also developed policies, planning frameworks, guidelines and protocols to guide the national response. A national HIV/AIDS policy such as the national strategic plan for intervention in HIV/AIDS and sexually transmitted infections has been developed. In addition, Zambia has been scaling up the health sector response to HIV/AIDS through several initiatives, including the Poverty Reduction Strategy Program (PRSP), the Highly Indebted Poor Country Initiative, The Zambia Social Investment Funds, The Zambia National Response to HIV/AIDS Project (Funded through the World Bank Multi-Country Program for Africa) and the Global Fund to fight AIDS, Tuberculosis and Malaria (WHO, 2004).

2.5.5.3 Some constraints in the delivery of HIV/AIDS activities

There are a number of constraints that have hampered the smooth delivery of HIV/AIDS services in the country.

Firstly, although there are a lot of initiatives in the districts and provinces addressing HIV/AIDS related issues, field observations have confirmed that the impact of HIV/AIDS on the professional labour force in the public health care system is currently affecting human resource capacity thereby worsening the already overburdened health care system (MoH/CBoH, Mid-Term Review Report, 2003).

Secondly, at the district level, AIDS task forces have been developed. However, there are concerns that the technical assistance offered to task force members is insufficient to enable them to effectively deal with local HIV/AIDS issues. In addition, roles and

responsibilities of the task forces are not clearly defined due to lack of national guidelines (*ibid*).

Thirdly, much stigma is still associated with HIV/AIDS thereby limiting the number of people who seek HIV testing and care.

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CHAPTER 3: LITERATURE REVIEW

Chapter overview: This chapter reviews literature on National Health Accounts (NHA), cost and cost-effectiveness studies conducted in general and on HIV-related treatment in particular. The Chapter is divided into **three** sections. *Section 3.1* provides a brief description of key concepts used in the studies. *Section 3.2* reviews the studies conducted by focusing on the methods used and how certain output measures were calculated. The Chapter ends with *section 3.3*, which provides some concluding remarks of the studies conducted.

3.1 Brief description of key concepts used in the studies

- ☞ *Full costing* values the opportunity cost of all resources required to deliver a service;
- ☞ *Incremental costing* involves calculating the costs of extra resources incurred such as when an extra service is added onto an existing package;
- ☞ The *ingredients* approach to calculating costs involves the identification of specific ‘ingredients’ directly involved in delivering a specific service, and links these ingredients to the cost of each ingredient;

- ☞ *Step-down costing* is an approach to costing that allocates all expenditure in a facility to cost centres (such as inpatient and outpatient departments) and allocates this expenditure between patients using a number of allocation factors such as headcounts or inpatient days;

- ☞ *Patient day equivalent (PDE)* is a weighted combination of the number of inpatient days and outpatient visits and provides a useful means of allocating expenditure between inpatient days and outpatient visits using a step-down costing approach. Expenditure per inpatient day is assumed to be higher than an outpatient visit (because inpatients receive hotel services for example), implying that expenditure should be weighted more for inpatients relative to outpatients (Cleary, 2004).

3.2 Review of literature on cost analyses and methods used in estimating output measures

This section outlines cost analyses conducted in general and HIV/AIDS in particular and focuses on methods used and how cost estimates were calculated. A review of this literature shows that most studies used a mixture of *ingredients* or *step-down costing methodologies*. Studies either calculated the full costs of delivering a service, or calculated the incremental costs.

3.2.1 National Health Accounts (NHA) studies on HIV/AIDS

In order to address the need for information on HIV/AIDS expenditure, the PHR_{plus} conducted the first National Health Accounts (NHA) analysis on HIV/AIDS Expenditure in Rwanda where nearly 11% of the population was estimated to have HIV/AIDS. The main objective of this study was to analyse the socio-economic status of respondents, their expenditure on health services and how HIV-positive individuals financed these services. The study used a sample of 350 HIV-positive individuals who were either enrolled in an HIV/AIDS support group or sought care at four selected health facilities (Nandakumar *et al* 2001).

Data was collected by using questionnaires and interviewing HIV-positive individuals in four different health facilities. One of the indicators generated from the Rwandan study was the *annual per capita use rate for outpatient visits*, calculated by dividing the number of outpatient visits of a given locality (i.e. urban or rural) by the total population of that particular locality. The other indicator was the *annual expenditure per capita* calculated by dividing the total household expenditure of a given locality (i.e. urban or rural) by the total population of that particular locality.

Some findings of the Rwandan NHA sub-analysis showed that the *annual per capita use rate for outpatient visits* was 10.92 compared to 0.29 outpatient visits in the general population. The other finding was that HIV-positive people living in urban areas (with outpatient visits per capita of 26.45) used over ten times the number of visits compared to those in rural areas (with outpatient visits per capita of 2.45), reflecting lack of access as well as inability to pay by the latter.

Results of the Rwandan study further indicated that *annual expenditure per capita* by respondents in the sample was US\$63 compared to the *annual expenditure per capita* for the total population of US\$5. Those living in urban areas (with expenditure per capita of US\$45) spent nearly three times more per capita compared to those living in rural areas (with expenditure per capita of US\$5) (*ibid*). This study focussed on assessing the expenditure by households on health services, and therefore no specific costing was undertaken.

Izazola *et al* (2002) conducted a study among five countries (i.e. Brazil, Guatemala, Honduras, Mexico and Uruguay) with the objective of estimating summary indicators to assess the response to HIV/AIDS within a National Health Accounts framework.

Data on expenditure was collected and classified by source (public, private, international), use of funds (prevention, care), and by type of provider institution. Information from official reports allowed estimation of public expenditure, whereas private expenditure estimates were complimented by surveys. Other data collected from each country included total population and total expenditure on HIV/AIDS (*ibid*).

To analyse the financial response to HIV/AIDS and evaluate the patterns of expenditure critically, the study combined economic, demographic and epidemiological data. HIV/AIDS expenditure per capita was one of the indicators estimated and was calculated by dividing total population of a given country by the total expenditure on HIV/AIDS for that particular country.

Results of the study showed that HIV/AIDS expenditure per capita for the entire population in 1998 was: Brazil US\$2.69, Mexico US\$1.25, Guatemala US\$1.08, Uruguay US\$6.63 and Honduras US\$6.63 (*ibid*).

Barnet *et al* (2001) conducted a study to estimate expenditure on HIV/AIDS in Rwanda for 1999 and 1998 using the National Health Accounts (NHA) framework. Data was collected from public and private sector organisations and agencies involved in HIV/AIDS activities. HIV/AIDS expenditure was defined as expenditure that has a direct impact on the prevention, management and treatment of HIV/AIDS. Other data was collected on household spending using a questionnaire that gathered information on the use of inpatient and outpatient health services, number of days spent in hospitals and cost of medication purchased (*ibid*).

A comparison of HIV/AIDS –related costs (prevention, treatment and mitigation) to the overall health expenditure, revealed that AIDS prevention was primarily financed by donor funds, whereas treatment costs place the heaviest financial burden on households. This is because no financial support systems exist to facilitate patient’s access to care.

3.2.2 Cost analyses of treatment for HIV/AIDS

Bautista (2002) conducted a study in Mexico to look at costing public sector HIV/AIDS treatment. The main objective of this study was to document the Mexican experience in HIV/AIDS treatment in three different health systems - the Ministry of Health, the Mexican Social Security Institute and the National Institute of Health.

A sample of 1,062 HIV positive patients was selected from a total of 11 health facilities – 2 were specialised tertiary hospitals; 8 were secondary care hospitals and 1 was a specialised HIV outpatient clinic. The health facilities were chosen to reflect several criteria, including health subsystem, geographical locality and level of care.

Data on socio-demographic characteristics, clinical events, and use of outpatient, inpatient and laboratory services was collected from medical records. Cost data on goods and services consumed for the provision of care for People Living with HIV/AIDS (PLWHA) was collected from each of the facilities. The study estimated the total annual cost of care at different levels of care by multiplying the unit cost with the number of patients receiving the service (*ibid*).

The methodology developed in the Mexican study was a mixture of *ingredients* and *step-down costing* and it allowed for cost comparison of the treatment program provided by the major institutions that treat HIV/AIDS patients and provided vital information necessary to guide future planning and scaling up of treatment programs. The study used *ingredients method* because laboratory services were identified and costed. Although the study did not indicate the use of the patient day equivalent (PDE) to split inpatient days and/or outpatient visits, the allocation of cost data to departments that are directly involved in the delivery of health services for the patients reflects a common feature of a *step-down costing methodology*.

