MONITORING RESOURCE ALLOCATION AT THE DISTRICT LEVEL IN UGANDA: IMPLICATIONS AND CHALLENGES

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Declaration

I **Kamoga Edward Nelson,** declare that the material I have written, with the supervision of the Health Economics Unit of the School of Public Health and Primary Health Care at the University of Cape Town, in my mini-dissertation entitled "Monitoring Resource Allocation at the District Level in Uganda: Implications and Challenges", in partial fulfilment of a Masters in Public Health (Health Economics) awarded by the University of Cape Town, is my own. Where this is not the case acknowledgement has been done in the form of quoting and or referencing of the original source.

Kamoga Edward Nelson.

Signed by candidate

Signature... Date 30th Apr / 2004

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ACRONYMS

DI	Deprivation Index
DISH	Delivery of Improved Services for Health
GNP	Gross National Product
HC II	Health Centre II
HCIII	Health Centre III
HC IV	Health Centre IV
HSD	Health Sub-District
MOH	Ministry of Health
MOF	Ministry of Finance
NHS	National Health Services
PEAP	Poverty Eradication Action Plan
PCA	Principal Component Analysis
PHC	Primary Health Care
UK	United Kingdom

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DEDICATION

This mini-dissertation is dedicated to my grand mother Naome Nantale.

EXECUTIVE SUMMARY

Like most developing countries, Uganda works on a very tight health budget and the government has to ensure strict principles of efficiency and equity in the allocation and use of the minimal resources. One of the strategies in the process of improving delivery of public services has been to decentralise them. The district local government is responsible for the planning process, data management, resource allocation and co-ordination with the central government. However the capacity of the districts to stick to the principles of efficiency and equity is not a given.

In Uganda, the health system has been further devolved with the creation of health sub-districts. Because there are no clear guidelines from both local and central governments on how to ensure equity in resource allocation at the district level there have been arguments that resources from the centre to the district are not necessarily equitably allocated at the sub-district. The principle of equity that would seem of relevance in this case is that of providing resources to those in most need (most deprived) given the minimal resources available.

This study was done to assess how health resources are allocated between sub-districts relative to the level of need/deprivation in each sub district and in the process suggest a resource allocation formula for the district. Using mainly data from a rapid household hold survey and simple additive averaging to aggregate variables to create a deprivation index, the study showed that three sub-districts in Luwero district differed in the level of deprivation and the most deprived sub-district was actually under-resourced. The study therefore showed that there is room for using simple indices in a resource allocation formula at the district level so that budgets in the future are allocated to the most deprived areas hence maintaining the central government goal of ensuring equity in the use and allocation of minimal resources that are usually available.

CHAPTER 1

INTRODUCTION

1.1 Background

Policy makers in Uganda have been concerned that following devolution of public services, central government will lose the ability to deal with differences in socio-economic characteristics between populations (districts/sub-districts) when allocating resources since a greater proportion of public funds are transferred to district control (Hutchinson 2000). Similarly local government (district) leaders have been concerned that a district that has more "vocal" representatives at the central government will be able to bargain for more funds. Based on the 1996-1997 national household survey the central government has tried to ensure equity by allocating resources based on revenue generated by each district districts. Thus, districts with lower locally generated revenue would receive more resources including donor resources (Hutchinson 2000).

In the new decentralisation framework the district local government is responsible for the planning process, data management, resource allocation and co-ordination with the central government and other stakeholders. The district health manager is then responsible for allocating all resources (including conditional grants and donor funds) to different cost centres within the district. This process of intra-district allocation has become as controversial as the central government allocations following further decentralisation of districts into health sub-districts (HSD) in 1998. The pressure now is on the local government and the district health office to allocate all the resources received efficiently and equitably to health sub-districts. There is doubt that the local government and the district health office have the capacity to equitably allocate health

resources across the district. For this to be possible there has to be an accurate and unbiased health information system, which is often not the case. Thus whereas the central government has tried to allocate health resources equitably, there is no obvious framework for equitable and resource allocation within the districts.

Detailed and accurate information on the factors that influence need for health care is critical to ministries of health at both the central and local governments levels in order to develop informed health policies and a framework that monitors the implementation and effects of any policy changes. The ability of the districts to fulfil the obligations of the health policy require that they also monitor the resource allocation processes involved in providing health care at the sub-district levels. Districts would also have the opportunity to compare and contrast themselves with other districts and sub-districts and thus contribute to an environment of transparency and peer-review eliminating controversy in the healthcare resource allocation process between district and sub-districts. But probably most important is that districts have to ensure that the reallocation of resources to the sub-districts is equitable and efficient.

The goal of this study therefore is to assess equity in the allocation of health resources at the sub district level in one district with the purpose of developing a resource allocation formula that can be adapted by districts in the hope of improving equity in resource allocation within sub districts. Thus, the research question(s) for the study were the following:

i. What are the socio-economic and health status characteristics of the sub districts?
ii. How are health resources allocated in the sub districts in the district?

iii. Given the level of need at sub district level, is there equity in resource allocation?

iv. How could resource be allocated equitably at the sub district?

1.2 Aims and objectives

The goal of the research was to assess equity in the allocation of resources in a district based on the characteristics of need of each sub-district within the district. Based on the characteristics of need a resource allocation formula would be derived to estimate the equitable target share of resource allocation or expenditure by each sub-district. The specific objectives therefore included:

i. Collecting data on socioeconomic characteristics and health status of sub-districts.

ii. Develop an index of need or deprivation from the health status and socioeconomic characteristics of sub-districts.

iii. Interview key informants about method(s) of resource allocation at the sub-district level

iv. Collect and analyze available data on resources allocated and used at the sub district for the 1999 fiscal year.

v. Based on the index of need or deprivation, compare resource allocation at the sub district level

vi. Make recommendations about use of a resource allocation formula at the district level.

1.3 Justification

A needs-based formula of resource allocation at the district level will ensure that even after further devolution of the health system, resources are equitably allocated. The

health managers will be confident about how the resources are allocated at the lowest level knowing that the process is based on a scientific measure of deprivation or need for health care resources in the geographic areas (sub district) in question. They will also be able to inform the district executive committee about any changes in the level of deprivation or need and therefore reallocate resources accordingly. Additionally, the formulae will act as a base line from which a new resource allocation formula can be derived as the priorities of health service delivery change and as other drivers of need are identified for inclusion in the resource allocation formula. This is also in line with Uganda's national poverty eradication plan that emphasizes improving the quality of life of the most disadvantaged (Poverty Eradication Action Plan 2001).

1.4 Country context

1.4.1 Political and administrative system

Uganda is a landlocked country, bordered by Sudan to the North, Democratic Republic of Congo to the west, Rwanda and Tanzania to the South, and Kenya to the East. Lying astride the equator between latitudes 4deg.0' North and 1deg.30' South of the equator, and longitudes 30deg.0' East and 35deg.0' East of Greenwich, covering an area of 242,554 km^2.

At the time of its independence from Britain in 1962, Uganda was an emerging success story with rapid agricultural growth, a developing industrial sector, and growing intellectual and cultural leadership. However, progress was reversed when political instability was followed by a coup led by Idi Amin in January 1971, and turbulence continued after Mr. Amin was overthrown in 1979.

The political turmoil in Uganda between 1970-1986 saw a significant disintegration of the public and private sectors. The National Resistance Movement (NRM) led by the current president Yoweri Museveni assumed power in 1986, inheriting one of the poorest economies in the world. The education and health systems had all collapsed and real gross domestic product (GDP) per capita was 42 percent below its level in 1970 (McCrae et al 1996). Since 1987 the new government has been engaged in a process of putting the public sector back on track through a number of public sector reforms. One of the most fundamental reforms has been decentralization. A new constitution in 1995 and a local government act in 1997 have created a decentralised political system. The country is divided into 45 districts each with a local government and a population ranging from 200,000 to 1,000,000 people. Each district is responsible for planning and managing all its public services while the central government ensures policy formulation, regulation, quality control and technical support for the districts.

1.4.2 Organisation of Health Sector

The restructuring process has seen the decentralisation of responsibilities in the health sector within the overall public sector decentralization framework. Thus the Health system has also been further decentralised with planning and management of health services taking place at the districts and lower still at the sub-districts (Ministry of Health 1998). The district health system (devolution) introduced in 1998 left the ministry of health with the roles of policy formulation, quality assurance, resource, capacity development, technical support, provision of nationally coordinated services and coordination of health research. The local governments (district health authorities) on the

other hand are now responsible for the planning, budgeting and allocation and raising of some revenue.

Under the new reforms the ministry of health has undergone organisational restructuring that will enable it to focus on its new role. Two directorates and five departments have been established. These are the Directorate of Planning and Development and the Directorate of Community and Clinical services. Departments under the Directorate of planning and development are Health planning (Planning division, Human resource development, Health information) and Quality Assurance. Under the directorate of Community and Clinical services are National disease control, Community services and clinical services. The government is also in the process of establishing autonomous bodies and institutions. These include National Chemotherapeutic Research institute, Uganda National Health Research Organisation among others. At the district level a District Health Committee (DHC) performs the legislative functions, planning, and policy making, supervision of lower level health committees and coordination of the health sector in the district. The DHC is assisted by the District Health Team (DHT) headed by the District Director of Health Services through provision of technical advice. This also includes supervision of health units and facilities, implementing plans and policies. The district health system has been further decentralised by the creation of the HSD based on a political constituency with the sub-county as the basic unit and is headed by a Deputy District Director of Health Services. The main purpose of creating the HSD is to improve community involvement in health care planning and delivery as well as improve access to a better quality of health care to the district community (Ministry of Health 1998). Beside Health centre IV each HSD should have other health facilities that have been categorised

into health centres I, II and III. Table 1 is a brief summary of the characteristics of the facilities in a HSD.

Table 1. Type of services provided by health facilities in a health sub-district

Type of facility	Minimum services provided	Staffing standards
Health Centre IV	• Supervision of Health centres I, II and III • Centralised data collection in sub-district • Simple surgery including Caesarean sections • Blood transfusion • All functions of Health centre III	1 Medical officer 2 Clinical officers 1 Registered Nurse 1 Registered Midwife 2 Enrolled Nurses 1 Enrolled midwife 1 Comprehensive nurse 1 Assistant Health educator 1 Accounts assistant 1 Records assistant 1 Lab technician
Health Centre III	• Simple surgery • Antenatal care • Treatment of common ailments • Immunisation (Static point) • Family planning (including IUCD implants) • Laboratory services • Minor dental care • Facility data collection • Some functions of Health centre II	1 Clinical officer 2 Enrolled Nurses 1 Enrolled midwife 1 Assistant Health visitor 1 Lab Assistant 1 Records assistant 1 Nurse Aide
Health centre II	• Immunisation (fixed and mobile) • Antenatal care • Health education • Family planning (simple methods) • Basic first aid • Facility data collection	1 Enrolled nurse
Health centre I	• Mobilisation of community • ±Immunisation • First aid	Community health workers

Community participation has been enabled by the creation of Sub-county, Village and Health Unit Management Committees. These committees are responsible for identifying the communities' health problems, mobilising communities and serving as a link between the community and the health providers.

1.4.3 Health status indicators

Following the military takeover in 1986, the health sector like the rest of the public sector has undergone fundamental change with improvement in health expenditure and infrastructure. Health spending has increased to approximately 7% of total government expenditure (Hutchinson 2000). Despite the political and administrative change health status indicators still remain very poor. Infant mortality rate is 97 per 1000. Maternal mortality rate is 506 per 100,000 (Hutchinson 2000). 75% of life years lost in Uganda are due to preventable conditions like childhood and maternal conditions (20.4%) and HIV (prevalence of 10%) (Ministry of Health 1999 - 2000). Life expectancy at birth is 42 years. Access to improved water sources also remains at a low 52%.

1.4.4 Uganda's economic situation

With a population of about 22 million, a GDP of US$ 6.2 billion in 2000 (World Development Indicators database, April 2002) and an estimated GDP per capita of US$ 1,400 (CIA World fact book, 2002), Uganda is one of the poorest countries in the world. Agriculture is the main source of revenue for the country contributing about 42.5% of GDP.

1.4.5 Financing of Uganda's Health Sector

Uganda is a low-income country and the current public health expenditure per capita remains at a low US$ 4.0, which cannot finance the essential health package of US$ 12 per capita as recommended by the World Bank/World Health Organisation (World Health Report 2000). Uganda's health funding is divided into two budgets namely a recurrent and development budgets. The recurrent budget at the district level includes salaries and lunch allowances for all public health facilities and health service administration and this budget is provided directly by the ministry of finance. The budget for non-wage health

activities is provided for through the unconditional block grant which allocations are determined by the district local government and the district health team. The ministry of health has also supplemented the unconditional block grant with a conditional grant to ensure primary health care service delivery. Other non-wage resources in the form of delegated funds are allocated to cater for district referral hospitals, NGO district hospitals, referral hospitals and health training schools (Table 2).

Table 2. District resource allocation from Ministry of Finance

Ministry of Finance Allocations to Districts for Health, 1997-98(Ushs. Millions)		
Item	**Average**	**%**
Delegated salaries	45,867	7.7
Medical workers lunch allowance	114,444	19.3
District Hospital services	143,267	24.1
Referral Hospitals	89,333	15.0
NGO hospitals	22,222	3.7
Training schools	34,289	5.8
Unconditional grants	106,913	18.0
Conditional grants primary health care	37,778	6.4
Total	**594,113**	**100**

(Source. Ministry of Finance 1998)

About 76% of funds allocated to health from the Ministry of Finance go to wages and allowances, hospitals and training institutions as shown in the table 2. The development budget mainly consists of capital expenditures and donor funded vertical projects although up to 40% of the latter budget is actually spent on recurrent expenditures. The development budget consists primarily of capital expenditures and donor-financed projects. Since 1992-1993 the development budget has been divided into Primary Health Care, Curative care, Technical assistance, Studies and other (Ministry of Planning and Economic Development 1996). It is worth noting that donors account for 90% of this budget. The development budget has not yet been fully decentralised due to the fear that districts may not abide by the broad goal of increasing expenditure on primary health

care even when this is the Ministry of Health strategy. The major sources of funding for health care in Uganda include Donors (43%); households (34%); Employers (3%); Central and Local government (20%) (National Health Accounts 2000). The major financing intermediaries include the Ministry of Health (21%), district health services (10%) and non-governmental organisations (25%). However households are the second largest (33.5%) source of funds to health care expenditure even though their contribution does not go through any major intermediary. For example households indirectly contribute to intermediaries that provide health services like the ministry of health through paying for services at referral hospitals, DHS by paying for services at district hospitals. Other purchases by households are made at NGO hospitals, pharmacies/drug shops, private hospitals and traditional healers (See table 3a and 3b).