One of the key findings of the Mexican study was that treatment costs were higher for patients in their last year of life. Excluding ARVs, treatment costs were two to three times higher for patients near death than for average patients. In addition, the longer the

patient was under treatment, the higher the costs during the last years of life. The study also showed that there were some marked differences in total expenditure across different levels of care - specialised tertiary hospitals incurred higher costs compared to secondary hospitals and specialised HIV outpatient clinics.

Koné *et al* (1998) conducted a study of expenditure on AIDS in Côte d'Ivoire whose main objective was to analyse total health care expenditure; the source of funding for treatment, prevention and activities to mitigate the impact of AIDS; and the determinants of these funding patterns.

Data for the study were collected at different localities – Abidjan (the largest and capital city), rural areas and Anti Tuberculosis Centres (ATC). The main type of data collected was the number of HIV/AIDS patients classified according to different types of treatments they were likely to seek such as hospital drugs, specialty consultations, outpatient visits, laboratory and X-ray and visits for other medications. The total cost of each type of treatment was estimated by multiplying the number of patients for each type of treatment by the estimated cost for that particular treatment.

In order to estimate the share of total bed days and hospital costs for HIV/AIDS patients, data on the number of inpatient beds, consultations, bed-days and expenditure from each hospital was collected. A “bed-day equivalent” was calculated to represent the amount of hospital services equivalent to an inpatient day. Using the rule of thumb that one ambulatory consultation costs about one-quarter of an inpatient day (Barnum and Kutzin, 1993), each ambulatory consultation was converted into one-quarter day equivalent.

Estimation of cost of bed-days for public health facilities was done by dividing total expenditure by the total number of bed-day equivalents (*ibid*).

Results of the study indicated that costs of HIV/AIDS consultations for health facilities in rural areas were much lower than those in Abidjan because health services were less costly outside the capital city. In addition, the cost of one night of hospitalisation in rural areas was substantially less than the amount in Abidjan and HIV/AIDS accounted for more than one-fifth (21%) of all hospital bed-days in the country, the reason being Côte d'Ivoire had an adult *seroprevalence* rate of 6.8% (World Bank, 1997) and that HIV/AIDS patients tend to be hospitalised much more often than non-infected patients.

Results and methodology of the study conducted in Côte d'Ivoire are consistent with a study conducted by Iunes *et al* (1998) in São Paulo state, Brazil which looked at estimates of total public and private expenditure on HIV/AIDS treatment and prevention, by source of financing and type of programme.

Data on hospitalisation for all cases and for HIV/AIDS cases for the Brazilian study was collected from the Ministry of Health's information system and included total admissions, hospital days, average length of stay and total expenditure by different health facilities. Expenditure per admission for all diseases, including HIV/AIDS was estimated by dividing total expenditure by the total reported admissions. Results of the study showed that, overall, hospitalisation was much greater for hospitals in São Paulo compared to the rest of the country due to the expensive equipment used in the latter.

A study conducted by Govender *et al* (2000) examined the costs and perceived quality of care for people living with HIV/AIDS in the Western Cape Province in South Africa. The aim of this study was to evaluate the costs of care for people with HIV/AIDS at different levels of care in the Western Cape metropolitan area and the patients' perception of care.

A sample of 350 patients diagnosed with HIV/AIDS, excluding newly diagnosed cases was selected. The main sources of data were financial records, patient folders (records) and cost information from various laboratories and pharmacies. The methods for estimating costs differed between the inpatients and the clinics. For *inpatient costs*, total cost per HIV/AIDS inpatient was calculated by multiplying ward costs per inpatient day by the length of stay and then adding the patient specific costs such as drug costs, lab investigations and radiology as follows:

$$\text{Total cost per HIV/AIDS patients} = [\text{Ward cost per inpatient day} \times \text{length of stay}] + [\text{patient-specific costs}].$$

For *outpatient* and *primary level costs*, total cost per HIV/AIDS patient was calculated by adding together costs of clinical care, capital and shared costs and patient specific costs. Capital costs on the other hand were calculated by first establishing replacement values of each item, estimating the useful lifespan, then annualising using discount rates to arrive at an annual cost.

Results of the study showed that overall, across disease stages and different HIV-related conditions, costs of care were higher at the hospital level than at the lower levels.

A study conducted in Kenya by Guinness *et al* (2002) looked at costs of hospital care for HIV-positive and HIV-negative patients at Kenyatta National Hospital (KNH). The main objective of this study was to record the costs of hospital care for HIV-positive and negative-patients in Nairobi, and identify cost per patient per admission. Data was collected from a sample of 398 inpatients enrolled in a linked clinical study.

Data were collected from the clinical study records, cashier records, staff rosters, hospital expenditure records, laboratory and radiology examination records and interviews with key staff.

The average length of stay and average costs were calculated for each patient category. Hospital costs were classified according to medical and staff ward costs, pharmaceuticals, investigations and non-curative costs (overheads). Cost per patient was calculated by dividing total hospital costs by total inpatient days or outpatient visits. A combination of *ingredients* and *step-down costing* methodology was used. After identifying all the services (ingredients) directly involved in providing patient services, hospital costs were allocated to patient visits (step-down costing). However, the study did not indicate the weighting factor used to split costs between inpatients and outpatients using the patient day equivalent.

Study results showed that there was no significant difference in costs or mean length of stay between HIV-positive and HIV-negative groups, nor were the costs and lengths of stay for clinical AIDS patients significantly different to those for HIV-positive patients without AIDS. The similar cost pattern for inpatient care irrespective of HIV status or

clinical AIDS was attributed to the limited provision of care beyond basic clinical services.

A study conducted by Hansen *et al* (2000) in Zimbabwe looked at the cost of HIV/AIDS care at government hospitals. The main objective of this study was to estimate cost per inpatient day as well as per inpatient stay for patients in government health facilities in Zimbabwe with special emphasis on HIV/AIDS patients.

Data collection for the study was based on a sample of seven hospitals out of 200 hospitals in Zimbabwe, representing various levels of the referral system. The cost per inpatient day and per inpatient stay was estimated through a combination of two methods; *ingredient costing methodology* (through an in-depth patient record review) to identify the direct treatment and diagnostic costs such as medication, laboratory tests and X-rays, and the *step-down costing methodology* to capture all the remaining resources used such as hospital administration, meals, housekeeping, laundry, etc (*ibid*).

The Zimbabwean study showed that hospital care for HIV/AIDS patients was considerably higher than for non-HIV/AIDS patients. In five of the seven hospitals visited, the average costs of an inpatient stay for an HIV/AIDS patient was found to be as much as twice that of a non-HIV/AIDS patient. This difference was attributed to slightly higher direct costs per inpatient day (medication, laboratory tests and X-rays) as well as longer average length of stay in hospitals for HIV/AIDS patients compared with non-infected patients (*ibid*).

3.2.3 Cost-effectiveness analyses of treatment for HIV/AIDS

In Cost-effectiveness studies, the costs of two or more programmes, from a particular view point, are compared to the health effects of these programmes, where the health effects are measured in natural units such as cases cured, lives saved and cases of diseases averted. The results are expressed as incremental cost per unit of additional effect (Drummond, 1997).

A study conducted by Cleary *et al* (2004) in a South African Township, looked at the cost-effectiveness of antiretroviral treatment for HIV-positive adults. The study was conducted in three HIV- dedicated clinics in Khayelisha, a township in Cape Town, South Africa. The main objective of this study was to describe the cost-effectiveness of providing ART in a poor public health sector setting, in terms of the economic cost per life year gained and quality adjusted life year gained and describe the lifetime costs for those on ART and those not on ART.

Patient specific items (radiology, laboratory, investigations and medicines) were calculated using the *ingredients approach* based on utilisation by a sample of patients. The remaining cost per inpatient day or clinic visit relating to overheads and capital costs was allocated to patients using a *step-down* methodology.

The PDE was calculated by applying a weighting factor of 0.27 and was used to calculate the overhead or hotel cost per inpatient day after excluding patient specific items from expenditure at a given health facility. Results of the study showed that lifetime costs for those on ART were approximately R93,000 compared to R23,000 for those not on ART.

One of the key findings of the Zambian study was that the average annual incremental cost per patient for first-line HAART in Zambia was \$488, with drugs and monitoring tests accounting for 57 percent and 36 percent, respectively. Capital and training costs made up the remainder. The average variable cost per patient for providing voluntary counselling and testing (VCT) services was US\$3.64 (Kombe and Smith, 2003).

3.2.4 General cost analyses

Flessa and Dung (2004) conducted a study in five hospitals in Vietnam to determine the average costs as well as the main cost drivers. The study used a mixture of *ingredients* and *step-down* costing methodologies to arrive at various cost estimates.

Utilisation data from all hospital departments on the number of outpatient visits, inpatient days, X-ray procedures and the number of surgical operations was collected. All hospital departments were identified based on the organizational structure. They were separated into *direct*¹ and *indirect cost centres*². For each department, current costs of salaries and wages, drugs and supplies and other running costs were collected. Costs of buildings, vehicles and equipment, their expected lengths of life and the depreciation were calculated. All costs were allocated to departments involved in the delivery of health services using a *step-down costing methodology*. The unit cost was calculated by dividing the total cost of each department by the number of service units in each health facility.

¹ *Direct cost centres* render services directly to patients such as all clinical departments, X-ray and laboratories (Flessa, 2003)

² *Indirect cost centres* support other indirect costs centres or final cost centres such as kitchen and/or administration (*Ibid*)

respectively. Utilisation statistics were combined with cost data to come up with utilisation indicators at different health facilities. Using the assumption that an inpatient uses more resources than an outpatient and that an outpatient visit costs one third the cost of an inpatient day, patient day equivalent (PDE) was used to split outpatient visits and/or inpatient days. After the PDE was calculated, it was used to calculate the cost per inpatient day by estimating total expenditure at different health facilities, subtracting off patient specific expenditure, and dividing by the patient day equivalent.

The methodology used was a combination of *ingredients, full* and *step-down costing*. The study used *ingredients* and *full costing* since all costs (inputs) utilised in the provision of hospital services were identified and costed. Therefore, an aggregation of these costs constituted full costs. On the other hand, *step-down costing methodology* was used because all the costs of running respective district hospitals (recurrent and capital) were allocated to final outputs of the hospital such as inpatient and outpatient departments so that the full cost of providing each type of service was computed to yield cost per inpatient day and cost per outpatient visit.

Results of the South African district hospital costing study (Wamukuo and Ntutela, 2002) indicated that the cost of an outpatient visit was significantly *higher* at pure district level compared to the district cum-regional hospitals mainly due to higher utilisation in the latter. The study also indicated that although total inpatient costs were similar across hospitals, the cost per inpatient day was substantially higher at district-cum-regional level hospital. This was attributed to the fact that inpatient stay and bed occupancy were reasonably higher in the other hospitals (*ibid*).

Another cost analysis conducted by Kumaranayake and Watts (2001) looked at the costs of scaling up priority health interventions in low-income and selected middle-income countries. The specific aim of this study was to conduct a full cost analysis of scaling-up the implementation of priority programmes designed to address the causes of major disease burden among people in low and middle-income countries, in order to maximise health outcomes. These programmes included TB treatment malaria prevention and treatment; HIV prevention, care and treatment; treatment and immunisation of childhood-illnesses and maternity-related illnesses. The cost of *scaling-up*¹ these programmes reflected how much it would cost the health care system to extend coverage for the main diseases and other health conditions.

Study results showed that annual incremental cost of scaling up programs were about three times higher in low-income countries (US\$10 billion) than in middle-income countries (US\$3billion). In addition, out of all the intervention program areas, incremental cost of scaling up the intervention was highest for HIV prevention (3.6 billion) followed by treatment on child related illnesses (US\$1.7 billion).

3.3 Conclusion

The literature review has shown that a number of countries have attempted to estimate expenditure on HIV/AIDS in their efforts to develop appropriate responses to the epidemic and that methodologies of estimating costs were similar for all the studies

¹ *Scaling-up* refers to increasing the level of coverage of HIV activities from current levels as well as expanding the type of HIV/AIDS programs (Kumaranayeke, 2001).

4.3.1 Financial data sources

Resources for the treatment of HIV-positive people in Zambia are derived from the general pot of resources allocated to public health facilities. Additional earmarked HIV funds are also allocated to the health sector, but it cannot be guaranteed that these are only spent on HIV-related treatment and prevention activities. It was therefore necessary to collect data on total health service financing as well as separate data on HIV/AIDS financing. This included expenditure data from the 1999-2002 National Health Accounts (NHA) report and separate data on HIV/AIDS expenditure. Initially, it was hoped that expenditure data would be derived from the Financial Management Administration System (FAMS). However, this data was fragmented and incomplete for the year 2003. Therefore, 2002 NHA expenditure data was inflated to 2003 using the inflation rate of 17.5% (MoH/CBoH Mid term Review Report, 2004). The NHA figures included expenditure on personnel, drugs, medical supplies and other costs required for the smooth operation of the health facility and would therefore include resources for treatment of HIV-positive people.

The other source of *financial* data was collected from the 2003 District Health Board reports and covered funds allocated for HIV related activities. These funds are an aggregation of both government and donor funds and are allocated for treatment and prevention activities. As noted above, it cannot be guaranteed that these funds are spent solely on HIV-related activities.

expenditure data were included in the same excel spreadsheet for easy analysis of the data.

4.3.1 Scope and analysis of data

The scope and analysis of data for this study was based on the three levels of care (i.e. first, second and third level hospitals) in all the public health institutions. Health posts and health centres were not part of the analysis because these levels of care, as discussed in Chapter 2 (*section 2.5.3*), only cover non-curative services such as voluntary counselling of HIV/AIDS compared to first, second and third level hospitals which offer treatment and testing of HIV-related services. Therefore, health posts and health centres do not make a significant contribution to expenditure on HIV-related treatment compared to the first, second and third level hospitals. In other words, health posts act only as referrals to first level hospitals.

4.3.2 Calculation of OPD visits per capita and IP days per capita

Data on *outpatient visits* were collected from the HMIS database and were disaggregated by different levels of care (i.e. First, Second and Third Level Hospitals) and for each geographical locality (i.e. provinces). In order to have a picture of which provinces utilise outpatient and inpatient departments most, both outpatient visits per capita and inpatient days per capita were calculated using the following basic formula:

$$\text{OPD visits per capita} = \frac{\text{OPD visits for a given province}}{\text{Total population}}$$

$$\text{IP days per capita} = \frac{\text{IP days for a given province}}{\text{Total population}}$$

4.3.3 Estimation of unit cost for inpatients and outpatients at different levels of health care

In most studies conducted (Flessa and Dung, 2004; Wamukuo and Ntutela, 2002) inpatients and outpatients were split by applying the patient day equivalent (PDE) and using a weighting factor of 0.3 on the assumption that it costs three times as much to offer inpatient care compared to outpatient care. This reasoning has been used to estimate the unit costs of inpatients and outpatients at different levels of health care by splitting total expenditure between outpatient visits and inpatient days using the patient day equivalent (PDE) and a weighting factor of 0.3 as follows:

For inpatients:

$$PDE_{(Inpatients)} = (\text{Inpatient days}) + (\text{outpatient visits} \times \text{weighting factor}); \text{ where the weighting factor is } 0.3$$

$$\text{Therefore, Unit cost}_{(Inpatients)} = \frac{(\text{Annual expenditure in a given level of health care})}{PDE_{(Inpatients)}}$$

For outpatients:

$$PDE_{(outpatients)} = (\text{outpatient visits}) + (\text{inpatient days} / \text{weighting factor}); \text{ where the weighting factor is } 3$$

$$\text{Therefore, Unit cost}_{(outpatients)} = \frac{(\text{Annual expenditure in a given level of health care})}{PDE_{(outpatients)}}$$

4.3.4 Estimation of annual HIV/AIDS expenditure at different levels of care for inpatients and outpatients

In estimating the annual HIV/AIDS expenditure at different levels of care for both inpatient and outpatients, the unit cost calculated in *Section 4.3.2* for each level of care, was multiplied by HIV/AIDS utilisation figures (i.e. inpatient visits and outpatient days)

CHAPTER 5: RESULTS

Chapter overview: This chapter provides an overview of study findings. Unit costs per inpatient day and per outpatient visit at different levels of the health care system are estimated. The chapter also outlines an estimate of HIV/AIDS expenditure per capita at levels of care and geographical locality.

5.1 Total NHA expenditure and HIV/AIDS expenditure at different levels of care and geographical locality

This section presents summary information on total health expenditure collected from Zambia's NHA report covering the period 1999-2002 and that on HIV/AIDS expenditure collected from the District Health Boards reports. It provides health expenditure figures for 2003, projected from the NHA report using the end of year inflation rate of 17.5% (MoH, Mid Term review report, 2004). The section also presents an aggregate of the NHA and HIV/AIDS expenditure by different levels of the health system together with some explanations of what is contained in the totals for each of them.