Table 3a. Flow of funds to financial intermediaries (Ugshs. Million)

	PRIMARY SOURCES							
FINANCING INTERMEDIARIES	Government		Donors		Employers			
Public Sector	MOF	LG	External	Internal	Private firms	Parastatals	Total	(%)
MOH	24,303	-	41,619	31	-	-	65,953	21.3%
DHS	15,980	1,434	14,954	124	-	-	32,492	10.5%
MOD	2,522	-	-	-	-	-	2,522	0.8%
MOE	-	-	11	-	-	-	11	0.0%
National specialist hospitals	15,450	-	821	-	-	-	16,271	5.3%
Uganda Police Services	245	-	223	-	-	-	468	0.2%
Private Sector								
NGOs	764	-	71,595	5,172	-	-	77,531	25.0%
Private Health insurance	-	-	-	-	733	200	933	0.3%
Private firms	-	-	-	-	7,189	-	7,189	2.3%
Parastatals	-	-	-	-	-	2,720	2,720	0.9%
Total	59,264	1,434	129,223	5,327	7,922	2,920	**206,090**	
NB. Households pay directly to providers with no intermediaries							**103,710**	33.5%
Percentage	19.1%	0.5%	41.7%	1.7%	2.6%	0.9%		

Source. National Health Accounts of Uganda, 2000

Table 3b. Flow of household funds to providers (Ugshs.Million)

	PROVIDERS							
SOURCE	District hospitals	Referral hospitals	NGO hospitals /clinic	Pharmacies/ Drug shops	Private hospitals /clinic	Traditional healers	Other	Total
Out of pocket	41	37	30,880	30,610	25,748	4,520	11,875	103,711

Source. National Health Accounts of Uganda, 2000

1.4.6 Financial decentralisation

The process of local government decentralisation started in 1992 and comprised of three components namely political, administrative and financial decentralisation (Villadsen 1996). Financial decentralisation comprised giving districts the authority to plan and allocate their budgets. From the fiscal year of 1993 district local councils therefore became the main budgetary units and local governments were no longer expected to forward their budgets to the central government. This process was consolidated with the adoption of the local government act of 1997. In line with the financial decentralisation, from the 1996 fiscal year districts were given unconditional block grants that in the health sector would cover primary health care (non hospital care). The central government also continued providing district hospitals with delegated funds via the district health service. However preceding surveys showed that districts were not spending resources on primary health care as intended hence the introduction of the conditional primary health care grant in the 1997 fiscal year (Jeppsson 2001). Additionally in 1998, the central government created health sub-districts within the districts in an effort to further devolve management and improve delivery of health services. The HSD is now the operational level for district health services and on average consists of population of 100,000 people and at least a pre-existing hospital or an upgraded health centre now called health centre IV (HC IV). HC IV units provide outpatient services, maternity, inpatient and surgery. To

support this new venture, the central government increased the primary health care conditional grant for both capital and recurrent expenditures in the district (sub district) in 1998/99 (see table 4)

Table 4. Estimated resource allocation to Luwero district-1997-2000.

ACTUAL RESOURCES ALLOCATED TO LUWERO DISTRICT (1997-2000)-Ugshs.						
	Salaries	**PHC (Conditional)**	**District Hospital**	**Donor projects**	**Others**	**TOTAL**
1997/98	267,240,780	29,926,721	293,814,696	141,334,537	220,246,250	**952,562,984**
1998/99	298,110,270	309,934,012	388,236,334	211,204,467	291,960,550	**1,499,445,633**
1999/00	302,358,590	60,354,000	430,650,491	153,298,668	122,129,500	**1,068,791,249**

Source. Ministry of Health-DISH Project. Review of financial flows to the Health sector. September 30, 2000

The controversy however is that with the back drop of failing to spend health care resources on health priorities (primary health care), the district health authority have not used a clear formula of resource allocation to the new sub districts. Anecdotal evidence from a number of districts suggests that allocation of the primary health care conditional grants at the district level was based on number of HSD (i.e. Equal distribution of funds among health sub-districts) irrespective of likely differences in population size, socio-economic characteristics and previous performance of health service delivery in the sub-districts. Thus the assumption of the district health authorities is that all the sub districts have the same socio economic characteristics, access to health and social services. This is not necessarily the case as will be shown in chapter 5.

The analysis of resource allocation in the district and sub-district is based on available data on finances from two primary sources of funds namely the ministry of finance and external donors, both of which provide funds mainly through the ministry of health and

the district health services project for personnel, general primary health care services, district hospitals and specific primary health care projects (See tables 3a and 4).

1.4.7 Structure of dissertation

This dissertation is organised as follows:

Chapter 2 is the literature review and will include an overview of the principles of equity in health care and resource allocation.

Chapter 3 is an overview of the conceptual framework that was used to answer the research question.

Chapter 4 describes the methodology that was used to answer the research question including reasons including why specific activities and methods were used and the limitations of the methodology.

Chapter 5 is a description of the results of the study. The results will include an overview of the demographic, socio-economic and health status characteristics of sub districts as well as the pattern of health care expenditure in the sub district.

Chapter 6 is a discussion of the results. The discussion will focus on distribution of health resources across the sub districts relative to the measure of need or deprivation derived from the data.

Chapter 7 is a conclusion of the results and discussion including recommendations towards policy change based on the results in the previous chapter. This involves an

overview of the key findings in the study and a way forward for the districts and the ministry of health of Uganda.

1.4.8 Summary

Uganda's health system is in a phase of restructuring characterised by devolution of the district health system. The central government is trying to ensure a smooth transition of this process despite inadequate funding for the health sector and amid very poor health status indicators. But the districts also have the task of ensuring that decentralisation does not compromise equity and efficiency in the process of resource allocation and utilisation. The central government seems not to have given districts and sub-districts the tools/guidelines for this. From the lowest level (sub-district), districts must have a framework of resource allocation that would best be guided by scientifically sound measures of differences in need and or deprivation within the different geographical areas of a district.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is a general overview of the principles of equity in health care including a description of the key issues relevant in assessing equity in resource allocation.

2.2 Overview of equity in health

Starfield (2001) defines equity in health as "the absence of systematic and potentially remediable differences in one or more aspect of health across populations or population subgroups defined socially, economically, demographically, or geographically" and further argues that equity in health implies that that there are no differences in health services where health needs are equal (horizontal equity) or that enhanced health services are provided where greater health needs are present (vertical equity).

Central to the definition of equity in health is the argument that inequality in health vis-à-vis health status among humans may be unfair and unjust and these inequalities constitute health inequity. Whitehead (1992) suggests that the health differences due to health damaging behaviours not based on informed choices, exposure to unhealthy living and working conditions, or inadequate access to health and social services are more likely to be judged avoidable and unfair and thus constitute health inequities. Whitehead continues to suggest therefore that the goal of improving equity in health is to bring the differentials in health status to the lowest level possible.

In most developing countries because of the gross inequities in health and inadequately financed health systems vertical equity would seem to be the most relevant as most policy makers try to ensure that more inputs of health resources are provided to improve health care and therefore health status of those in most need. Most countries ensure this through the constitution and the strategy is characterised by policies that ensure that societal and health resources are distributed or re-distributed equitably to those in most need. Gilson (1998) urges that for this to be possible "there has to be an enabling state that protects and promotes the interests of the poor through 'public interest' institutions, health care financing mechanisms and strategies that are critically important to the promotion of equity goals".

The difference in health status among populations and population groups has long raised the question as to what factors could account for this. Several factors including genetics, health care services or an individual's lifestyle have been put forward to explain this phenomenon. However the overall conclusion is that the phenomenon is a manifestation of the differences in social, economic, environmental and or institutional determinants of health status between populations and population groups. Murray and Lopez (1996) in a quantitative analysis of the worldwide burden of disease suggest that these risk factors account for 60% of deaths. All this points to the argument that inequity in health should be seen in the context of the factors that are most likely to cause inequality in health status namely differences in socio-economic status as well as inputs in health care across diverse outcomes and or settings in population groups. In response to arguments promoting measuring equity in health using the individual, Braveman et al (2000) and Krieger et al (2000) argue that there is ample evidence that one cannot understand

health and illness in individuals or populations without examining social factors. Measurable socio-economic factors that have been found to be key determinants of health status include income, education, occupation, gender, race and the environment in which people live (including living conditions). Other categories of factors that have been identified as determinants of health include geographical distribution of health services as well as health finances all of which may be influenced by political circumstances. Several studies have shown that these variables often work in concert to propagate health inequalities and the possibility of them differing in the relative strength of their contribution to the inequality may explain variance in equity among population groups (Kawachi et al 1999, Burstrom et al 2001). Section 2.2.1, below is an overview of the socio-economic factors influencing equity in health.

2.2.1 Socio-economic factors influencing equity in health.

The evidence available is that socio-economic circumstances affect health and individuals or population groups at a lower socio-economic level run a higher risk of ill health and premature death. The differences in socio-economic status may be absolute or relative. Poverty being a major determinant of health can be used to elaborate on the principle of relative and absolute differences. Absolute poverty is used to define the minimum basic needs required to physically sustain life for an individual or a population group. On the other hand relative poverty is used to define the amount that the basic needs fall below the rest of the individuals or population groups. However depending on the context the boundary between absolute and relative poverty may be blurred. For example not having access to water may be considered absolute poverty but one may argue that not having access to safe water (which increases risk of ill health) should not be defined as absolute

poverty. Accordingly, health and development policies that target improvement of relative or absolute socio-economic differences that account for the persistent disadvantage and ill-health that occurs in population groups would go along way in eliminating or reducing health inequity.

2.2.1.1 Income levels and income inequalities

Higher income determines living conditions like purchasing sufficient nutritious food. Higher income allows the individual and populations more control of their life circumstances like stress. Studies have shown that inability to cope with stress (common among the poor due to limited coping options) sets off a hormonal reaction that compromises immunity.

Using Health interview survey data to construct concentration curves of self-assessed health, van Doorslaer et al (1997) found that inequalities in health favoured the higher income groups and were statistically significant in all the countries assessed. Similarly, based on a National population health survey in Canada, Humphries and Van Doorslaer (2000) found that significant inequalities in self-reported ill-health existed and favoured the higher income groups. Their analysis also showed that lower income individuals were somewhat more likely to report their self-assessed health as poor or less-than-good than higher income groups. Using the Gini coefficient to test whether state level income inequality is related to individual mortality risk, Lochner et al (2001) found that individuals living in high-income inequality states had an increased risk of mortality (relative risk =1.12 95% CI 1.04-1.19) compared to those within low-income inequality states.

2.2.1.2 Education and occupation

Education leads to individuals and population groups having the knowledge and skills to get a job and ensure income security allowing access to living in healthy environments. Additionally, it enables access to and ability to understand information on the best healthy living behaviour(s).

In a study to compare the differences in total and cause-specific mortality by educational level among women with those among men in 7 countries, Mackenbach et al (1999) found that mortality was significantly lowest among women with a high level of education and highest among men with a low level of education. Marmot et al (1997) performed a comprehensive analysis of three large sample mortality studies and showed that the social gradients observed in physical and mental morbidity were observed for educational and occupational status.

2.2.1.3 Gender

Gender refers to society's definition of roles, responsibilities and power ascribed to the two sexes. This definition also determines the varying patterns of ill health among women and men. Although there are biological factors that determine gender differences in health, socio-economic differences aggravate these differences. For example the fact that women live longer than men coupled with their double burden of work at home and in the workplace means they are more likely to suffer depression, anxiety and chronic conditions like arthritis.

Using age standardized illness ratios and multivariate logistic regression to compare inequalities in ill health among men and women in Britain and Finland, Arber and Lahelma (1993) demonstrated a significant difference in the ill health of women between the two countries. Because state provisions supported their economic independence and they were participating in fully paid work, women in Finland were less likely to suffer ill health as compared to those in Britain.

2.2.1.4 Race

Race is often used to define the differences of humankind based on certain inherent physical characteristics common to individuals and population groups. These differences have been translated into social and economic exclusion of individuals or population groups. The exclusion then results in people being prevented from having absolute access to health care, income, education or other necessities of life or otherwise having relatively less access to these needs than those that are not excluded because of their race.

In South Africa because of the legacy of apartheid, the infant mortality rate of the African population in the early 1990s was almost 12 times higher than that of the whites. Similarly, the maternal mortality rate of Africans in 1991 was 31 times that of the white community (Department of Health 1995, Fawcus et al 1996).

2.2.1.5 Environment

The physical environment is an important determinant of health status as for example relative exposure to certain contaminants in the air, water, soil and food may cause ill

health. Being at the lower level of the socio-economic scale means that individuals or population groups are more likely to be exposed to contamination.

Gilson and McIntyre (2000) developed an index to depict health related socioeconomic status of communities in South Africa based on the ability to access water, sanitation and source of energy for cooking. This simple index (simply called the Environmental Health Index) showed a positive correlation between mortality, inability to utilize health services and poor general socioeconomic status.

2.2.1.6 Social policies

Social support and related support networks at the individual or population level help to provide emotional and physical resources needed for mental and physical well-being. The networks may be reflected in the way the societies are organised to share these resources. The strength of the support networks varies by socio-economic status. Inequality in the socio-economic status of societies leads to a risk of poor social cohesion.

In a study that explored the role of policy in dealing with social inequalities that perpetuate health inequity, Whitehead et al (2001) showed that the health of lone mothers is poor in both Sweden and Britain even though social policies have tended to protect lone mothers from poverty and insecurity in the labour market in Sweden more than in Britain. The results of this study also showed that the fact that in Britain 42-58% of the health disadvantage of lone mothers was accounted for by the mediating factors of poverty and joblessness supported the emphasis of the government on improving the poor socioeconomic circumstance of lone mothers. In Sweden however poverty and

joblessness accounted for only 3-13% of the health gap. To explain this, Whitehead et al (2001) advanced some hypotheses that included lack of time for lone mothers as they care for the family and are the breadwinners, poor quality jobs and lack of social support for lone mothers. These results show that there is room for policy intervention to improve socio-economic equity.