In order that we make comparisons with results of other studies conducted, all expenditure data were converted from the local currency (Zambian Kwacha) to the United States Dollars (US\$) using an exchange rate for 2003 of 1US\$ =ZMK4,800.

However, it cannot be guaranteed that these funds are spent solely on HIV-related activities. Therefore, it would be more accurate to consider that part of the “HIV/AIDS” expenditure spent on HIV-related activities, but there is no data on how much is spent.

Table 2 below presents data on trends of total NHA expenditure for the period 1999-2002 and the 2003 projected NHA figures at different levels of health care. The inflated NHA expenditure figures were added to the HIV/AIDS figures to get the overall health expenditure for 2003.

Table 2: Total NHA expenditure and HIV/AIDS expenditure by different levels of care, 2003						
Trends of total NHA expenditure (1999-2002) and 2003 projected NHA expenditure by different levels of health care, 1999-2003						
Year	First Level Hospitals		Second Level Hospitals		Third Level Hospitals	
	(ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)
1999	8,118	-	48,089	-	45,722	-
2000	18,600	-	57,698	-	87,381	-
2001	31,616	-	61,475	-	215,926	-
2002	38,319	-	91,570	-	267,284	-
2003*	45,025	9.3	107,595	22.4	314,059	65.4
Source: Zambia's NHA report for 1999-2002						
* These figures were projected using the 2003 end of year inflation rate of 17.5%						
HIV/AIDS expenditure by different levels of care, 2003						
Year	First Level Hospitals		Second Level Hospitals		Third Level Hospitals	
	(ZMK' millions)	(US\$' millions)	((ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)
2003	5,540	1.2	28,658	6.0	52,084	10.9
Source: CBoH, District Health Boards Financial Reports, 2003						
Grand Total of the Projected 2003 NHA expenditure and HIV/AIDS expenditure by different levels of care, 2003						
Grand Total Projected + HIV/AIDS expenditure	First Level Hospitals		Second Level Hospitals		Third Level Hospitals	
	(ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)
	50,564	10.5	136,253	28.4	366,143,	76.3

5.1.2 Total expenditure by levels of health care and provinces

In order that we have an idea about the variations within and across different levels of health care and geographical localities (provinces), total health expenditure by provinces and different levels of health care was collected. This information is presented in *Table 3*. Note that the total health expenditure presented is an aggregate of the projected NHA expenditure for 2003 and HIV/AIDS expenditure, for the same period under review.

Province	First Level Hospitals		Second Level Hospitals		Third Level Hospitals	
	(ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)	(ZMK' millions)	(US\$' millions)
Central	17,628	3.7	9,416	2.0	**	**
Copperbelt	595	0.1	17,832	3.7	67,982	14.2
Eastern	2,499	0.5	12,533	2.6	**	**
Luapula	1,145	0.2	15,813	3.3	**	**
Lusaka	*	*	*	*	298,161	62.1
Northern	12,419	2.6	20,893	4.4	**	**
North-Western	858	0.2	18,945	3.9	**	**
Southern	14,684	3.1	24,747	5.2	**	**
Western	737	0.2	16,073	3.3	**	**
Zambia	50,564	10.5	136,253	28.4	366,143	76.3

*Denotes that there are no First and Second Level hospitals in Lusaka province
 **Denotes that there are no Third Level Hospitals in the provinces indicated, hence no data collected

5.2 Utilisation data for outpatient visits and inpatient days at different levels of health care and geographical locality

5.2.1 Distribution of outpatient visits and inpatient days by different levels of care

Table 4 presents data on outpatient visits and inpatient days for all diseases, collected from the country's facility based Health Management Information System (HMIS). The table shows that three quarters of the outpatient visits to health facilities were at Third

Table 5: Calculation of outpatient visits per capita by provinces, all diseases, Zambia, 2003			
Province	Total Population*	Outpatient visits**	^yOutpatient visits per capita
Central	1,012,257	1,223,445	1.2
Copperbelt	1,581,221	2,220,218	1.4
Eastern	1,306,173	1,595,842	1.2
Luapula	775,353	827,149	1.1
Lusaka	1,391,329	2,289,494	1.6
Northern	1,258,696	1,053,295	0.8
North-Western	583,350	828,622	1.4
Southern	1,212,124	1,545,507	1.3
Western	765,088	1,028,164	1.3
Zambia	9,885,591	12,611,736	1.3
<i>*Source: CSO Census of Population and Housing, 2002</i>			
<i>**Source: HMIS database, 2003(also refer to Appendix I on page 88)</i>			
Basic formulas used to calculate outpatient visits per capita is as follows:			
${}^y\text{Outpatient visits per capita}_{(\text{outpatients})} = \frac{(\text{outpatient visits for a given province})}{\text{Total population of a given province}}$			

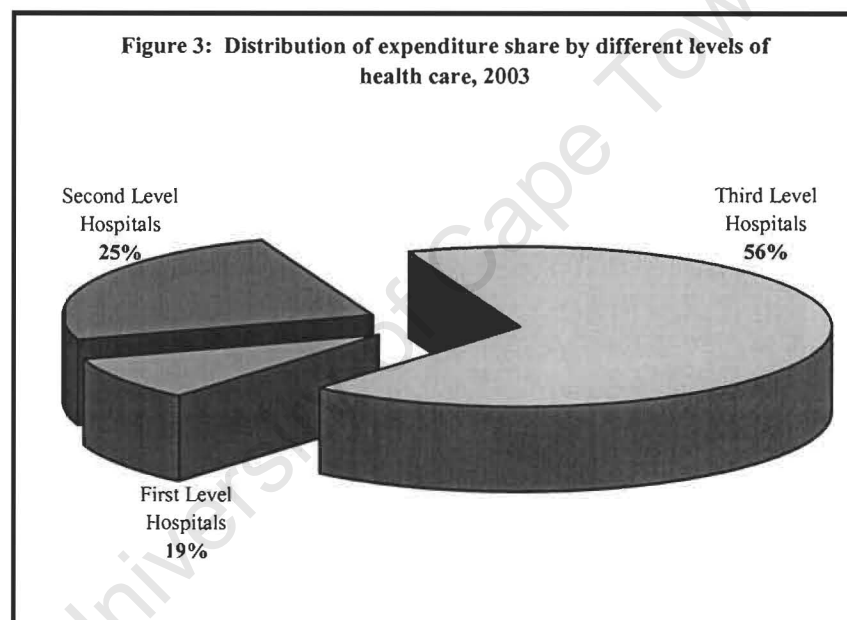
5.2.3 Calculation of inpatient day per capita by different provinces

Information on inpatient days and population size for each province was collected from the HMIS database and the 2002 Census of Population. Data on inpatient days and population size of each province were used to calculate inpatient days per capita for each province. This information is presented in *Table 6* below. The table shows that, unlike the outpatient visits which were higher for urban than rural provinces, inpatient days per capita were higher in rural than urban provinces.

This pattern of higher per capita inpatient days for hospitals in rural as opposed to urban provinces is mainly attributable to the longer length of stay at hospitals in the former. This could be attributable to the lower quality of care provided in rural facilities, implying that patients spend longer in hospital waiting to receive treatment, but also could be because patients have an incentive to remain in hospitals where they receive food and shelter.

5.2.4.3 Proportion of expenditure share by different levels of health care, 2003

Figure 3 illustrates differentials in health expenditure patterns according to different levels of health care. The figure shows that in 2003, the highest expenditure was spent at Third Level Hospitals, representing more than half of the total health expenditure, followed by Second Level Hospitals who spent a quarter of the total expenditure and the lowest expenditure was by First Level Hospitals who spent about one fifth of the expenditure.



Source: Author's illustration using data collected from the NHA report, 2003

5.3 Utilisation and expenditure data on HIV/AIDS at different levels of care and geographical locality

This section presents summary information on the distribution of HIV-positive people in each province. It also shows how the annual HIV/AIDS expenditure for *inpatients* and *outpatients* was estimated using the unit cost calculated in *sections 5.2.4.1* and *5.2.4.2* respectively.