2.2.1.7 Distribution of health finances and resources

Health services especially primary health care that targets illness prevention and health promotion greatly contributes to individual and population health. Thus availing resources that allow provision and maintenance of primary disease or injury prevention would go along way in reducing ill health.

A comprehensive survey of health expenditure and financing in South Africa by McIntyre et al (1996), showed that beside the public health service being biased towards curative hospital care, the richest provinces had 2.4 to 5 times more doctors and nurses and spent almost 4 times public expenditure per population head as the poorest provinces.

2.3 Key dimensions of equity in health care

Literature shows that some of the most explored and probably most important aspects of equity in health care are equity in access and or utilisation as well as resource allocation. While some researchers have maintained that equity should be defined in terms of equal access to treatment (Le Grand 1982, Mooney et al. 1992) others contend that it should be in terms of actual utilisation of health care itself (Culyer, van Doorslaer and Wagstaff 1992). Access is mainly about equal opportunity in terms of supply of health services.

Mooney (1983) argues that whether or not the opportunity is exercised is not relevant to equity defined in terms of access. However gaining access to or utilisation of health services also depends on cultural, financial, organisational as well as physical barriers and not just adequate supply of services. Mooney (1983) thus argues that equity in utilisation is a factor of both supply and demand and that if access (supply) is equalised, unless demand is the same, utilisation will not be the same. Those in favour of a focus on access are therefore arguing that utilisation includes factors that determine demand for health care, some of which may not be as easily addressed by health services themselves.

2.3.1 Equity in access to health care

A number of definitions of access to health have been put forward but the general definition entails use of health care services according to the degree of need for health care. Cuyler and Wagstaff (1993) define need as the "capacity to benefit". Capacity to benefit may not necessarily be because one is ill but can also be because one is at risk of being ill hence benefiting from for example preventive care. Additionally, Mills and Gilson (1988) argue that need for health care is often difficult to define as it may depend on a patient's perception, society's perception or on clinical determination. In general equity in access to health care is concerned with creating equal opportunities to available health care for equal need less other barriers to access (Whitehead 1992). Thus the presence of factors like socio-economic barriers, scarce health resources where they are most needed or other obstacles like geographical barriers and poor quality of care should be considered when making any inference about equity of access to health care (Bevan 1995). Often access and utilisation are used interchangeably when defining equity in access to health care. Whitehead (1992) explains that equity in utilisation for equal need

should be explored in the context of identifying factors that would explain differences in utilisation. This is because any difference in utilisation does not necessarily indicate inequity. For example an individual not using a service because of a religious belief despite having equal need for the service should not constitute inequity. Similarly differentially increasing utilisation of a service like immunisation in case of low uptake in the midst of socio-economic disadvantage would be justifiable as the attempt is to achieve equity in utilisation.

An example of measuring equity in access was in Italy where Mapelli (1993) showed that the most socio-economically disadvantaged group reported a higher per capita health services use and expenditure than their morbidity conditions would require, indicating possible achievement of vertical equity as a fundamental policy goal.

2.3.2 Equity in resource allocation

Often equity in financing of health care is used in reference to health care resource allocation as a theoretical measure of the capacity or availability of health resources to the different socio-economic or geographic population relative to needs. Key indicators of equity in resource allocation include per capita public health expenditure, per capita human resource expenditure and distribution of facilities across socio-economic and geographic groups as well as equal resources per capita weighted for other measure of need deemed appropriate (Braveman 1998).

2.4 Monitoring equity in health and health care

Inequity in health is based on differences in health or determinants of health between groups of people that have been categorized a priori according to the socio-economic

factors alluded to above that determine social position. Monitoring equity (inequity) in health would therefore involve not only monitoring health disparities but also the social characteristics of population groups to determine if the disadvantaged are more likely to be unhealthy because of their socio-economic characteristics. Braveman (1998) argues that monitoring equity should be policy oriented and describes eight steps to use as a guide in monitoring equity that include the following:

Step 1: Identify the social groups of a priori concern

Step 2: Identify the major concerns and information on equity in health and its determinants

Step 3: Identify the major sources of information on a priori groups

Step 4: Identify indicators suitable for assessing differences between "a priori" groups i.e.

- Health status
- Determinants of health status
- Health care access, utilization and financing

Step 5: Describe the pattern of distribution of differences between "a priori" social groups.

Step 6: Describe the trend in the patterns over time

Step 7: Generate policy implications of the patterns and trends observed

Step 8: Involving relevant stakeholders, develop a strategic plan for implementation and monitoring of policies that help to improve equity in health care.

The process would be repeated on completion of Step 8 in the event of new knowledge or priorities. In this literature review only step 1, 3, 4 and 5 will be briefly discussed.

2.4.1 Identifying social groups

As highlighted in section 2.2.1 a number of socio-economic factors influence health status. These factors have been used in a number of studies to categorise social groups. The most common factors used in this classification include age, gender, income (expenditure, consumption, wealth), education and occupation. Social groups are then identified according to these factors into subgroups for example income quintiles. Geographical classification is also of importance in the context of equity as this would help to assess whether resources allocated to a particular geographic area matches the level of need (socio-economic characteristics) of the people living in that particular area as compared to other areas (Braveman 1998).

Literature shows that several studies have been done to measure socio-economic characteristics of social groups. One of the recommendations has been that the socio-economic characteristics be converted into an index that accounts for a range of these characteristics. This index has also been defined as the index of need or more commonly called the deprivation index. Townsend (1987) defined deprivation as "a state of observable and demonstrable disadvantage relative to the local community or the wider society nation to which an individual, family or group belong." Townsend et al (1988) further define deprivation as consisting of material deprivation (for example inadequate sanitation, water or food) or social deprivation for example lack of education (Townsend 1987, Townsend et al 1988). Townsend (1987) argues that deprivation defines the concept of "relative" poverty as opposed to absolute poverty and that the former may be easier to measure and more informative because it is able to cover various conditions experienced by the poor independent of income. Thus after identification of the priority

social group then strategies must be made to collect information that defines these social groups.

2.4.2 Identifying major sources of information

Measurement of health status and its determinants to monitor equity requires routinely available data. This is often not the case in most developing countries as the available information does not often represent the entire population or the disadvantaged nor does it include the appropriate health status and socio-economic factors to measure equity. Existing data sources that could be used include census data, demographic and health surveys (DHS), living standard measurement or household surveys (LSMS) (Braveman 1998). Census data often include most of the key measures of socio-economic status like income, education and living conditions. Because the census encompasses all the people it becomes easy to disaggregate the data collected to the geographical level needed when monitoring equity. However because some factors are not always measured in the census other sources of data like the DHS are used. Although restricted to maternal and child health, DHS have the advantage of including measures of health status, health care access and utilisation by socio-economic category. On the other hand LSMS lack information on health status but contain information on poverty, malnutrition, access to social services and use of and expenditure on health, food and other household items. Thus LSMS can be used in assessing equity in financing health as well as distribution of determinants of living conditions that are determinants of health status. If the three data sources are not adequate new data sources may be used. These may include health facility interviews, community surveys or "sentinel" population survey (Braveman 1998).

2.4.3 Identifying indicators and measures of disparity

A number of studies have been able to show that there is a significant relationship between absolute and relative inequality in the socio-economic variables and health (section 2.2.1). The choice of the variables to use as indicators should be based on the fact that they are able to adequately measure the gap in socio-economic status especially in conditions that are most important to the broad policy of achieving equity to the country or geographical area in question as alluded to in section 2.2.1. For example as compared to the indices of deprivation used in developed countries, those used in South Africa include access to water and sanitation (McIntyre et al 2002). In relation to the points above Mackenbach and Kunst (1997) emphasise the need to present the information on equity to policy makers in the simplest, most understandable and relevant form vis-à-vis the proportion of ill health that would be eliminated if equity were achieved. Additionally, they argue that given their diversity indicators used in measuring disparity have advantages and disadvantages and should complement each other to produce a more realistic and informative picture to policy makers and those delivering health services especially in situations where the quality of data is doubtful.

A number of studies have measured disparity of population groups by combining these indicators into an index that defines deprivation vis-à-vis the social group. This index of deprivation can then be used as a guide in identifying the most deprived individuals or population groups relative to their health status and therefore also guide allocation of health resources. Most of the work on development of the deprivation indices has been conducted in the United Kingdom. A number of techniques to create deprivation indices

have been used in the past and sections 2.4.3.1 to 2.4.3.4 give a brief description of the major ones and their application.

2.4.3.1 Simple additive measures

This technique involves combining a range of variables into a single measure by just adding them up. The variables are scored based on a standardised measure of the larger geographical area. However this type of index has been shown to hide some information as it relies on averages (Folwell 1995).

2.4.3.2 Weighted indices

This type of index is similar to the one above except each component of the variables is accorded a weight based on its relative importance in the index. This means that any change in the weights of the variables in the index would alter the deprivation index (Folwell 1995). An example of this index is the Jarman Under Privileged Area (UPA) score (Jarman 1983)

2.4.3.3 Signed X^2

This index is also a type of weighted index as it gives greater weights to variables with greater population. This is based on the fact that measures based on an area with a small population are less reliable than those based on a large population. However the problem arises in the interpretation of the index when for example areas with the same scores of measurable components have different X^2 because they have different populations (Folwell 1995). An example of this index of local conditions developed at the University of Manchester for the Department of the Environment in UK (Department of environment 1994).

2.4.3.4 Factor analysis

Factor analysis is a statistical technique that simplifies complex data sets by combining variables into a correlation matrix (set of correlation coefficients) to construct a factor(s) that explain this correlation (Kline 2002). However this technique has been critiqued due to the fact that the factors derived in the index depend on the variables used from the start and that addition or elimination of variables may yield different factors and or different variable correlations (Folwell 1995). One method of factor analysis that is most commonly used is principal component analysis (PCA). The aim of this technique is to estimate the correlation matrix by assigning weights to a combination of variables that best explain the variance in the correlation matrix. The key advantage of PCA is that it maximizes the variance in the correlation matrix explained by any number of factors (components).

Folwell (1995) argues that because the definition of deprivation differs according to the standing policy in a particular area the method of measuring deprivation may also vary. Similarly the relevance of various indicators of deprivation and therefore deprivation indices differs from country to country as well as function. For example, as a guide in resource allocation, the Jarman UPA score was developed to measure the socio-economic factors that were most likely to increase workload of general practitioners in Britain. However using it in the overall English RAWP formula to allocate resources to community hospitals was found to be inappropriate as several variables in this index did not appropriately correlate with the relevant health status indicator (Jarman (1983), Morris and Carstairs 1991). Townsend et al (1988) then developed the Townsend index that was a better predictor of variation of health status.

Taylor (1998) suggests that when considering development of a deprivation index the following principles should be considered:

- Development of the index should be based on policy goals
- Identify the geographical size for which the index is being created.
- The index should be specific to a particular program or strategy and therefore in line with the original goals of the policy.
- The index should be reviewed regularly in order to take into account new methodologies of deriving the index as well as new data that may account for changes in deprivation.

Other relevant issues to consider when constructing a deprivation index include the fact that the variables should be assigned different weights and should be additive when combined (Folwell 1995). Saunders (1998) defines additivity to mean greater deprivation for individuals with two or more variables included in the index.

2.4.4 Application of measures of equity and their limitations

In the context of this study, the most relevant definition of equity entails allocation of resources on the basis of need such that more resources are allocated to those in most need. Need in this context refers to the "normative need" for health care services that is quantified professionally as the optimum standard as opposed to "expressed need" that is driven by availability and or affordability of services. Thus measuring equity in resource allocation has been used in need-based formulae to allocate resources between geographical regions based on the population's need for health care and the costs involved in providing the care. The formula sets the relative share of the available budget

for each geographic region. Needs-based formulae have been used in most developed countries and some developing countries although most of them have based their formula on that developed in the UK.

Before 1976, the annual health budget allocation between regions in England was based on historical patterns of expenditure, and population size weighted by hospital bed numbers and caseload. However the government realised that this formula entrenched inequity and was based on supply and demand for services ("expressed need"). Thus the Resource Allocation Working Party (RAWP) was set up in 1975 to develop a new formula that took account of these limitations. The elements of the first RAWP formula included:

- Total population of each region (acting as baseline)
- Adjusted regional population relative to other regions (based on age and sex health service utilisation profile of each region)
- Weighting of adjusted population (based on condition specific all-age standardised mortality ratios).

This formula was also adjusted for cross-boundary flows, special costs of teaching hospitals and market related costs in densely populated urban areas (Department of Health and Social Security 1976). In 1990 the original formula was replaced with a simpler weighted capitation formula (that also took account of deprivation) to be applied in both regions and districts (Department of Health and Social Security 1989, Smith and Sheldon et al 1994).

One of the major limitations of the RAWP formula and similar formulae is that the re-allocation of resources often does not occur in circumstances of increasing revenue. Thus re-allocation of resources to the regions (districts) with greater need may have to be financed from the budget cuts of the richer regions (not the case in UK as RAWP was funded from budget increases). Coupled with the change in equitable targets of the regions (for example because of changes in population), some regions may end up progressing rapidly towards their equitable target shares yet others progress slowly or not at all (Winyard 1981). To avoid this problem, New Zealand adopted some measures that included expressing the equitable target allocations as a range to account for any possibility of changes in ranking of regions; tying any budget increases to the poorer regions to providing detailed financial plans and providing bridging grants for any year-to-year budget variations (Barnett 1984). Some other limitations of the RAWP formula include:

- Failure to account for the private health sector which if large may reduce the need for public health services but may not necessarily provide the health care needed (Leck 1989, Barnett 1984)
- Application of formula on health care budgets ignores other social sectors that may impact on need for health care.
- Failure to re-direct capital expenditure such that disadvantaged regions with poor infrastructure do not benefit from the recurrent budget re-distribution (Buxton and Klein 1978).
- Failure to provide guidance on how the re-allocation of funds is transformed to other resources (e.g. drugs, facilities or personnel).

There is little literature on the application of needs-based formulae in the low and middle-income countries. In Africa, literature shows that most of the work on needs-based health resource allocation has been done in South Africa. Most Sub-Saharan Africa (SSA) countries are struggling with lack of adequate resources for basic needs and the main concern is therefore in allocating most of the little available resources to the most deprived. For example, use of a deprivation index in a resource allocation formula would seem appropriate especially given the fact that a number of countries in Africa have decentralised or are in the process of decentralisation hence resource allocation from the centre to the lowest local government levels would be best guided by a method that takes a broader view of need. As part of the strategy to redress the disadvantages of apartheid in South Africa, McIntyre et al (1990,1991) developed a resource allocation formula based on the RAWP formula and compared the target allocations derived from the formula with current budgets to estimate the extent of geographical mal-distribution of health care resources. One of the most recent studies in Africa on the use of the deprivation index was that done by McIntyre et al (2002). In this study three indices of deprivation constructed for magisterial districts showed correlation with ill health and most importantly showed that the resource allocation between geographic areas, was biased towards the less deprived areas within South Africa.

The general index of deprivation (GID) was created using principal component analysis (PCA) of those socio-economic, demographic and physical household characteristics from the national census of 1996 that were most highly correlated with deprivation. The policy-perspective index of deprivation (PID) was developed by using the proportion of the population in each magisterial district falling into groups that were identified by policy

makers as the most disadvantaged or should receive priority in social service delivery. The third index was a single variable indicator of deprivation (SID) and consisted of the variable that had the highest correlation with other variables found to be important in measuring deprivation and that could be easily updated. The study showed that the GID and the SID were highly correlated and both correlated well with the PID. The study showed therefore that a single variable indicator could be as effective as composite indices. This is of significant importance to other lower income countries that do not have resources to perform time consuming surveys and complex statistical procedures like PCA. The other significant finding was that a health-related index of deprivation (HID) created using PCA of those socio-economic, demographic and physical household characteristics most highly correlated with mortality (ill health) did not correlate with the other three indices. This was attributed to the poor quality of mortality data, which is the most likely case in most SSA (were there is a poor record of deaths).

2.4.5 Summary

In general, a formula that allocates financial health resources on the basis of population adjusted for relative need is a globally accepted approach in attempting to achieve vertical equity. However the limitations of the formula should always be acknowledged and Doherty and Van den Heever (1997) suggest key principles for a successful needs-based resource allocation formula. Firstly, policy objectives of the formula consistent with the prevailing political and financial situation as well as the health status and health care conditions in the geographical areas in question should be clearly outlined before the formula is developed. Secondly the components (indicators) that constitute the formula should be easily and frequently recorded, should not reflect "expressed need", and should

correlate well with health risks and need for health care. The minimum indicators in such a formula should therefore try to take account of demography; utilisation of the private sector; health status; cross boundary flows; cost of research and teaching; and special costs of service delivery. Thirdly, the redistribution that follows using the formula should have a clear time-frame as well as guidelines on both what the redistributed resources will be spent on and how to redistribute the resource in the context of economic growth or lack there of.

CHAPTER 3

CONCEPTUAL FRAMEWORK

3.1 Introduction

This chapter briefly summarises the concepts that were used in the methodology of the research and are based on the literature review in the previous chapter.

3.2 Key concepts

From the literature review the conceptual framework for this research was based on the following principles:

a. Guided by Uganda's Poverty eradication Action Plan policy of improving the socio-economic and health status of the most disadvantaged, the principle of vertical equity was used as the basis of resource allocation to geographic areas. Thus, overall allocation of available health care resources in the district, as well as any new funds, for example primary health care block grants, would be such that relatively more resources would be allocated to the most disadvantaged population.

b. The health sub-district was used as the geographic area for the analysis as this is representative of the decentralised operational units of the health system in Uganda. Additionally, available data on resources was not disaggregated to lower geographical areas (sub-county) of a district.

c. Composite and single variable indices would be constructed to measure health and environmental health status as well as general deprivation in each of the HSD and thus determine the most disadvantaged of the HSD.

d. The variables to include in the indices would be based on generally accepted measures of health status and determinants of health. The data on these

characteristics would be obtained from the available data sources and where necessary new information would be generated from a rapid survey. The indicators to be used in the study would be chosen from the following categories:

i. Demographic indicators.

ii. Socio-economic indicators

iii. Health status indicators

To determine which variables best suite the indices, the degree of correlation between them is measured. Thus variables that are not positively well correlated would be dropped before construction of the indices.

e. The variables chosen from the correlation matrix are then combined into indices that measure general health status, environmental health status and general deprivation through a process of weighting and aggregation. It should be noted that principal component analysis method is not applicable for deriving weights for the variables because only three observations were made (i.e. three sub-districts) as opposed to the fifteen variables that were chosen (inadequate degrees of freedom).

f. The indices would be used in a resource allocation formula to show which HSD should receive more health resources because of their greater deprivation or need.

Figure 1 below is a diagrammatic representation of the flow of resources from the centre to the district through to the sub districts.

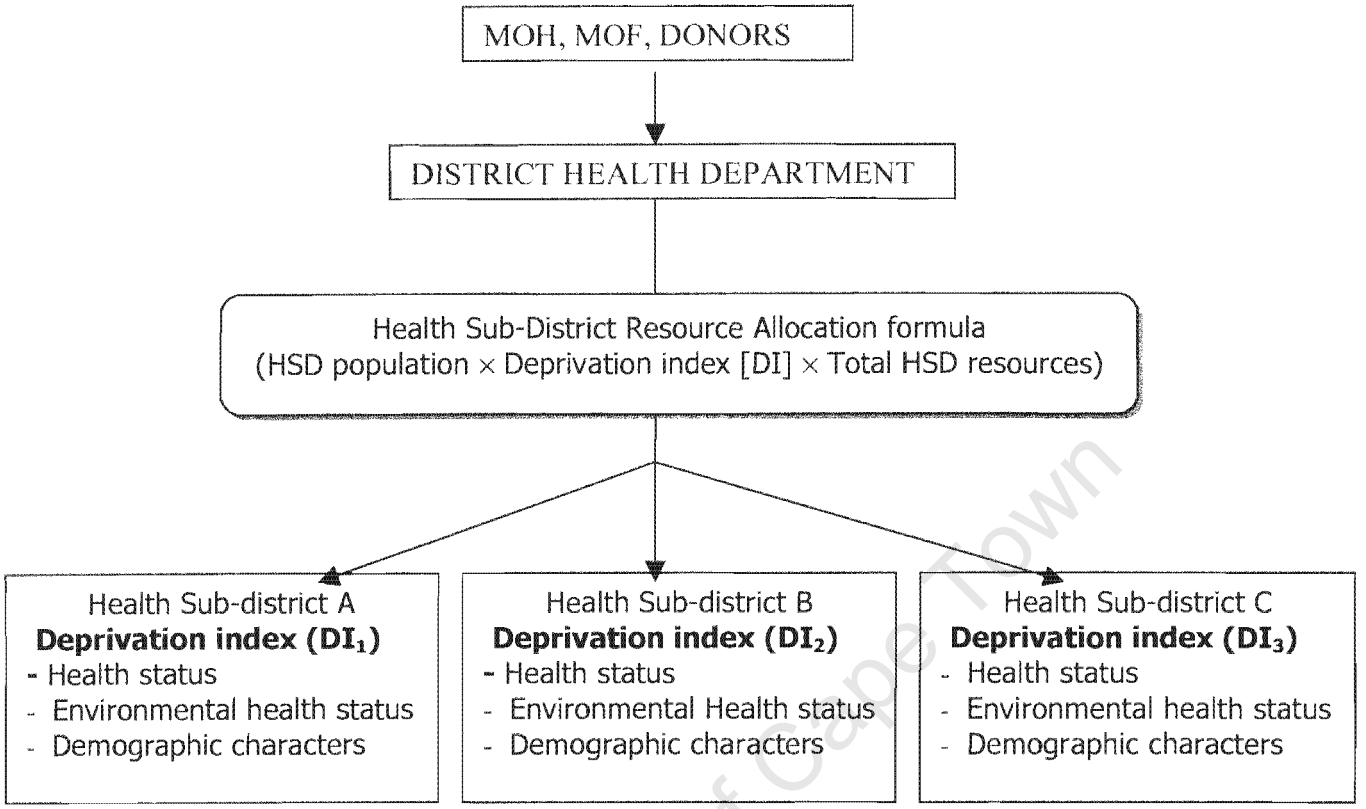

Figure 1. Conceptual framework

The resource allocation formula in this case did not take into account some of the factors that are normally considered. Firstly, utilisation of the private sector was not included for ease of creation of the formula. This was mainly related to the fact that there is little information on the number of private facilities in the district and how often such facilities are used. Secondly, cross boundary flows were also not included based on the assumption that given the rurality of the district, communities are more likely stick to using the health services in their health sub-districts and that most cross border facility utilisation in the district is likely to be due to communities needing to use a referral hospital(s) which are found in the fourth HSD that was not considered in this study. Additionally, it is difficult to estimate the extent of cross-boundary flows because

information on where clients reside it not routinely collected and even when it is collected it is not reliable. Thirdly, costs related to teaching, research or other special expenditures were not considered as none of the three HSD had this special status.

CHAPTER 4
METHODOLOGY

4.1 Introduction

This chapter explores the methodology used in conducting the research and includes data collection and methods used to derive a resource allocation formula based on indices of need (deprivation).

4.2 Research question

The research question was to determine whether the health status and some of the factors that determine it were different between HSD districts hence different levels of deprivation. Related to this was the measure of resources allocated relative to the level of deprivation and hence making an inference on whether there is equitable resource allocation at the sub district.

4.3 Type of information and sources

The sources of information included the 1991 census data and interviews with the district health manager district health accountant. A rapid household survey was conducted to get information that was not readily available from the census and demographic household survey. Although the district used in this study has four HSD only three were used in this analysis. The main reason was because of a lack of finances to conduct a more extensive survey. Secondly, was the fact that the three sub-districts were the ones that received the funds for the new HC IV as additional funds for primary health care and recurrent costs associated with implementing the role of HSD. Additionally, the fourth sub-district had some unique characteristics that made it different from the other three sub-district i.e. having a much larger surface area, being sparsely populated as well a

having two hospitals namely a district and private missionary hospital. The purpose of the study was to explore a methodology of how an index of need or deprivation could be derived from the available information and used as a guide in resource allocation at a sub-district level. Any implications of this process would then be taken forward to develop a more comprehensive index accounting for any heterogeneity within the district.

4.3.1 Measure of health status

Disaggregated HSD data on health status is not readily available in the districts. This is because there is a very poor record of mortality at both the district and the health facilities. This is coupled with the fact that utilisation of a facility is not necessarily a good indicator of health status and or need. Thus the easiest way to infer health status was self reported morbidity and immunisation status of children under five at a household level from a rapid household survey. A HSD that reported more illnesses in the last two weeks than the other(s) was considered to have more need for health care and therefore more deprived. However measuring health status using self reported illness has its weaknesses and care should be should be taken in making inferences about this variable. Similarly, the variable used to measure health status of children less than five years (immunisation status) falls in the same category as self reported illness as households may tend to report immunisation status in the affirmative even when they are opposed to the immunisation campaigns. Table 5 below shows the health status variables used in the study.

Table 5: Health status variables

HEALTH STATUS		
Variable	**Definition of variable**	**Purpose**
Illness	Proportion of HSD households reporting at least one ill household member in last 2 weeks	Self reported illness is a proxy measure morbidity
Immunisation status	Proportion of HSD households with under 5 children whose immunisation status is not up to date	Poor immunisation status implies inequity in access and or delivery of health care

4.3.2 Measures of socio-economic status

The 1991 census was conducted five years after military coup in the country. After ten year it was more likely that there had been socioeconomic changes. Thus a quick household survey based on the sampling frame of the 1991 census was done to get a more recent picture of the socio economic characteristics of the different sub-districts. Many studies measuring social status of population groups have used income or proxy measures of income like occupational status. However this information was not readily available in the census data. Additionally, a pilot survey revealed that attempts to ask about any information on income, occupation or non-health related expenditure in the rapid household survey were viewed with suspicion because the perception was that this information would be used to identify approximate amount of the unpopular "graduated" tax revenue owed to the district by the individual or household. Income was therefore not used in this study. Table 6a and 6b show the demographic and socio-economic variables used in the study respectively.

Table 6a: Demographic variables

DEMOGRAPHIC VARIABLES		
Variable	**Definition of variable**	**Purpose**
Rural	Proportion of HSD population in rural areas	Rural residents are more likely to be disadvantaged
Female	Proportion of HSD population that are females in reproductive age	Females in reproductive age have higher rates of facility utilisation
Under 5	Proportion of HSD population that are children under five	This age group is dependant and vulnerable to ill health
Elderly	Proportion of HSD population that are over 65 years	Older people are less likely to earn an income and have increased like-hood of ill health

Households resident in rural areas are considered more deprived in this context. Most of these areas are remote with poor road networks, poor access to basic social services including education. Thus a HSD that has more residents falling in this category is considered more deprived. The three categories of people (i.e. children less than five years, women in reproductive age and adults above 65 years) are mostly dependants and constitute the most vulnerable part of the population. Thus a HSD that has a larger population of these categories of people resident in rural areas but receives less health resources would be considered more deprived.

A household that does not have access to safe water, sanitation or electricity is vulnerable to ill health. Access to safe water was defined by a household having access to water from a borehole, piped water point and or protected spring. Access to toilet facilities was defined as a household having a flush toilet or pit latrine. Access to electricity was defined as a household being connected to electricity. These three variables represent the effect of the environment on health and will constitute an environmental health index as used by McIntyre et al (2002). Thus rural household with poor environmental indicators of health is considered more deprived than one whose

environmental indicator(s) are not poor. In the absence of information on income, education (literacy) is a fairly good indicator of potential income. Thus a household head with a higher level of income would be expected to have a higher income and would therefore be able to support the household. However if the level of education is lower and the household size is higher then such a household is more disadvantaged. If such a household were rural, had poor environmental health indicators and most of its population were in the vulnerable category then it would be considered more deprived than one than is not.

Table 6b: Socio-economic variables

SOCIO-ECONOMIC VARIABLES		
Variable	**Definition of variable**	**Purpose**
Education	Proportion of HSD households whose household head attained only primary education	Lack of adequate education increases likelihood of inadequate earned income
Water	Proportion of HSD household with no access to safe water	Lack of safe water increases likelihood of ill health
Toilet	Proportion of HSD household with no access to toilet facilities	Poor sanitation increases likelihood of ill health
Electricity	Proportion of HSD households with no access to electricity	Lack of electricity for cooking or lighting increases likelihood of health related environmental ill health

4.3.3 Measure of health service resource allocation

Data on health resources allocated to Luwero district was obtained from a district financial flow report (Ministry of Health/DISH 2000). However, not all the expenditure data in the report was disaggregated to the sub-district or lower still sub-county level, as this would have been best. Additionally, insufficient funding for the study and a lack of time did not permit in-depth inquest into how all the total district resources were allocated (spent) at the different local government levels. Additionally, HSD and the district as a whole have poor expenditure tracking methods and thus total expenditure in

the HSD on various primary health care and donor projects was not easily measurable. However reasonably accurate inference about the funds allocated to each HSD for human resources, drugs and medical supplies and the primary health care conditional grant could still be made.