5.3.1 Distribution of total population and HIV/AIDS population by provinces, 2003

Table 8 shows the distribution of the total population, population aged 14 to 49 years, and the HIV-positive population in the same age group. The Table shows that the national HIV prevalence in 2003 was 14.4% for people aged 14-49. Lusaka province had the highest HIV/AIDS prevalence in the country (20.7%) followed by Copperbelt (18.5%) and Southern province (16.2%). Rural provinces such as Central (14.8%), Eastern (13.2%), Western (12.6%), Luapula (10.6%), North-Western (8.6%) and Northern (8.0%) had the lowest prevalence.

Province	Total population	Population (in 14-49 year age group)	HIV/AIDS ⁺ population (in 14-49 year age group)	HIV prevalence (%) (in 14-49 year age group)
Central	1,012,257	582,900	87,435	14.8
Copperbelt	1,581,221	1,423,816	270,525	18.5
Eastern	1,306,173	629,115	81,785	13.2
Luapula	775,353	449,655	49,462	10.6
Lusaka	1,391,329	752,367	157,997	20.7
Northern	1,258,696	797,650	63,812	8.0
North-Western	583,350	32,078	27,587	8.6
Southern	1,212,124	754,800	120,768	16.2
Western	765,088	448,823	58,347	12.6
Zambia	9,885,591	6,555,129	917,718	14.4

Source: CSO, Epidemiological Projections, 2003-2010

5.3.2.2 Estimation of total annual HIV/AIDS expenditure by different levels of care (outpatients)

Information on the estimation of HIV/AIDS expenditure for *outpatients* by different levels of health care is presented in *Table 9b*. The Table shows that out of the total estimated US\$314,073 expenditure on HIV/AIDS for *outpatients*, the highest estimated expenditure was spent on Third Level Hospitals (64%) followed by that for Second Level Hospitals (25%) and the lowest being the First Level Hospitals (11%).

Table 9b: Using the unit cost to estimate total annual HIV/AIDS expenditure by different levels of health care, 2003 (outpatients)				
Different levels of health care system	*NHA Unit cost _(outpatients)	**HIV/AIDS utilisation figures (outpatients)	Y Total estimated HIV/AIDS expenditure _(outpatients) (in US\$)	
			Total estimated HIV/AIDS expenditure (in US\$)	Percent (%)
First Level Hospitals	4.10	8,228	33,734	11.0
Second Level Hospitals	6.33	12,650	80,075	25.0
Third Level Hospitals	13.12	15,264	200,264	64.0
Total for all hospitals per year (outpatients)		36,142	314,073	100.0
* Source: Adapted from Table 7b (column 7)				
** Source: HMIS database, 2003 (also refer to Appendix I on page 88)				
Basic formulas used to calculate Total estimated annual HIV/AIDS expenditure _(outpatients) :				
Y Total estimated annual HIV/AIDS expenditure _(outpatients) = Unit cost _(outpatients) X HIV/AIDS utilisation figures _(outpatients)				

5.4 Estimation of HIV/AIDS expenditure per capita for the total population and HIV/AIDS positive population by province

This section illustrates how HIV/AIDS expenditure per capita for *inpatients* and *outpatients* for the total population and also the HIV positive population by provinces was calculated. This information is presented in *Tables 10a* and *10b*.

5.4.2 Estimation of HIV/AIDS expenditure per capita for the total population and HIV positive population (outpatients)

Table 10b illustrates how HIV/AIDS expenditure per capita for the total population and HIV positive population by province was calculated. The Table shows a similar pattern of higher HIV/AIDS expenditure per capita for both the total population and HIV positive population in Lusaka Province as that reflected for inpatients in Table 10a.

Table 10b: Estimation of HIV/AIDS expenditure per capita for the total population and HIV positive population by provinces, Zambia, 2003 (outpatients)					
Province/ National	*Total Population	* HIV/AIDS* population (14-49 years group)	Estimated annual expenditure for HIV/AIDS patients in 2003 (outpatients)	^Y Expenditure per capita (outpatients) (HIV + population)	^Z Expenditure per capita (outpatients) (Total population)
Central	1,012,257	87,435	14,239	0.16	0.01
Copperbelt	1,581,221	270,525	49,091	0.18	0.03
Eastern	1,306,173	81,785	10,592	0.13	0.01
Luapula	775,353	49,462	12,564	0.25	0.02
Lusaka	1,391,329	157,997	154,388	0.98	0.11
Northern	1,258,696	63,812	20,949	0.33	0.02
North-Western	583,350	27,587	14,803	0.54	0.03
Southern	1,212,124	120,768	24,803	0.21	0.02
Western	765,088	58,347	12,600	0.22	0.02
Zambia	9,885,591	917,718	314,073	0.34	0.03

*Source: These figures were adapted from Table 8 Table 8 on page 57

Basic formulas used to calculate expenditure per capita (outpatients) for the total population:

^YExpenditure per capita (outpatients) for the HIV + population = $\frac{\text{Total estimated annual HIV/AIDS expenditure in 2003 (outpatients)}}{\text{HIV + population (14-49 years group)}}$

^ZExpenditure per capita (outpatients) for the total population = $\frac{\text{Total estimated annual HIV/AIDS expenditure in 2003 (outpatients)}}{\text{Total population}}$

5.5 Total number of projected AIDS deaths (14-49 year age group) by provinces, 2003-2005, both sexes, Zambia

Table 11 presents data on total projected number of HIV/AIDS deaths for the 14 to 49 year age group, from 2003-2005 (CSO Epidemiological Projections, 2003). The Table shows that, a higher proportion of deaths are in the Copperbelt province (30%) followed by Lusaka province (17%), during for the period 2003-2005.

5.5.2 Calculation of projected expenditure for 2004 by provinces, (inpatients)

According to the Central Statistical Office's Epidemiological Projections (CSO, 2003), the death rate of the Zambian HIV epidemic is set to peak in 2004 and 2005. Therefore, in order to meet future needs for care, we projected the expenditure requirements for 2004 on the assumption that the number of patients needing care in 2004 is equal to HIV/AIDS deaths in 2004 and 2005. The projected expenditure for 2004 was calculated by multiplying expenditure per capita for total projected deaths for the years (2003 + 2004) of each province by projected deaths for (2004 + 2005) of that particular province. Results of the projected expenditure by province (*inpatients*) for the year 2004 are presented in the last column of *Table 12b* presents.

Table 12b: Projected expenditure for 2004, by provinces, both sexes, Zambia (inpatients)			
Province/ National	*Expenditure per capita (<i>inpatients</i>) for total projected deaths (2003+2004)	**Total projected deaths (2004 +2005)	^ZProjected expenditure for HIV/AIDS in 2004 (<i>inpatients</i>) (in US\$)
Central	1.4	17,146	24,004
Copperbelt	1.4	55,162	77,227
Eastern	0.9	18,933	17,040
Luapula	2.0	10,126	20,252
Lusaka	7.7	32,843	252,891
Northern	2.8	12,521	35,059
North-Western	4.5	5,476	24,642
Southern	1.6	25,102	40,163
Western	1.8	11,734	21,121
Zambia	2.7	189,043	510,416
<i>*Source: Adapted from Table 12a (column 4)</i>			
<i>**Source: Adapted from Table 11 (column 6)</i>			
Basic formulas used to calculate projected expenditure for HIV/AIDS in 2004:			
$\text{ZProjected 2004 expenditure}_{(inpatients)} = \text{Expenditure per capita}_{(inpatients)} \text{ for the total projected deaths for the years (2003 + 2004)} \times \text{Total projected deaths for (2004 + 2005)}$			

5.5.6 Comparison of estimated annual expenditure for HIV/AIDS patients in 2003 and projected expenditure for 2004 (outpatients)

Table 13c compares estimated annual *outpatient* expenditure for HIV/AIDS patients in 2003 and the 2004 projected expenditure. The expenditure figures presented in Table 13c below were adapted from Table 13a (column 1) and Table 13b (column 4). The Table shows a similar pattern of an increase in expenditure for HIV/AIDS patients over the past two years. Expenditure for *outpatients* increased from US\$314,073 in 2003 to US\$321,373 in 2004.