Data on personnel expenditure was derived by totalling the annual salary of health workers at health centre II, III and IV in each HSD. Expenditure on drugs and supplies was derived from a study on drug needs assessment at health centres II, III and IV that was conducted by DISH Uganda (Vincent and Khalid 2002). This study used estimates of drug costs based on the number of average outpatient visits at the different types of facilities. There were no reliable studies that estimated average costs based on number of average in-patient visits even though the three categories of health centres have some inpatient visits. Total drug cost in each sub-district was derived by multiplying the average annual drug cost of each type of health centre by the total number of each type of health centre in each HSD as derived by the drug cost study (See Appendix 5). Data on the PHC conditional grant allocated to each HSD was collected from the accounting office of the District Director of Health Services. The estimate of total resources available for reallocation that was used in this study is not far from that derived in a study by the MOH (See Table 4).

Information on access to health care was obtained from the rapid household survey for comparison with the data on actual resource allocation. This would help to clarify whether a HSD population that is deprived also has worse access to health services compared to the least deprived. Access to health services was measured by asking households

whether they consult for their illness, how long it takes to get the consultation and average expenditure on treatment for the illness. Table 7 is a summary of the health access indicators.

Table 7. Health access variables

HEALTH ACCESS VARIABLES		
Variable	**Definition of variable**	**Purpose**
Consult	Proportion of HSD population that did not consult for their illness	Failure to consult increases likely hood of severe illness
Time	Proportion of HSD population that took longer than the mean time to get consultations	Delay in consulting increases likelihood of severe illness
Expenditure	Proportion of HSD population that spent more than the mean amount of money for treatment of illness	Above average expenditure is likely to inhibit access to health services

4.4 Method of Data collection

4.4.1 Qualitative

Using a semi-structured questionnaire, an interview was conducted with the district health manager on the resource allocation process.

4.4.2 Quantitative

Quantitative methods used involved totalling the amount of resources allocated to sub-districts and performing a rapid household survey to assess the health, demographic and socio-economic status of a sample of households in each of the three sub-districts. The household survey data was collected with the help of 9 students from Makerere University, Kampala. The students were trained for one day on how to collect the data, using role-play method and four examples of pilot questionnaires that had been completed by the principal investigator. Due to time and financial constraints students did not go to the field to conduct individual pilot tests on the tool.

In order to derive the deprivation indices, principal component analysis would have been the preferred method for giving weights to the variables chosen to measure deprivation. However because of the inadequate degrees of freedom it was not used.

Three indices of deprivation were created from the variables and compared. Two of the indices were composite indices and were defined as follows:

a. General composite Index: this would be composed of demographic, health status and social economic variables.
b. Environmental Health Index: this would be composed of only environmental health related variables.

The third index was a single variable indicator and consisted of the variable that best correlated with the other variables.

An index separate from the three that measure deprivation was created to measure access to health care and was used to assess any relationship between resources allocated to a HSD that is most deprived and access to health services. The index was defined as the index of health care access (IHCA) and was composed of three indicators as shown in table 7.

All the variables were designed in such a way that they were all percentage measures of a deprivation (or health access) variable. Thus increases in the percentage of any of the variables corresponded to overall deprivation. The directionality issue was therefore dealt with and transformation of the variables was not necessary given the implicit standardisation by percentages. To create the indices a correlation matrix was created for

all the variables that were chosen. The variables that did not correlate well with the others were eliminated from the process of constructing the indices. The variables were then aggregated using additive averaging.

When using additive averaging, equal weights were given to each variable and the sum of the product of each variable and its weight constituted the index. The sum of all the weights had to be equivalent to one. Thus the weights of the variables although equal in one instance would change depending on the number of variables used in the index in question. It was decided that equal weights would be used in light of the fact that many variables were being used to measure deprivation (need) and the notion that a set of weights capable of perfectly measuring the relative contribution of each variable to deprivation is not realistic. Given that population size is the primary indicator of need for health services, the HSD population size weighted by the deprivation index created was then used in a resource allocation formula.

The first step in creating the resource allocation formula was to "normalise" the index such that the index of the most deprived sub-district (depicted by the most positive deprivation index) is expressed in relation to the least deprived sub-district (depicted by the least positive deprivation index). Thus the index of the least deprived sub-district was normalised to 1 and whatever value is added to the index of the least deprived to normalise it, is added to the rest of the indices thereby expressing the level of deprivation in the rest of the HSD relative to the one that is least deprived.

The next step involved multiplying the actual population in each sub-district by the normalised index in order to estimate the weighted population (i.e. based on the deprivation index). Each sub-district's percentage share of the weighted population was then calculated and it is this proportion that was used to calculate the equitable target share of the resources allocated or spent by the each sub-district as opposed to the actual resource allocation or expenditure.

4.5 Sampling for rapid household survey

The district used for the study was purposefully selected. It is a predominantly rural district divided into four sub-districts each having a central health facility that supervises and monitors lower level health facilities in the HSD. The household interviews were conducted in only three of the sub-district for reasons explained earlier.

The rapid household survey used a two stage sampling strategy with the list of enumeration areas from the 1991 population census forming the first stage sampling units and the list of households in each of the enumeration areas forming the second stage of sampling. A total of 383 households were randomly selected from each of the enumeration areas in each sub-district based on the number of households in each enumeration area.

4.6 Limitations of study

A number of limitations need to be mentioned. Firstly, it is assumed that the small areas used in this study are homogeneous in personal and household characteristics. Secondly, some measures of health and socio-economic status that have been shown to be useful in similar studies like mortality, morbidity and income could not be used because such

data is not readily available. Thirdly, the expenditure data used is not wholly disaggregated to the sub-districts and only expenditure data that was easily accessible directly or could be derived from other studies could was used. Thus the total resource used in calculating the resource allocation were only those derived for the sub-districts as explained in section 4.3.3. Fourthly, cross border utilisation was not factored into the analysis as was explained in chapter 3. Fifthly, the question of income was not explored even in the rapid household survey as most of household heads felt threatened. Sixthly, PCA could not be performed because of the limited number of observations leading to deriving a priori components of deprivation.

CHAPTER 5

RESULTS

5.1 Introduction

This section gives a description of the results of the construction of the indices and a resource allocation formula.

5.2 Distribution of "deprivation" characteristics by sub-district

5.2.1 Background of Luwero district

Luwero district is divided into 4 constituencies that form the 4 health sub-districts namely Katikamu North, Katikamu South, Bamunanika and Nakaseke. Despite its closeness to the capital city, the district is largely rural and most of the access roads in the district are gravel. Table 8 shows the distribution of the population by sub district based on the preliminary results of the 2002 census. The table shows that the greatest proportion of the population in Luwero district resides in Bamunanika HSD. However table 9 shows that Bamunanika HSD has fewer health centres at level II.

Table 8. Luwero district population distribution (3 sub-districts)

Estimated Luwero District population in 1999-00 based on 2002 census		
	Population	Total population (%)
BAMUNANIKA		
Males	62,862	20.0%
Female	63,560	20.2%
Total	**126,422**	**40.2%**
KATIKAMU SOUTH		
Males	38,578	12.3%
Females	40,432	12.9%
Total	**79,010**	**25.2%**
KATIKAMU NORTH		
Males	53,325	17.0%
Females	55,359	17.6%
Total	**108,684**	**34.6%**
Grand total	**314,116**	**100.0%**

Table 9. Distribution of MOH health facilities in Luwero district by HSD

Distribution of government public health facilities in Luwero by sub-district			
	Health Centre IV	Health Centre III	Health Centre II
Bamunanika	1	4	3
Katikamu South	1	7	1
Katikamu North	1	2	5

5.2.2 Demographics

Table 10 shows the distribution of key demographic characteristics (Rural, Under five, females and elderly) chosen for this study based on the rapid household survey that was conducted. Although the 1991 census data may be considered out dated, demographic data collected from the rapid survey on these specific indicators was very similar to that collected in the 1991 census. Three of the indicators (under five children, females in reproductive age and elderly households) show little difference between the three HSD. The indicator on rurality however appears to show greater difference between the HSD.

Table 10. Distribution of demographics variables by HSD (Based on Rapid household survey)

	Bamunanika	Katikamu South	Katikamu North
Rural	100.0%	74%	87%
Under 5	19%	20%	20%
Female	20%	21%	20%
Elderly	5%	4%	4%

5.2.3 Socio-economic characteristics

The distribution of the socio-economic characteristics in the three sub-districts is shown in table 11. Socio-economic characteristics show a varying distribution. However, Katikamu North HSD has the highest proportion of households with least household head education, lack of safe water and lack of electricity. Katikamu South has the least proportions for all socio-economic characteristics.

Table 11. Distribution of socio-economic variables by HSD (Based on Rapid household survey)

Proportions based on Rapid Household survey			
	Bamunanika	Katikamu South	Katikamu North
Education	61%	43%	71%
Water	37%	18%	39%
Toilet	35%	12%	25%
Electricity	82%	51%	87%

5.2.4 Distribution of health status.

Bamunanika HSD had the largest proportion of households reporting illness in the last two weeks but had a smaller proportion of households whose children less than five years were reported not to have an up-to-date immunisation status. Table 12 shows health status distribution. More households in Bamunanika HSD reported illness in the last two weeks as compared to Katikamu North households that reported least illness. On the other more households in Katikamu North reported Under-five children not up to date with their immunisation than in Bamunanika HSD.

Table 12. Distribution of health status variables (Based on Rapid household survey)

Proportions based on Rapid Household survey			
	Bamunanika	Katikamu South	Katikamu North
Illness	76%	67%	59%
Immunisation status	32%	31%	42%

5.3 Construction of the deprivation index.

5.3.1 Correlation of variables

Table 13 is a correlation matrix of all the variables that were used in this study and is based on the distribution of deprivation indicators in tables 10, 11 and 12. The correlation showed that Under 5, female and illness did not correlate appropriately with most of the variables and thus were dropped before the aggregation was done. Immunisation status was eliminated because it positively correlated with less than half of the other variables. The shaded cells of the table correspond to the highest positive correlation coefficients of the indicators. Those indicators that had the highest positive correlation coefficients were selected for inclusion in the indices. The variables that were chosen for use in the construction of the indices were therefore as follows:

1. The general index of deprivation (GID) would be composed of rural, elderly, education, water, toilet and electricity.
2. The Environmental Health Index of deprivation (EHID) would be composed of water, toilet and electricity.
3. The Single variable index of deprivation (SID) would be composed of rural as this variable had the best positive correlation with the variables that were chosen. Also information on this variable is easy to collect, as this variable is a simple geographical description.

Since health status variables (reported illness and immunisation status) did not correlate appropriately with most of the demographic and socio-economic indicators an index of health status was not created.

Table 13. Correlation matrix of deprivation indicators

	Rural	Under5	Female	Elderly	Education	Water	Toilet	Electricity	Immunisation	Illness
Rural	1.000									
Under5	-0.443	1.000								
Female	-0.641	-0.404	1.000							
Elderly	0.940	-0.723	-0.339	1.000						
Education	0.613	0.436	-0.999	0.306	1.000					
Water	0.801	0.182	-0.973	0.547	0.964	1.000				
Toilet	0.997	-0.370	-0.700	0.909	0.674	0.846	1.000			
Electricity	0.778	0.219	-0.981	0.516	0.973	0.999	0.826	1.000		
Immunisation	0.064	0.866	-0.807	-0.281	0.828	0.649	0.144	0.677	1.000	
Illness	0.550	-0.992	0.288	0.803	-0.322	-0.059	0.482	-0.097	-0.798	1.000

5.3.2 Additive aggregation and weighting of variables

The indices were created based on the methodology described in section 4.4.2. Details of the results of the aggregation and weighting are in appendix 1. Table 14 below is a summary table of the 3 indices derived. The results show that Katikamu South HSD was the least deprived and Bamunanika HSD was the most deprived when any of the four indices is considered.

Table 14. Summary of Normalised indices

Summary of indices (Additive averaging)			
	Bamunanika	Katikamu South	Katikamu North
GID	1.17	1.00	1.16
EHID	1.24	1.00	1.23
SID	1.26	1.00	1.13

5.3.3 Resource allocation based on the deprivation index.

A review of the expenditure on wages, drugs and primary health care conditional grant shows that Katikamu South sub-district spends more funds per capita than the other sub-districts (Table 15). An interview with the district health manager revealed that no formula of resource allocation is used in the allocation of resources especially of donor funds and projects. The district health manager reported that for example the first allocation of the primary health care conditional grant in 1998-99 financial year from the central government was equally shared between health sub-districts.

Table 15. Current estimated resource allocation by sub-district

Resource allocation and expenditure of key resources in Luwero-1999-00 (Million Shillings)							
	Wages	Drugs	PHC grant	**Total per capita expenditure**	Per capita (wages)	Per capita (Drugs)	Per capita (PHC grant)
Bamunanika	134,336,580	127,611,228	89,441,545	**2,779**	1,062	1,009	707
Katikamu-South	169,963,224	150,486,308	73,330,690	**4,984**	2,151	1,905	928
Katikamu-North	139,120,044	121,198,098	71,081,661	**3,049**	1,280	1,115	654

From the value of the normalised deprivation indices in table 14, the population of each HSD is weighted and the percentage share of the weighted population calculated (Table 16). Table 16 clearly shows that whichever index is used Bamunanika HSD has the highest weighted population.

Table 16. Weighted HSD population based on the three indices

Weighted HSD population based on the Indices			
	Bamunanika	Katikamu South	Katikamu North
Actual population	126,442	79,010	108,684
Weighted population (GID)	147,935	79,010	126,073
Weighted population (EHID)	156,788	79,010	133,681
Weighted population (SID)	159,317	79,010	122,813
Share of weighted population (GID)	41.9%	22.4%	35.7%
Share of weighted population (EHID)	42.4%	21.4%	36.2%
Share of weighted population (SID)	44.1%	21.9%	34.0%

Based on the weighted population derived from the deprivation indices (table 16), the equity target for the total expenditure would be as shown in table 17a and 17b.

Table 17a. Equitable target share of resources based on deprivation indices

Equity target share based on weighted population percentages (Million Uganda shillings.)				
	Actual expenditure	Target share with GID	Target share with EHID	Target share with SID
Bamunanika	351,389,353	451,082,569	456,465,416	474,767,096
Katikamu South	393,780,222	240,948,407	230,385,847	235,768,694
Katikamu North	331,399,803	384,472,783	389,718,115	366,033,589

Table 17b. Equitable per capita target share of resources based on deprivation indices

Target Equitable Per capita share based on weighted population percentages (Uganda shillings/capita.)				
	Actual per capita expenditure	Target per capita share with GID	Target per capita share with EHID	Target per capita share with SID
Bamunanika	2,779	4,531	4,584	4,768
Katikamu South	4,984	2,420	2,314	2,368
Katikamu North	3,049	3,861	3,914	3,676

Table 17a and 17b show that whichever index is used there is an element of in-equity in the distribution of the health care resources between the three health sub-districts. Katikamu South is spending more than its equitable share of health resources as compared to the other HSD. The actual resource distribution is most likely related the fact that Katikamu South has more health centre III facilities and has more urban residents

than its counterparts and yet has a smaller population. To achieve a more equitable share of resources the per capita expenditure of Katikamu South may need to be halved in order to avail more resources to both Bamunanika and Katikamu North. The resource allocation disparities are further emphasised by the results from the rapid household survey that showed that residents in Katikamu South HSD are more likely to have better access to health services than the other HSD indicated by the IHCA (See Table 18 below).

Table 18. Composite index of access to health care by HSD

INDEX OF HEALTH CARE ACCESS					
	Consult	Time	Expenditure	IHCA	**Normalised IHCA**
Bamunanika	0.31	0.76	0.63	0.5603	**1.25**
Katikamu South	0.11	0.37	0.45	0.3069	**1.00**
Katikamu North	0.25	0.69	0.59	0.5052	**1.20**
NB Each variable was multiplied by equal weight of 0.33					

5.3.4 Summary of results

The analysis is based on expenditure data on personnel, drugs and primary health care conditional grant. The two main sources of these expenditure categories are the ministry of finance and external donors through the ministry of health. Using a simple survey method and available census data the results show that a simple measure of deprivation (need) can be derived to measure relative need across HSD. From the outset, census data shows that Katikamu South has the smallest population of the three HSD. Based on the principle of allocating resources to the most disadvantaged, Bamunanika HSD would receive the greatest share of the resources as it has more people. However Katikamu South receives more resources per capita than the other HSD. This would be acceptable if the characteristics used to define relative deprivation of the populations in the three HSD showed that Katikamu South was most deprived relative to the others. The

characteristics used to define deprivation however show that Katikamu South is the least deprived relative to the other HSD in terms of general deprivation and environmental health needs. In fact the results show that the Bamunanika HSD with the largest in absolute population size was the most deprived relative to the other HSD. However the most deprived HSD receives the least amount of resources and this is contrary to the principles of vertical equity in resource allocation where resources are allocated to the most disadvantaged in this case Bamunanika HSD.

CHAPTER 6

DISCUSSION

6.1 Introduction

This chapter is a discussion of the implications of the process of deriving a deprivation index and its use to guide resource allocation at the district level.

6.2 Distribution of indicators and their correlation

Although the deprivation indices above could easily be estimated using the methodology used in this paper, it is important that data that are used in the analysis of the correlation are accurate. In the case of this study there was no readily available database to derive the key variables used in calculating deprivation. Even available summary census reports conducted in 1991 do not disaggregate variables adequately. This is coupled with the fact that the boundaries of the district used in this study have changed since the last census. Household surveys that would be used to collect data that is not normally collected by the census are not appropriately disaggregated. Additionally, the poor tracking of mortality and morbidity at most of the health facilities meant that other proxies of health status had to be used. In this case self reported illness was used although this variable had to be dropped due to inadequate correlation with most of the variables. Similarly, the expenditure and resource allocation data is not adequately disaggregated leading to fewer observations being made thus negating the appropriateness of using PCA in the aggregation and weighting of deprivation variables.

The variables selected for this study are relatively accurate in identifying the most disadvantaged households in the district and are simple and as such could easily be

collected with the help of village and sub-county health committees at least once every two years. However this may not be necessary if the quality of census data is improved (with appropriate indicators disaggregated to the lowest geographical level possible). There is a need to choose variables that are appropriate for identifying the difference in need (deprivation) between geographical areas. For example, the three demographic variables namely females in the reproductive age, children less than five years and adults above 65 years represent the most vulnerable members of the population and are the most frequent users of health services. However, an overview of the indicators shows that the distribution of these variables in the three HSD is similar (Table 10). These variables may therefore not be appropriate in identifying the distinct characteristic of deprivation that is being measured in these HSD. However, these characteristics may be relevant and significantly different in other districts. In the case of Luwero district, the differentiating demographic indicator seems to be rurality of the households (table 10). This may be due to the fact that the majority of the population is immigrating back into Luwero district after the civil war and thus the demographic characteristics are not significantly different between sub-districts.

The most appropriate measures of health status are morbidity and mortality. However, both are poorly recorded in the district as in most of the country. One method of improving the accuracy of this information would be to mobilise the local government health committees to regularly collect the mortality data. The other way would be to improve the health information system with special emphasis on recording the village or HSD of the population that accesses a health facility with the help of Health Unit management Committees (HUMC) that are selected from community members resident in

the service area of the health facility. Thus cross boundary-flow of patients between HSD would be easy to monitor and used to account for resource utilisation by origin of HSD at each facility and therefore HSD.

Based on the proxy of health status that was used, households in Katikamu South seem to have a poorer health status than those in Katikamu North even though the indices shows that they are least deprived. This is one of the problems with self-reported illness as individuals in a higher socio-economic class tend to report more illness and are more likely to consult medical personnel for their illness. This is also the case in this study as Katikamu South actually had the fewest households that did not consult about their illness (table 18). However, also the rapid survey did find that more households in the most deprived HSD (i.e. Bamunanika) reported illness in the last two weeks and more of them failed to consult about their illness or if they did they took much longer compared to the households in the other HSD. This implies that households in Bamunanika have a poorer health status yet have less access to health services. It is also worth noting that reported illness had the highest correlation with elderly. The question then would be whether the fact that Bamunanika has a higher proportion of households with reported illness, failure to consult, taking long to consult and spending more on drugs is because they have a slightly higher number of households with adults above 65 years.

The variable of immunisation status was included as a measure of the health status of children under five and could also be used to make some inference about access to primary health care. It had the highest positive correlation with poor household head education. More children less than five years in Katikamu North are not up to date with

their immunisation and thus the assumption is that more of them would be more likely to develop preventable illness. Although immunisation status was dropped from aggregation of indices, its correlation with education is worth exploring in terms of its implication for overall primary health care delivery. This is an interesting correlation as it may mean that a household head that is not well educated is more likely to have children less than five years with a poor immunisation status. A closer look at the distribution of these two variables shows that Katikamu North has the largest proportion of household heads that have attained least education and also has the largest proportion of children less than five years in the household whose immunisation is not up to date. There is anecdotal evidence that immunisation campaigns in this sub-district have met most resistance. The other variable that did not correlate appropriately was females in the reproductive age group and was not used in the construction of the index.

6.3 Policy implications of deprivation indices for resource allocation

The results show that there is an element of deprivation in the sub-districts and this may be mainly because of the differential remoteness of the sub-districts and the lack of services like water, sanitation and electricity. Table 14 showed that whichever index was used, Bamunanika was the most deprived of the three HSD and this is further emphasised by the fact that this HSD Bamunanika has the largest population of the three and yet it receives relatively few resources.

Beside being deprived and receiving relatively few resources, the population in Bamunanika HSD is less likely to access health services as shown by the health care access index. This relationship seems plausible given that Bamunanika households are all

rural and the remoteness of their residence means that they are less likely to consult for their illness and therefore more likely to develop chronic illness, severe illness or complications. This may explain why Bamunanika households may spend more on drugs following their illness than their counterparts in the other sub-districts. Additionally, the price of drugs in Bamunanika could be higher because of its remoteness.

The fact that Katikamu South is the least deprived HSD may be related to the fact that a larger percentage of its population resides in the urban areas. Two of the three town municipal councils in Luwero district are found in this HSD and thus more of the population may be found in these towns or their surroundings. These areas are also more likely to have better access to water, sanitation and electricity. However, the residents in this HSD characteristically report more illness. The current allocation of resources means that Katikamu South has a much greater supply of health facilities and resources (See table 9 and 15) and thus if residents in this HSD fall ill they are more likely to have better access to a medical person to consult. The health care access index from the rapid survey also seems to confirm this. Residents in Katikamu South are more likely to access health services in that, a greater proportion of them are always able to consult a medical person when they fall ill, spend less time to get consultation and also spend less on medication for their illness.

Bamunanika HSD having fewer health centre III facilities than the least deprived HSD shows that there is room for adjusting resource allocation in the form of creating more health facilities in the extremely remote areas of Bamunanika that actually have a larger population than the least deprived sub-district. However given the extent of inequity in

the resource expenditure between the sub-districts the process of resource re-allocation would have to be done in a gradual manner with emphasis being put on improving access to health services to the remotest areas of the district.

Using the deprivation index in a resource allocation formula as in section 5.3.3 shows that both Bamunanika and Katikamu North are currently not receiving their equitable share of total resources available for allocation. The re-distribution in table 17a and 17b also shows that Katikamu South is receiving much more than its equitable share. Although it may be easy to justify the re-allocation given the objectives of a vertical equity policy and the rigorous process involved in creating an index of need, the political implications are significant. For example the prevailing health service situation is such that most of the primary health care infrastructure is found in Katikamu South yet this HSD has the smallest population.

An analysis of resource allocation based purely on population size shows that per capita expenditure in Katikamu South is almost twice that of Bamunanika (table 15 and 17b). On this basis alone resources can still be re-allocated. It may therefore be easier to convince the district local government to reallocate resources based only on population size. Beside population size one may consider other variables that correlate with need (deprivation). For example instead of using an index composed of a number of variables, one indicator that correlates strongly with the other variables of need could be used. The advantage of such a strategy is that less time is involved in collecting data on indicators of need and the calculations are simple. In this study rurality seems to be the biggest driver of deprivation and could be a good substitute for measuring deprivation. The

results in tables 14, 17a and 17b show that reallocation using rurality as a single variable index of deprivation does not change the direction in which resources need to be reallocated.

As highlighted in section 2.4.4 one of the weaknesses of the resource allocation process is that the re-distribution is not coupled with guidelines for this to be done and the disadvantaged regions have less capacity to use the extra resources allocated in the new budget. Thus, any allocation of additional resources to Bamunanika would have to be in conjunction with capacity development strategies and activities. Katikamu South clearly has more infrastructure and more resources are therefore spent on human resources (Appendix 6). The funds reallocated especially to Bamunanika would have to be spent on improving these two inputs. Similarly, it is important to be on guard against negative consequences of resource reallocation. One of the problems with the formula is that the assumptions may stand the risk of being viewed as "simplistic" and geographical areas end up contesting the allocations compromising any integrated planning. This could lead to unrealistic budgeting. Additionally, any abrupt expenditure cuts may lead to loss of staff morale, compromising the quality of care. Another important factor to note is that the level of relative deprivation may not be significantly different between population groups in the respective sub-districts. Thus any budget or expenditure cuts may actually worsen the inequity in health care in the population groups resident in the sub-district that suffers budget cuts.

Although the process of developing a formula for resource allocation is important, appropriate application of this activity is probably more important. As highlighted above,

the consequences of using the formula are immense especially when there is an unrealistic time frame for the resource allocation to occur. Doherty and van den Heever (1997) suggest that besides being determined by attempting to maintain equity and provision of priority services, the timescale of changes in the allocation should be based on the size of the previous budget (whether there is growth), constraints on the capacity of the respective geographical regions to expand or cut back services and the extent to which the previous year's budget conformed to the projected one.

The challenge for the local government in collaboration with the local community and the central government is therefore to develop clear guidelines on how to measure need at sub-district level as well as realistic timeframes of how to reallocate resources to meet need equitably. Whatever measure of need is selected, clear and simple indicators should also be set up to monitor changes in deprivation and whether vertical equity is being achieved. A single index would be most cost effective to use but its ability to monitor equity of resource allocation should be practical and meaningful.

Besides identifying indicators for measuring need, other indicators that measure what the reallocated resources are spent on, especially in the deprived sub-districts, should be chosen. For example it may have been agreed that the reallocations be spent on human resource; a monitoring indicator would measure the type and number of health personnel relative to the population across the sub-district. This study further emphasises the role of indicators in identifying where resources could be targeted in the health system; in this case health education of the community about the importance of immunisation especially in Katikamu North HSD. Other indicators that need to go hand in hand with those used in

monitoring equity in resource allocation are those that measure whether health services are actually being accessed. By using a simple index of health care access derived from a rapid household survey, inference about access to or capacity to access health services in the respective HSD could be made directly from those that demand (need) the service.

CHAPTER 7

Conclusions

This study has shown that a deprivation index has a role to play in highlighting inequity and monitoring equity in resource allocation and expenditure at the district level in Uganda. For illustration purposes, indices were created in one district in Uganda based on the most important demographic, health status and socio-economic variables that would contribute to measuring need vis-à-vis deprivation. Although the weighted indices did not include a measure of morbidity or mortality they still showed that other socio-economic and demographic characteristics are as important in measuring overall need or deprivation. But application of the indices should be based on more accurate and disaggregated HSD data. This may be possible in the future as the 2002 census was designed to present data disaggregated to the enumeration level and included various demographic and health components not normally included in census questionnaires. Similarly more accurate and disaggregated health expenditure data at the lowest level of district health service delivery should be obtained. This may require developing better frameworks for tracking expenditure in the district and or conducting studies to quantify health expenditure in geographic area(s) at the lowest level.