Table 13c: Comparison of estimated annual expenditure for HIV/AIDS patients in 2003 and projected expenditure for 2004 (outpatients)		
Province/ National	*Estimated annual expenditure for HIV/AIDS patients in 2003 _(outpatients) (in US\$)	**Projected expenditure for HIV/AIDS patients in 2004 _(outpatients) (in US\$)
Central	14,239	15,431
Copperbelt	49,091	49,646
Eastern	10,592	11,360
Luapula	12,564	13,164
Lusaka	154,388	157,646
Northern	20,949	22,538
North-Western	14,803	15,333
Southern	24,803	25,102
Western	12,600	12,907
Zambia	314,073	321,373
*Source: Table 13a (column 2)		
**Source: Table 13b (column 4)		

CHAPTER 6: DISCUSSIONS OF KEY SELECTED INDICATORS

Chapter overview: This chapter discusses results of key selected indicators. The indicators include expenditure on HIV/AIDS for *outpatients* and *inpatients*, expenditure per capita for *outpatient visits* and *inpatient days*. These indicators are discussed according to their geographical distribution and at different levels of health care. *Section 6.1* outlines utilisation statistics on *outpatient visits* and *inpatient days* compared according to their geographical distribution. *Section 6.2* on the other hand, compares them by different levels of health care. *Section 6.3* compares selected findings for this study and for other studies reviewed.

6.1 Summary findings compared by different provinces

Table 14 presents information on the utilisation of *outpatient visits* and *inpatient days* compared according to their geographical distribution. The Table shows that geographical inequalities exist in the distribution of resources among provinces.

A look at the comparison between total projected number of deaths and expenditure by different provinces reveals that some provinces had relatively small numbers of projected AIDS deaths and yet had relatively large amount of resources. For example, Lusaka province with total projected AIDS deaths of 31,871 in 2003 and 2004 combined, had an estimated expenditure of US\$244,221 and US\$154,388 on inpatients and outpatients respectively, whereas the Copperbelt province with total projected AIDS deaths of 55,131 during the same period, had an estimated expenditure of US\$77,656 and

Hospitals tend to be well equipped with medical supplies and have more qualified personnel such as medical doctors compared to the other provincial and district hospitals. Therefore, you would expect demand for health care to be higher at these hospitals. As Alderman and Lavy (1996) note, demand for health care is sensitive to the quality of services provided, implying that factors such as drug availability, staff skills and the general quality of health services provided at a given health facility might have an impact on the client's demand for health care.

The other reason is that health facilities tend to be more accessible in the urban provinces in comparison with the rural provinces in terms of the distance that individuals need to travel to access the facility. High prevalence rates in urban settings could also account in some way to higher utilisation of health facilities.

6.2 Summary findings compared at different levels of health care

Table 15 presents data on utilisation of *outpatient visits* and *inpatients days* and estimated expenditure at different levels of health care. The Table shows a higher utilisation of health facilities at Third Level Hospitals than Second and First Level Hospitals.

Level s of care	IP days	OPD visits	Total estimated annual expend. on HIV/AIDS in US\$ (inpatients)	Total estimated annual expend. on HIV/AIDS in US\$ (Outpatients)
First Level Hospitals	113,598	2,522,347	39,952	33,734
Second Level Hospitals	227,195	4,414,108	101,970	80,075
Third Level Hospitals	416,525	5,675,281	354,898	200,264
Total	757,318	12,611,736	496,820	314,073

Fourthly, various factors may impact on the cost per PDE for higher level hospitals and these include possible mix in diagnoses of patients and case severity; variations in quality of service and mix between outpatient and inpatient services supplied. In addition under-utilisation of health services reflected in lower levels of health care might be an indication of poor services provided. Therefore, there is need to improve the general health services such as medical supplies and drugs and more qualified medical personnel at lower levels of health care.

6.3 Comparison of selected findings for this study and for other studies reviewed

A comparison of results on certain indicators for this study and other studies reviewed (i.e. those under the Chapter on literature review), yielded almost the same results. For example, results of HIV/AIDS expenditure per capita on HIV positive population for this study was US\$0.54 and that for a study conducted by Izazola *et al* (2002) in Guatemala on the same indicator was US\$1.08. However, the indicator compared was not exactly the same for the two countries due to differences in expenditures relative to the number of HIV positive people. In the case of Zambia whose utilisation data only cover public health institutions, data on outpatient visits are under reported since private health facilities are excluded.

Results of annual outpatient visits per capita for the total population for this study was 1.3 and that for a study conducted by Nandakumar *et al* (2001) in Rwanda on the same indicator was 0.29. As explained above, this difference could be due to differences in the completeness of utilisations figures used for the respective countries.

- **Probabilistic Sensitivity Analysis:** This type of sensitivity analysis allows the analyst to assign ranges and distributions to uncertain variable with an evaluation.

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Table 17b: Performing a Simple Sensitivity Analysis using the unit cost (per inpatients) at difference levels of health care, all diseases, Zambia, 2003							
Different levels of health care	OPD Visits*	IPD Days*	Weighting Factor	^Y PDE _(outpatients)	Expenditure (in US\$)**	^Z Unit cost _(outpatients) (in US\$)	Ranking
FLHs	2,270,112	102,238	3	783,272	10.5	13.4	1
SLHs	3,972,697	204,476	3	1,396,285	28.4	20.3	2
TLHs	5,107,753	374,873	3	1,907,198	76.3	40.0	3

Assuming 10% of the patients seen by private and mission hospitals are excluded from each of the three levels of care (i.e. hospitals)

Source:
 *Table 16 (Column 3, Page 74)
 **Table 16 (Column 5, Page 74)

Basic formulas used in Table 17b above:

$${}^Y\text{PDE}_{(\text{outpatients})} = (\text{IP days} / \text{weighting factor}) + (\text{OPD visits}); \text{ where the weighting factor is } .3$$

$${}^Z\text{Unit cost}_{(\text{outpatients})} = \frac{(\text{Annual Expenditure in a given level of health care})}{\text{PDE}_{(\text{outpatients})}}$$

6.5 Conclusion

In conclusion, the observed disparities in expenditure per capita and utilisation of health services among provinces and different levels of health care have shown that health care supply tends to fuel further demands. In other words, as more resources are allocated to hospitals in urban provinces and less to hospitals in rural provinces, more patients tend to bypass the latter and attend the former. This scenario creates a vicious circle and existing disparities in the utilisation of health services widen. Therefore, concerned health authorities need to take measures aimed at strengthening the referral system within the Zambian health sector.

The study results have also shown that the cost per inpatient day and outpatient visit was significantly higher at Third Level Hospitals compared to the Second and/or First Level Hospitals. Results of the study are consistent with findings of other studies that show that the cost per inpatient day for hospitals at the tertiary level are significantly higher than those providing lower levels of care. However, the higher utilisation of services at Third Level Hospitals points to *allocative inefficiency* in resource allocation. Therefore, policymakers should focus on improving the quality of services at the lower levels of care in order to shift utilisation away from the more expensive facilities.

The study has also projected the likely expenditure required to provide a given level of care to AIDS sick patients in coming years. Because the death rate associated with the Zambian HIV/AIDS epidemic will peak over the next three years, these projections show the additional expenditure that would be required to cater for these patients at the current level of care and at current expenditure levels.

The study recommends that expenditure per capita for the AIDS sick population is a better indicator of need than expenditure per capita for the HIV-positive population. The concept of need for health care is generally related to '*ill-health*'. Williams (1962) and Gillon (1986), both suggest that persons who are more ill than others have greater need. Therefore, it is against this background that we consider expenditure per capita for AIDS sick population a better indicator of need than HIV prevalence, since people who are sick are more in need of resources than those who are merely HIV positive but not yet sick. In addition, the observed disparities among provinces on the distribution of expenditure per capita for AIDS sick patients points to inequitable access to services, and this should call

for the need to use the indicator to reallocate resources with the view to promoting equitable access to services for HIV-positive people.

The study results have indicated that the expected increase (though the increase was not that large) in expenditure required to maintain the current level of access and quality of care provided to HIV/AIDS patients underscores the need for more concerted efforts by government, civil society and the general public in responding to the disease.

In response to the rising costs of providing care to PLWHA, in 2003, government allocated US\$3million from the national budget to purchase antiretroviral drugs. The same amount was committed to scaling up antiretroviral therapy in both 2004 and 2005 (WHO, 2004). During the same period (i.e. 2003), the Global Fund to Fight AIDS, Tuberculosis and Malaria (2005) granted Zambia US\$122 million to cover the first two years (i.e. 2003-2005). Out of this amount, US\$69 million was meant for the following HIV services:

- Provision of ARVs to at least 10,000 HIV positive people;
- Increasing the regular use of condom of 15-49 year-olds to 40% by the year 2005;
- Decreasing the percentage of HIV-positive mothers infected with HIV to 25% by the year 2005.

In addition, government encourages the development of home-based care programs at all levels of health care. However, these programs are still more predominant in urban areas and district hospitals than rural areas (MoH/CBoH, 2003).