District managers have not necessarily been provided with adequate guidelines to allocate resources to HSD based on some kind of equity framework. This was clear from the interview with the district manager who said that "... resources within the districts are often allocated based on historical budgets to maintain the status quo of the resource allocation (and services) and if new resources are availed they have to be allocated equally between HSD". The manager also raised the issue of "re-centralisation" of

resource allocation hampering attempts to allocate resources according to need. "... Since the additional resources are often given in the form of conditional grants, allocating resources based on need is a futile exercise". Even at a political level district managers have to contend with the ill-informed bureaucracy at the local government level. "...The district director of health services and his team often find it difficult to convince the district local government that health resources are not enough and only priority services receive funds. They often do not appreciate that shifting resources should be based on genuine principles like equity". However with the deprivation index managers are able to show that the most deprived sub-district is actually under-resourced and there is room for using the indices in a resource allocation formula at the district level so that budgets in the future are allocated to the most deprived areas, albeit gradually, thus improving health service delivery in the most disadvantaged areas at the lowest level of the health care system. District managers are able to identify the most disadvantaged areas at the lowest level of the health care system to which they are able to allocate more funds from the overall allocation of available health care resources in the district, as well as any new funds. This is line with the concept of vertical equity in health care of allocating more resources to the most disadvantaged population. This study is also a primer for further research about issues of equity, deprivation and resource allocation in each district. It is especially important to investigate whether the same indicators of deprivation would be appropriate or necessary in each district given that even without accurate data on demographic, socio-economic or other indicators of health status, reallocation of resources could still begin using the population size or single variables indicators as measures of need.

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APPENDICES

Appendix 1: Tables showing results of aggregation and weighting of variables to create Normalised indices of deprivation

a. Normalised General Index of Deprivation (GID)

GENERAL INDEX OF DEPRIVATION								
	Rural	Elderly	Education	Water	Toilet	Electricity	**GID**	**Normalised GID**
Bamunanika	1.00	0.05	0.61	0.37	0.35	0.82	0.448	**1.17**
Katikamu South	0.74	0.04	0.43	0.18	0.12	0.51	0.283	**1.00**
Katikamu North	0.87	0.04	0.71	0.39	0.25	0.87	0.438	**1.15**
NB. Each variable was multiplied by an equal weight of 0.14								

b. Normalised Environmental Health Index of Deprivation (EHI)

ENVIRONMENTAL HEALTH INDEX OF DEPRIVATION					
	Water	Toilet	Electricity	EHID	**Normalised EHID**
Bamunanika	0.37	0.35	0.82	0.5072	**1.24**
Katikamu South	0.18	0.12	0.51	0.2686	**1.00**
Katikamu North	0.39	0.25	0.87	0.4980	**1.23**
NB. Each variable was multiplied by an equal weight of 0.33					

c. Normalised Single Index of Deprivation (SID)

SINGLE VARIABLE INDEX OF DEPRIVATION		
	Rural	**Normalised SID**
Bamunanika	1.00	**1.26**
Katikamu South	0.74	**1.00**
Katikamu North	0.87	**1.13**
NB. No weight was used		

Appendix 2: RAPID HOUSEHOLD SURVEY QUESTIONNAIRE IN LUWERO DISTRICT TO ASSESS DEPRIVATION FOR ANALYSIS OF EQUITY IN RESOURCE ALLOCATION

	NAME	CODE/NUMBER
1. SUB-DISTRICT		
2. SUBCOUNTY		
3. VILLAGE		
4. ENUMERATION REA		
4. HOUSEHOLD		

SECTION 1: HOUSEHOLD ROOSTER

1.1 Who is the household head (name) _____

1.2 What is the age of the household head? _____

1.3 What is the sex of the household head?

01=Female

02=Male

1.4 How many people are there in the household? _____

1.5 How many people in the household are in the following age groups?

a. 0-1year _____

b. 1-5years _____

c. 5-10years _____

d. 10-15years _____

e. 15+ years _____

f. Females 15-49years _____

g. Adults 65+years _____

1.6 How many __ in the household?

01 Females _____

02 Males _____

1.7 What is the highest educational qualification attained by the house hold/resident head?

01=Non

02= Primary 1-6

03= Primary leaving Exams

04= Senior level 1-4

05= U.C.E

06= Senior 5-6

07= U.A.C.E

08= Higher education including University and other tertiary institute.

SECTION 2: HOUSEHOLD SERVICES

2.1 What is the main source of water used in the household?

01=Piped-internal

02=Piped-yard

03= Water carrier/tanker

04= Piped-public tap (free)

05= Piped-public tap (pay)

06= Bore hole

07= Rain water tank

08= Flowing river

09= Stagnant water

10= Well (non-bore hole)

11= Protected spring

12= Other (specify)

2.2 How far is the water that has to be fetched?

01= Less than 100m

02= 100m-500m

03= 500m- 1km

04= 1km- 5km

05= 5km+

2.3 What type of toilet does the household use?

01= Flush toilet

02= VIP latrine

03= Other latrine

04= Other toilet

05= None

2.4 Is your household connected to electricity supply?

01=Yes

02=No

SECTION 3: HEALTH STATUS

3.1 Has any member of the household been sick or injured in the past 2 weeks

01=Yes

02=No

If yes go to 3.2, if no go to 3.9.

3.2 Name	3.3 Who was Consulted about the illness for treatment?	3.4 Where was the consultation made?	3.5 How long did it take to get to consultation? Hrs/Min/days	3.6 How long did it take to get treatment? Hrs/Minutes	3.7 How much was spent on drugs for the illness?	3.8 If no consultation was made, give a reason?

Use code table below for questions 3.3, 3.4 and 3.8

Codes for 3.3	Code for 3.4	Codes for 3.8
01= Non 02= Family/friend 03= Medical officer 04= Clinical officer 05= Nurse 06= Traditional healer 07= Community Health Worker 08= Other (specify)	01= Home 02= Public Health clinic 03= Private clinic 04= Public Hospital 05= Private Hospital 06= Pharmacy/drug shop 07= Traditional healers 08= Other (specify)	01= Didn't want/no need 02= Expensive 03= No transport 04= Inconvenient time 05= Employee refused 06= Congestion 07= Did not know where to go 08= Other (specify)

3.9 Ask question for children in the household equal to or less than 5years old.

3.9.1 Name	3.9.2 Age	3.9.3 What is the immunization status of the child?	3.9.4 What is the reason for not being immunized or not completing immunization?

Use code table below for questions 3.9.3 and 3.9.4

CODE OF QUESTION 3.9.3	CODE FOR QUESTION 3.9.4
01=Not immunized 02=Immunized (Up to date-by immunization card) 03=Immunized (Up to date-by history) 04=Immunized (Not up to date)	01=Not interested 02=Did not know when to return 03=Family refused immunization because child was sick 04=Health worker didn't immunize because child was sick 05=Mother was sick 06=Clinic/Outreach was too far 07=No money for clinic fee 08=Long waiting time at clinic/outreach 09=Fear of side effects 10=Afraid of catching AIDS 11=Changed residence 12=Child is/was not with family 13=No vaccine

Appendix 3: Household consent form

Interviewer's statement

Am a member of research team from the district carrying out a study to assess the major household characteristics in each of the constituencies in..... District. This information will help the district planners in improving the management and quality of health services in each of the constituencies.

We would like to ask you a few questions about your household on health status and access to health services. The questions will only take a few minutes and all the information you provide will remain confidential.

We will be glad if you accept to take part.

Do you accept to take part in this study?

Yes/No (Circle response)

If yes, proceed with interview

Appendix 4: Interview guideline for district health manager

1. What guidelines do you use when making plans and budgets for health services?
2. Do the guidelines include any resource allocation formula for the sub-district?
3. How do you allocate the resources that have been allocated you?
4. Do you feel as the district manager you are adequately equipped with the capacity to re-allocate resources with in the district?

Appendix 5a: Drug need/cost for health Centre IV

COST OF 1-YEAR DRUG SUPPLY FOR AVERAGE HC IV BASED ON STOCK CARD METHOD-AVERAGE OPD ATTENDANCE =14,063					
ITEM DESCRIPTION	**TOTAL COST**	**ITEM DESCRIPTION**	**TOTAL COST**	**ITEM DESCRIPTION**	**TOTAL COST**
Erythromycin 250mg/tablet	1,634,143	Aminophylline 100mg/tablet	36,792	**Others**	
Amoxycillin cap 250 mg	1,276,966	Imipramine 25mg /Tablet	35,241	Ether Anaethetic 500ml	711,889
Phenoxymethylpenicillin 250mg/tablet	1,263,434	Calcium lactate 300mg/tablet	33,734	ORS (Powder sachets)	553,515
Quinine 300mg/ tabs	1,217,695	Nifedipine tablets	28,287	Diazepam rectal tube 2mg/ml (2.5ml)	300,098
Ampcillin cap 250mg	1,047,632	Amitryptiline tablets 25 mg/tablet	26,299	Nystatin Pessaries 100,000 IU	221,864
Ciprofloxacin tablets 250mg/tablet	945,222	Salbutamol 4mg/tab	23,570	Clotrimazole cream 1% 15gm	202,139
Chloroquine 150mg base/tablet	863,186	Pethidine 50mg/tablet	16,970	Chloramphenicol ear drops	164,489
Cotrimoxazole 480mg/tablet	681,033	Chlorpheniramine 4mg/tablet	15,076	Tetracycline eye ointment 1% tube	146,195
Pyrimethamine / Sulphadoxine tablet	658,869	Glibenclamide tablets 5mg/tablet	12,376	Chloramphenicol eye drops 0.5%.	143,665
Chloramphenicol 250 mg/capsule	614,837	Metochlopromide 10 mg /tablet	11,312	Calamine lotion 100ml	132,648
Nalidixic acid 500mg/tablet	553,831	Bisacodyl 10mg/tablet	10,991	Gentamycin eye /ear drops 0.3%	78,195
Codeine 30mg/tablet	463,691	Benzhexol tablets 2mg/tablet	5,952	Hydrocortisone cream 1%	65,910
Paracetamol 500 mg/tablet	387,463	**Syrups**		Hydrogen peroxide 6% solution	36,979
Tolbutamide 500mg/tablet	370,757	Cotrimoxazole syrup 240mg/5ml	362,158	Gentian Violet 1% aqueous paint	8,028
Cimetidine tablets 200mg/tablet	340,485	Chloroquine 75mg base/ml syrup 100ml	268,024	**Total excluding Contraceptives and Sundries**	**27,287,653**
Griseofulvin 500mg /tablet	338,530	Amoxycillin suspension 125 mg/5ml	258,289	**Contraceptives**	
Tetracycline caps 250 mg	329,157	**Injections**		Medroxy progesterone acetate inj 150mg	1,674,215
Methyldopa 200mg/tablet	298,909	Sodium Chloride IV sol. 0.9% (500 ml)	642,816	Levonorgestrel implants	319,395
Ibuprofen 200mg/tablet	270,112	Benzathine Penicillin 2.4 mU/vial	641,783	Ethinylestradiol + Levonorgestrel (30 + 300 mcg) abs	188,363
Mebendazole 100mg/tablet	232,286	Benzyl penecillin 1mU	588,043	Ethinylestradiol + Levonorgestrel (30 + 150 mcg) tabs	135,162
Metronidazole 200mg/tablet	226,233	Procaine benzyl penicillin forte (PPF)	433,900	Levonorgestrel 75 mcg tablets	108,718
Ketoconazole 200 mg/tablet	222,053	Quinine inj. 300 mg/2ml	424,161	**Medical supplies**	
Propranolol 40mg/tablet	207,048	Lignocaine inj. 2% 20ml vial	403,669	Gloves surgical	1,409,259
Doxycycline 100 mg/tablet	199,786	Chloroquine inj.40mg/m l(5ml)	353,179	Syringes and needles 5 ml	1,168,130
Carbamazepine tablets 200mg/talet	189,943	Water for injection 10 ml ampoules	340,959	Cotton wool roll (500 G)	539,000
Amodiaquine 200 mg/tablet	163,294	Ringers lactate IV sol. 500ml	265,076	Gloves disposable (Examination)	464,227
Cotrimoxazole 120 mg/tablet	157,482	Cloxacillin 250mg/capsule	264,424	iv cannula 22G	350,995
Acetylsalicylic acid 300mg/tablet	153,376	Cloxacillin inj 500mg	254,966	Blood giving sets	345,039

Nystatin tab.500,000IU/tablet	127,949	Dextrose 5% sol (500ml)	247,123	Syringes and needles 2ml	229,430
Ferrous Sulphate tablets 60mg	126,304	Chloramphenicol inj. 1.0 G/vial	227,392	Suture catgut chromic 0	196,043
Multivitamin 1mg/tablet	125,269	Dexamethasone injection 8mg/2ml	219,859	Infusion giving sets (Adult)	134,935
Phenytoin 100mg/tablet	120,427	Ketamine 500mg/10ml	168,056	Cord ligatures	132,109
Digoxin 0.25mg/tablet	115,951	Bendrofluazide 10 mg/tablet	161,583	iv cannula 18G	128,523
Prednisone 5mg/tablet	103,609	Hydrocortisone succinate inj. 100 mg	132,775	Butterfly needles 23	102,609
Magnesium Trisillicate 370mg/tablet	92,932	Darrows Half Strength i/v 500 ml	130,841	Butterfly needle 21	84,172
Ascorbic acid tablets	75,719	Methylergometrine 0.2 mg/ml ampoule	120,666	Gauze absorbent cotton	67,235
Frusemide Tab 5mg /tablet	74,108	Pethidine inj 100mg/2ml	109,978	Suture catgut chromic 2/0	51,142
Diazepam 5mg/tablet	71,113	Gentamycin inj. 80 mg/2ml ampoule	96,952	Nasogastric tube 18 G	37,159
Nitrofurantoin 100mg /tablet	63,318	Diazepam inj. 10 mg/ml (2ml ampoule)	74,203	Syringes and needles 10 ml	35,811
Phenorbarbitone 30mg/tablet	59,874	Frusemide inj 20 mg/ml (ampoule)	64,940	Crepe bandage 100mm x 4m	34,222
Charcoal Activated 250mg	56,173	Atropine inj.1mg/ml	29,616	Scalpel blades size 22	29,168
Diclofenac tablets 50mg tablets	53,784	Chlorpromazine inj. 50 mg/2ml	28,969	**Total**	**35,252,714**
Chlorpromazine 25mg/tab	50,931	Oxytocin inj. 10 I.U./ml ampoule	22,799		
Promethazine 25 mg/tablet	48,768	Metochlopromide inj. 10 mg /2ml	22,514		
Pyridoxine (Vitamin B6) tablets	46,276	Aminophylline inj. 100 mg/ampoule	21,703		
Folic Acid 1 mg/tablet	41,912	Adrenaline inj.1 mg/ml ampoule	18,439		
Vitamin B. Complex Tablets	38,646	Ampicillin powder for injection 500mg	17,862		
Vitamin A caps 200,000IU	37,765	Phytomenadione inj. 1 mg/ml	9,441		

Source: Vincent David and Khalid Mohammed (2002).