7.2.1 Exclusion of data sources from the private sector, health posts and health centres

Expenditure and utilisation data used in this report covered only public healthcare services, which included first, second and third level hospitals. Health posts and health centres were excluded from the analysis because of the non-curative services offered and scanty data on expenditure for these levels of care. Therefore, estimates of expenditure per capita on HIV/AIDS and overall utilisation of health facilities provided might not be a reflection of total expenditure on HIV-related care in the country.

7.2.2 General problem with aggregated expenditure data

One of the limitations of expenditure data collected for this study was that it was not possible to present expenditure data disaggregated into commodities and products (drugs and other medical supplies), or human resources. Because of institutional constraints, health facilities in Zambia do not need to report their expenditure by line items to the Central Board of Health. Furthermore, it has not been possible to disaggregate expenditure data into service delivery and programme level expenditure, where the former would relate to expenditure spent on facilities and the latter would relate to resources for the running of the Ministry of Health, Central Board of Health, district health offices and resources for centrally coordinated programmes such as health education campaigns. In other words, the unit cost estimates include resources that would normally not be allocated to patient services in cost analyses. While this implies that our unit costs are an overestimate, on the other hand it is important to include programme level costs because they can be substantial in magnitude.

7.2.3 Problem with ‘suspected and confirmed’ cases of HIV/AIDS.

The HMIS data has limitations in that HIV utilisation includes the utilisation of services by patients who are confirmed HIV-positive through HIV testing and who are ‘*suspected*’ of being HIV-positive through clinical symptoms. ‘*Suspected*’ HIV/AIDS figures are collected using HIV/AIDS clinical case definition guidelines and these are available at all health facilities with no laboratories. Confirmed HIV/AIDS cases on the other hand, are confirmed through HIV tests.

7.2.4 Summary

Despite some of the above mentioned limitations on completeness and consistency of both utilisation and expenditure data in Zambia, estimated figures do nevertheless assist program managers in coming up with likely indication of how much is, for example, spent on HIV/AIDS patients.

7.3 Recommendations

The study has shown that costs per inpatient day were increasingly expensive at Third Level Hospitals compared with Second and First Level Hospitals. Therefore, it is recommended that, patients be treated as much as possible at the First and Second Level Hospitals and that only complicated cases should be sent to Third Level Hospitals. In short the referral system needs to be strengthened to avoid overcrowding of patients at Third Level Hospitals. There is need for policy makers within Zambian health sector to ensure that lower level health facilities are equipped with laboratory services.

The study concentrated on the distribution of expenditure per capita by provinces without focusing on district differentials as well. Districts in the same province tend to have different characteristics such as differences in disease burden, population size, number of health facilities, to mention but a few. Therefore, it is recommended that a similar study should be conducted to investigate distribution of expenditure per capita between districts.

The study findings have also shown that some provinces with relatively more resources have fewer numbers of total projected AIDS deaths. It is therefore recommended that more resources be allocated to provinces with relatively higher numbers of projected AIDS deaths.

This study was limited to the public health sector (i.e. first, second and third levels hospitals) and it would be important to carry out a similar study that should include privately owned institutions, health posts and health centres so as to have a complete picture of expenditure per capita for the whole country.

It is important to mention that the use of and potential institutionalization of this analysis is an invaluable aid in resource allocation for not only HIV-related care and treatment in particular but all diseases in general. If utilized appropriately, these analyses have the potential to encourage greater efficiency in the allocation of resources, as well as the development of more appropriate responses to the epidemic.

Finally, the role of politics in the Zambian health sector plays an important part in redirecting resources to provinces in need and also strengthening the overall referral

REFERENCES

- Alderman, H and Lavy, V. 1996. Household Responses to Public Health Services: cost and quality Tradeoffs. *The World Bank Research observer* Vol 11(1): 3-22.
- Babbie, E. 1997. *The Practice of Social Research*, 6th ed. Belmont Calif: Wadsworth.
- Barnet, C. Bhawalke, M. Nandakumar, A. K. and Scheinder, P. 2001. *The Application of the NHA Framework to HIV/AIDS in Rwanda*, Bethesda, MD: Abt associates.
- Barnum, H. and Kutzin, J. 1993. *Public Hospitals in Developing countries: Resource Use, Cost, Financing*, Baltimore, MD: Johns Hopkins University Press for the World Bank.
- Bautista, S. *et al* 2002. *Costing Public Sector HIV/AIDS Treatment in Mexico*, The Partners for Health Reformplus, Abt Associates Inc: Bethesda, MD.
- Bertozi, S. Gutierrez, J. P. Opuni, M. Walker, N. Schwartlander, B. 2004. *Estimating resource needs for HIV/AIDS health care services in low-income and middle-income countries*, [Online], Available: <http://www.sciencedirect.com/science?> (2005, April 30).
- Briggs, A., Sculpher, M., and Buxton, M., 2004. *Economic Evaluation: The Role of Sensitivity Analysis, Health Economics, Vol. 3: 95-104*
- Central Board of Health, 2000. *HMIS Technical Review Meeting Report*, Lusaka, Zambia.
- Central Board of Health, 2003. *Health Institutions in Zambia*, Lusaka Zambia.
- Central Board of Health *et al*, 2003. *Costing Second Level Basic Health Care Package in Zambia*, Lusaka Zambia.
- Central Board of Health *et al*, 2004. *Scaling –up antiretroviral therapy for HIV/AIDS in Zambia-The National Implementation Plan 2004-2005*, Lusaka Zambia.

Central Statistical Office (CSO), 2000). *Census of Population and Housing*, [Online], Available: <http://www.zamstats.gov.zm/census/census.asp> (2004, August 23).

Central Statistical Office (CSO), 2003. *Epidemiological Projections 2003-2010*, Lusaka, Zambia.

Central Statistical Office (CSO), 2003. *The 2001/2002 Zambia Demographic and Health Survey*, [Online], Available: <http://www.measuredhs.com/hivdata/surveys> (2004, August 23).

Chuma, J. 2001. Resource Allocation in the Kenyan Health Sector: A question of Equity. A Research project submitted in partial fulfilment of the requirement of the degree of Masters in Social Sciences (Health Economics) University of Cape Town, South Africa (unpublished).

Church, M. and Simwanza, A. 2000. *Establishment of Information Culture: Achievements and Challenges in Zambia*, Lusaka, Zambia.

Cleary, S. 2004. *Health Service Burden of HIV in two Districts in the Public Health System: Methodological Report*", Submitted to the JEAPP in accordance with Grant No.JEAAPP-AUS-2, Health Economics Unit, Cape Town.

Cleary, S. Boulle, A. McIntyre, D. and Coetzee, D. 2004. *Cost-effectiveness of anti-retroviral treatment for HIV-positive adults in a South African township*, Health Economics Unit, Infectious Disease Epidemiology Unit, School of Public Health and Family Medicine, University of Cape Town, South Africa.

Drummond, M. F. O' Brien, B. *et al*, 1997. *Methods for the Economic Evaluation of Health Care Programs*, Oxford University Press.

Flessa, S. and Dung, T. 2003. *Costing of services of Vietnamese hospitals: Identifying costs in one Central, two provincial and two district hospitals using a standard methodology*, [Online], Available: <http://www3.interscience.wiley.com/cgi-bin/abstract/107615494/> (2005, April, 18).

Kumaranayake, L. and Watts, C. 2001. *Costs of scaling up priority health interventions in Low-Income and selected Middle-Income countries: Methodology and Estimates*, CMH working paper series.

Loewenson, R and Whiteside, R, 1997. *Social and Economic Issues of HIV/AIDS in Southern Africa (SAfAIDS): A Consultancy Report Prepared for SAfAIDS*, Harare, Zimbabwe.

Ministry of Finance and National Planning (MoFNP), 2002. *Zambia Poverty Reduction Strategy Paper, 2002-2004 Ministry of Health*, Planning Department, Lusaka, Zambia.

Ministry of Health/Central Board of Health (CBoH), 1999. *HIV/AIDS in Zambia: Background Projections Impacts and Interventions*, Lusaka, Zambia.

Ministry of Health/Central Board of Health (CBoH), 2003. *National Health Strategic Plan (NHSP)*, Lusaka, Zambia.

Ministry of Health/Central Board of Health (CBoH), 2004. *Mid Term Review Report*, Lusaka, Zambia.

Mujinja, P.G. 1996. Service provision in district designated and district hospitals in Tanzania: A Research report. Muhimbili University College of Health sciences, Institute of Public Health, Dar-es-salaam (unpublished).

Nandakumar, A. K. Scheneider, P. and Bhawalker, M. 2001. *Use of and Expenditure on Outpatient Health Care by a Group of HIV positive individuals in Rwanda*, PHRplus, Abt associates INC, Bethesda, Maryland.

Opuni, M. and Bertozzi, S. 2003., *Financing HIV/AIDS Prevention and Care in Low and Middle-Income Countries* [Online], Available:
<http://hivinsite.ucsf.edu/InSite?page=pa-rr-03> [2005, April 18].

Partners for Health Reformplus (PHRplus), 2004. *Methodological Guidelines for conducting a National Health Accounts Sub-analysis for HIV/AIDS*, [Online], Available: http://www.phrplus.org/Pubs/Tech044_fin.pdf [2004, Aug.17].

Partners for Health Reformplus (PHRplus), 2004. *Using National Health Accounts to Examine HIV/AIDS and TB Expenditure in Africa*, Abt Inc, Bethesda, MD.

Thomas, S. et al, 2000. *Public Sector Report, National Health Accounts project*, [Online], Available: http://www.heu.uct.ac.za/stephen_3_2.pdf [2004, Sept.17].

UNAIDS/WHO, 1999. *AIDS epidemic update*. Joint United Nations Programme on HIV/AIDS, World Health Organisation (WHO), Geneva.

Wamukuo, J. and Ntutela, P. 2002. *Estimating the cost of district hospital services* Nelson Mandela School of Medicine, University of Natal, South Africa.

Williams A. 1962. *The idea of equality*, in: P.Lashett and W.G. Runcinman, eds. *Philosophy, politics and society*, Basil Blackwell, Oxford.

World Bank, 1997. *Confronting AIDS: Public priorities in a global epidemic*, New York: Oxford University Press for the World Bank.

World Health Organisation. 2004. *Summary Country Profile for HIV/AIDS Scale-Up:Zambia*, [Online], Available: <http://www.who.int/3by5/en/Zambia.pdf> [2005, March.1].

APPENDICES

Appendix I: Inpatient days and outpatient visits for all diseases, Zambia, 2003

Disease name	Inpatient days			Outpatient visits		
	Under 5	Over 5	Total	Under 5	Over 5	Total
Malaria	170,192	123,978	294,169	2,654,063	1,993,707	4,647,770
Respiratory infection: non-pneumonia	21,041	18,077	39,117	1,069,826	881,327	1,951,153
Diarrhoea: non-bloody	23,894	20,469	44,362	594,187	302,582	896,769
Respiratory infection: pneumonia	44,165	33,565	77,730	342,841	207,722	550,563
Trauma: accidents, injuries, wounds, burns	7,226	31,563	38,789	125,573	366,191	491,764
Eye Infections	2,507	1,128	3,635	346,108	136,874	482,982
Skin infections	3,670	6,599	10,269	207,120	203,035	410,155
Other diagnoses	6,563	20,515	27,078	98,113	251,905	350,018
Ear / Nose / Throat infections	1,525	1,824	3,349	129,434	141,886	271,320
Anaemia	22,096	10,971	33,067	133,396	100,136	233,532
Intestinal Worms	1,170	1,026	2,196	123,900	95,360	219,260
Digestive system (not infectious)	1,871	8,306	10,177	52,714	157,515	210,229
Muscular skeletal & connective tissue (not trauma)	837	5,801	6,638	14,171	171,923	186,094
Sexually transmitted diseases	447	2,569	3,016	2,923	175,476	178,399
Dental diseases	246	1,420	1,666	8,911	156,718	165,629
Skin Diseases (not infectious)	665	1,650	2,315	72,042	85,142	157,184
Tuberculosis (suspected & confirmed cases)	2,575	25,382	27,957	10,737	103,208	113,945
Cardio-vascular diseases	309	9,445	9,754	771	108,838	109,609
Ear / nose / throat diseases (not infectious)	354	738	1,092	38,759	70,042	108,801
Eye diseases (not infectious)	920	2,111	3,031	37,579	64,279	101,858
Pulmonary diseases (non infectious)	1,261	2,796	4,057	22,939	68,843	91,782
Urinary tract infections (non-STD)	614	3,493	4,107	9,393	77,145	86,538
Diarrhoea: bloody (suspected dysentery)	1,103	2,709	3,812	31,964	43,345	75,309
Protein Energy Malnutrition (PEM)	10,095	1,349	11,444	59,528	9,943	69,471
Genital-Urinary Diseases (other than above)	664	4,522	5,186	6,191	50,611	56,802
Complications of pregnancy	*	19,051	19,051	*	50,424	50,424
Pelvic Inflammatory Disease	2	3,483	3,485	13	47,478	47,491
AIDS (suspected and confirmed cases)	4,899	15,561	20,460	2,218	33,924	36,142
Bilharzia (<i>schistosomiasis</i>)	114	433	547	4,576	40,172	44,748
Pyrexia of Unknown Origin (PUO)	606	559	1,165	16,389	19,455	35,844
Nervous system disorders: Other	208	819	1,027	1,432	26,429	27,861
Varicella	215	295	510	8,952	9,006	17,958
Measles	4,163	4,289	8,452	8,622	8,167	16,789
Complications of delivery	*	9,631	9,631	*	14,311	14,311
Nervous system disorders: Epilepsy	185	807	992	1,398	12,381	13,779
Mental disorders	62	2,011	2,073	477	12,340	12,817
Other nutritional disorders	478	542	1,020	7,043	5,696	12,739

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-----Inpatient days and outpatient visits for all diseases, Zambia, 2003-----						
Disease name	Inpatient days			Outpatient visits		
	Under 5	Over 5	Total	Under 5	Over 5	Total
Poisoning	483	2,706	3,189	2,109	9,961	12,070
Any perinatal conditions	7,158	*	7,158	10,708	*	10,708
All other communicable diseases (total)	291	322	613	3,798	4,817	8,615
Neoplasm (all types)	101	3,003	3,104	366	8,132	8,498
Mumps	16	16	32	2,873	3,618	6,491
Meningitis	957	3,169	4,126	1,076	3,550	4,626
Substance abuse	70	820	890	518	3,940	4,458
Scabies	20	152	172	1,630	1,769	3,399
Leprosy (Suspected and confirmed cases)	*	113	113	*	1,863	1,863
Diarrhoea with severe dehydration (suspected cholera)	156	741	897	343	985	1,328
Hepatitis	27	222	249	139	407	546
Whooping Cough (pertussis)	47	16	63	293	98	391
Anthrax	18	61	79	71	270	341
Sleeping Sickness - <i>trypanosomiasis</i>	*	2	2	103	116	219
Typhoid fever	8	33	41	13	90	103
Acute Flaccid Paralysis	28	20	48	47	31	78
Rabies	19	34	53	19	34	53
Neonatal Tetanus	26	*	26	39	0	39
Diphtheria	8	9	17	17	14	31
Tetanus (non neonatal)	13	7	20	18	12	30
<i>Onchocerciasis</i>	*	*	*	3	4	7
Trachoma	*	*	*	*	3	3
Plague	*	*	*	*	*	*
Total for all diseases	346,387	410,932	757,318	6,268,486	6,343,250	12,611,736

Source: CBoH, HMIS database, 2003

**Data not available*

Appendix II: Projected number of annual AIDS deaths (14-49 year age group by Province, both Sexes, Zambia)								
Province	Year							
	2003	2004	2005	2006	2007	2008	2009	2010
Central	7,877	8,399	8,747	8,978	9,098	9,133	9,097	9,016
Copperbelt	27,704	27,609	27,553	27,477	27,405	27,275	27,094	26,799
Eastern	8,818	9,319	9,614	9,730	9,719	9,627	9,481	9,338
Luapula	4,761	4,995	5,131	5,204	5,232	5,234	5,224	5,209
Lusaka	15,597	16,274	16,569	16,617	16,468	16,211	15,849	15,429
Northern	5,712	6,103	6,418	6,657	6,807	6,901	6,949	6,958
North-Western	2,522	2,684	2,792	2,856	2,887	2,892	2,880	2,859
Southern	12,143	12,524	12,578	12,586	12,574	12,541	12,485	12,403
Western	5,438	5,763	5,971	6,097	6,150	6,150	6,109	6,044
Zambia	90,571	93,670	95,373	96,202	96,340	95,964	95,168	94,055

Source: CSO Epidemiological Projections, 2003.