Appendix 5b: Drug need/cost for health Centre II and health centre III

COST OF 1-YEAR SUPPLY OF DRUGS FOR AVERAGE HC II AND III BASED ON STOCK CARD METHOD				
HC II			**HC III**	
AVERAGE ANNUAL OPD ATTENDANCE	**6,578**		**AVERAGE ANNUAL OPD ATTENDANCE**	**8,551**
Tablets and capsules	**TOTAL COST**		**Tablets and capsules**	**TOTAL COST**
Erythromycin 250mg/tablet	795,062	1	Erythromycin 250mg/tablet	1,505,591
Ampcillin cap 250mg	597,969	2	Phenoxymethylpenicillin 250mg/tablet	747,832
Phenoxymethylpenicillin 250mg/tablet	582,638	3	Ampcillin cap 250mg	650,979
Amoxycillin cap 250 mg	520,844	4	Chloroquine 150mg base/tablet	614,300
Chloroquine 150mg base/tablet	456,665	5	Amoxycillin cap 250 mg	587,673
Quinine 300mg/ tabs	355,654	6	Quinine 300mg/ tabs	566,876
Cotrimoxazole 480mg/tablet	326,829	7	Cotrimoxazole 480mg/tablet	486,300
Chloramphenicol 250 mg/capsule	295,172	8	Ciprofloxacin tablets 250mg/tablet	437,646
Pyrimethamine / Sulphadoxine tablet	274,938	9	Pyrimethamine / Sulphadoxine tablet	349,068
Ciprofloxacin tablets 250mg/tablet	268,571	10	Chloramphenicol 250 mg/capsule	314,001
Tetracycline caps 250 mg	169,060	11	Paracetamol 500 mg/tablet	225,529
Paracetamol 500 mg/tablet	153,140	12	Tetracycline caps 250 mg	222,271
Cimetidine tablets 200mg/tablet	146,429	13	Doxycycline 100 mg/tablet	177,572
Cotrimoxazole 120 mg/tablet	126,755	14	Vitamin A caps 200,000IU	175,003
Nystatin tab.500,000IU/tablet	122,245	15	Ibuprofen 200mg/tablet	155,721
Ibuprofen 200mg/tablet	114,435	16	Cotrimoxazole 120 mg/tablet	142,817
Mebendazole 100mg/tablet	112,911	17	Mebendazole 100mg/tablet	132,199
Acetylsalicylic acid 300mg/tablet	94,937	18	Metronidazole 200mg/tablet	125,379
Metronidazole 200mg/tablet	93,234	19	Ketoconazole 200 mg/tablet	110,948
Amodiaquine 200 mg/tablet	92,739	20	Acetylsalicylic acid 300mg/tablet	106,827
Doxycycline 100 mg/tablet	91,130	21	Nystatin tab.500,000IU/tablet	95,809
Ketoconazole 200 mg/tablet	82,795	22	Cimetidine tablets 200mg/tablet	88,292
Vitamin A caps 200,000IU	72,264	23	Amodiaquine 200 mg/tablet	80,079
Prednisone 5mg/tablet	66,130	24	Ferrous Sulphate tablets 60mg	75,386

Ascorbic acid tablets	63,289	25	Multivitamin 1mg/tablet	68,968
Ferrous Sulphate tablets 60mg	54,025	26	Methyldopa 200mg/tablet	59,334
Multivitamin 1mg/tablet	50,651	27	Magnesium Trisillicate 370mg/tablet	53,052
Vitamin B. Complex Tablets	49,097	28	Ascorbic acid tablets	49,982
Magnesium Trisillicate 370mg/tablet	37,385	29	Propranolol 40mg/tablet	49,016
Phenorbarbitone 30mg/tablet	28,426	30	Diazepam 5mg/tablet	43,691
Diazepam 5mg/tablet	26,874	31	Vitamin B. Complex Tablets	38,646
Frusemide Tab 5mg /tablet	22,431	32	Prednisone 5mg/tablet	38,442
Folic Acid 1 mg/tablet	16,981	33	Phenorbarbitone 30mg/tablet	27,942
Chlorpromazine 25mg/tab	15,051	34	Folic Acid 1 mg/tablet	25,921
Chlorpheniramine 4mg/tablet	8,754	35	Frusemide Tab 5mg /tablet	19,458
Propranolol 40mg/tablet	8,294	36	Chlorpromazine 25mg/tab	12,313
Salbutamol 4mg/tab	12,506	37	Salbutamol 4mg/tab	9,896
Syrups		38	Chlorpheniramine 4mg/tablet	8,898
Amoxycillin suspension 125 mg/5ml	491,505		**Syrups**	
Cotrimoxazole syrup 240mg/5ml	452,844	39	Amoxycillin suspension 125 mg/5ml(100 ml	333,262
Injections		40	Cotrimoxazole syrup 240mg/5ml	234,227
Ampicillin powder for injection 500mg	368,042		**Injections**	
Benzathine Penicillin 2.4 mU/vial	274,038	41	Benzathine Penicillin 2.4 mU/vial	394,143
Procaine benzyl penicillin forte (PPF)	188,862	42	Procaine benzyl penicillin forte 4MU (PPF)	271,409
Chloroquine inj.40mg/ml(5ml)	146,237	43	Ampicillin powder for injection 500mg	214,919
Quinine inj. 300 mg/2ml	135,633	44	Chloroquine inj.40mg/ml(5ml)	172,615
Benzyl penecillin 1mU	92,958	45	Chloramphenicol inj. 1.0 G/vial	152,490
Dextrose 5% sol(500ml)	90,659	46	Quinine inj. 300 mg/2ml	152,409
Chlorpromazine inj. 50 mg/2ml	83,981	47	Benzyl penecillin 1mU	135,576
Chloramphenicol inj. 1.0 G/vial	72,021	48	Sodium Chloride IV sol. 0.9% (500 ml)	112,819
Lignocaine inj. 2% 20ml vial	63,870	49	Aminophylline inj. 100 mg/ampoule	103,886
Water for injection 10 ml ampoules	62,251	50	Water for injection 10 ml ampoules	101,980
Sodium Chloride IV sol. 0.9% (500 ml)	53,428	51	Dextrose 5% sol(500ml)	99,850
Gentamycin inj. 80 mg/2ml ampoule	50,163	52	Gentamycin inj. 80 mg/2ml ampoule	64,310

Hydrocortisone succinate inj. 100 mg via	41,925	53	Hydrocortisone succinate inj. 100 mg vial	39,949
Methylergometrine 0.2 mg/ml ampoule	22,266	54	Lignocaine inj. 2% 20ml vial	31,276
Aminophylline inj. 100 mg/ampoule	22,094	55	Methylergometrine 0.2 mg/ml ampoule	28,226
Diazepam inj. 10 mg/ml (2ml ampoule)	13,801	56	Diazepam inj. 10 mg/ml (2ml ampoule)	23,746
Others		57	Chlorpromazine inj. 50 mg/2ml	19,185
Nystatin Pessaries 100,000 IU	396,072	58	Adrenaline inj.1 mg/ml ampoule	18,871
Diazepam rectal tube 2mg/ml (2.5ml)	313,778		**Others**	
Clotrimazole cream 1% 15gm	302,249	59	Cetrimide + Chlorhexidine(0.5 + 0.05)% 5L	1,259,988
ORS (Powder sachets)	282,124	60	ORS (Powder sachets)	268,110
Tetracycline eye ointment 1% tube	116,841	61	Diazepam rectal tube 2mg/ml (2.5ml)	246,854
Gentamycin eye /ear drops 0.3%	76,437	62	Nystatin Pessaries 100,000 IU	140,572
Chloramphenicol eye drops 0.5%.	35,758	63	Whitfield ointment	127,206
Gentian Violet 1% aqueous paint	34,027	64	Tetracycline eye ointment 1% tube	126,933
Whitfield ointment	24,415	65	Clotrimazole cream 1% 15gm	102,205
Benzyl benzoate emulsion 25% 60ml	15,741	66	Chloramphenicol eye drops 0.5%.	68,982
Subtotal	**10,730,325**	67	Gentamycin eye /ear drops 0.3%	65,420
Contraceptives		68	Gentian Violet 1% aqueous paint	9,317
Ethinylestradiol/Levonorgestrel (30/150)	71,811	69	Benzyl benzoate emulsion 25% 60ml	8,710
Ethinylestradiol + Levonorgestrel (30 + 300 mcg)tabs	175,514		**Sub total**	**13,809,102**
Medroxy progesterone acetate inj 150mg	588,659		**Contraceptives**	
Levonorgestrel 75 mcg tablets	20,332	70	Ethinylestradiol + Levonorgestrel (30 + 150 mcg) tabs	56,439
Condoms	799,890	71	Ethinylestradiol + Levonorgestrel (30 + 300 mcg)tabs	106,831
Medical supplies		72	Medroxy progesterone acetate inj 150mg	803,890
Cotton wool roll (500 G)	101,911	73	Levonorgestrel 75 mcg tablets	51,763
Gauze absorbent cotton	19,307	74	Condoms	635,377
Gloves disposable (Examination)	91,483		**Medical supplies**	
Gloves surgical	300,516	75	Cotton wool roll (500 G)	130,521
Infusion giving sets (Adult)	22,333	76	Gauze absorbent cotton	28,809
Syringes and needles 5 ml	333,292	77	Gloves disposable (Examination)	102,147
		78	Gloves surgical	469,519

		79	Infusion giving sets (Adult)	46,413
		80	Syringes and needles 5 ml	221,130
Total	**13,255,373**		**Total**	**16,461,942**

Source: Vincent David and Khalid Mohammed (2002).

Appendix 6a. Allocation/expenditure of wages, drugs and grants in Bamunanika sub-district

Key resource allocation to Bamunanika Health Sub-district (Million-Shillings)			
	Wages	**Drugs and supplies**	**PHC grant**
Health Centre IV			
Kalagala	50,578,836	35,252,714	89,441,545
Total	**50,578,836**	**35,252,714**	**89,441,545**
Health Centre III			
Wabusana	18,556,236	16,461,942	0
Zirobwe	23,595,516	16,461,942	0
Bamunanika	20,306,292	16,461,942	0
Kamira	16,457,508	16,461,942	0
Total	**78,915,552**	**65,847,768**	**0**
Health Centre II			
Bububi	3,544,596	13,255,373	0
Kibengo	1,297,596	13,255,373	0
Mazzi	0	0	0
Total	**4,842,192**	**26,510,746**	**0**
Sub-total	**134,336,580**	**127,611,228**	**89,441,545**
Grand total	**351,389,353**		
Per capita total allocation (Ugsh.)	**2,779**		
Per capita total allocation ($)	**1.85**		
Per capita human resource allocation (Ugsh.)	**1,062**		
Per capita human resource allocation ($)	**0.71**		
Per capita drug and supplies allocation (Ugsh.)	**1,009**		
Per capita drug and supplies allocation ($)	**0.67**		
Per capita PHC grant allocation (Ugsh.)	**707**		
Per capita PHC grant allocation ($)	**0.47**		

Appendix 6b. Allocation/expenditure of wages, drugs and grants in Katikamu South sub-district

Key resource allocation to Katikamu South Health Sub-district (Million-Shillings)			
	Wages	Drugs and supplies	PHC grant
Health Centre IV			
Nyimbwa	54,604,392	35,252,714	73,330,690
Total	**54,604,392**	**35,252,714**	**73,330,690**
Health Centre III			
Bowa	13,657,680	16,461,942	0
Bombo	15,198,300	16,461,942	0
Nsawo	14,067,180	16,461,942	0
Kikoma	17,951,580	16,461,942	0
Katikamu	16,785,612	16,461,942	0
Makulubita	18,499,560	16,461,942	0
Bukalasa	19,198,920	16,461,942	0
Total	**115,358,832**	**115,233,594**	**0**
Health Centre II			
Bukolwa	0	0	0
Total	**0**	**0**	**0**
Sub-total	**169,963,224**	**150,486,308**	**73,330,690**
Grand total	**393,780,222**		
Per capita total allocation (Ugsh.)	**4,984**		
Per capita total allocation ($)	**3.32**		
Per capita human resource allocation (Ugsh.)	**2,151**		
Per capita human resource allocation ($)	**1.43**		
Per capita drug and supplies allocation (Ugsh.)	**1,905**		
Per capita drug and supplies allocation ($)	**1.27**		
Per capita PHC grant allocation (Ugsh.)	**928**		
Per capita PHC grant allocation ($)	**0.62**		

Appendix 6c. Allocation/expenditure of wages, drugs and grants in Katikamu North sub-district

Key resource allocation to Katikamu North Health Sub-district (Millions-Shillings)			
	Wages	**Drugs and supplies**	**PHC grant**
Health Centre IV			
Kasana	81,036,276	35,252,714	71,081,661
Total	**81,036,276**	**35,252,714**	**71,081,661**
Health Centre III			
Butuntumula	15,776,472	16,461,942	0
Kyalugondo	16,802,112	16,461,942	0
Total	**32,578,584**	**32,923,884**	**0**
Health Centre II			
Kikube	5,109,240	13,255,375	0
Kigombe	7,323,252	13,255,375	0
Katuugo	7,989,120	13,255,375	0
Kabakedi	5,083,572	13,255,375	0
Lutuula	0	0	0
Total	**25,505,184**	**53,021,500**	**0**
Sub-total	**139,120,044**	**121,198,098**	**71,081,661**
Grand total	**331,399,803**		
Per capita total allocation (Ugsh.)	**3,049**		
Per capita total allocation ($)	**2.03**		
Per capita human resource allocation (Ugsh.)	**1,280**		
Per capita human resource allocation ($)	**0.85**		
Per capita drug and supplies allocation (Ugsh.)	**1,115**		
Per capita drug and supplies allocation ($)	**0.74**		
Per capita PHC grant allocation (Ugsh.)	**654**		
Per capita PHC grant allocation ($)	**0.44**		
Total expenditure in 3 sub-districts	**1,076,569,378**		