AN ASSESSMENT OF EQUITY IN GEOGRAPHICAL ALLOCATION OF RESOURCES RELATIVE TO NEED, IN PUBLIC PRIMARY HEALTHCARE SERVICES IN THE NORTHERN CAPE IN SOUTH AFRICA

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A minithesis submitted in partial fulfilment of the requirements for the degree of Master of Public Health in the Department of Community Health Sciences, University of the Western Cape.

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An assessment of equity in geographical allocation of resources relative to need, in public primary healthcare services in the Northern Cape in South Africa

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KEYWORDS

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Health expenditure per capita

ABSTRACT

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South Africa has one of the most unequal societies in the world with regard to income, gender, socio-economic status and the distribution of key social services. Much of these inequalities, which are also reflected in its health sector and the general health status of its different population groups, can be attributed to the discrimination and systematic disadvantaging of certain race groups under the apartheid rule. Many researchers have highlighted and raised concern about these substantial disparities in allocation of resources between provinces. In spite of efforts by the post apartheid government to reduce such inequities, these geographic disparities still exist not only between provinces, but also within provinces.

Government resource allocation decisions are largely geographically based and the fiscal federalism, currently used in South Africa has been recognised in many ways for its incompatibility of promoting equity across national sectors. Though inter-provincial allocation of health budgets are set through the medium term fiscal framework process and are monitored for equity, most provinces still use historical budgets when making resource allocations at the district level, resulting in many rural areas and health districts being under-resourced. In a country like South Africa with gross inequities in health, equity in geographical allocation of resources can only be achieved through vertical equity, by preferential allocation of resources based on increased need.

This descriptive study uses routinely available data to compare health expenditure to health needs in measuring the inequities in financial and human resource allocation, relative to need, between districts in the Northern Cape. By identifying the dependent population and then areas of increased need through the use of different indicators weighted according to their costs and burden on health services, it estimates a composite measure of need for a health district. This measure of composite need is then compared with the expenditure per district to measure the distance from equity for each district.

The study also estimates the equitable number of professional nurses per district in proportion to the dependent population and also assesses the inequities in distribution of professional nurses between districts. The study concludes by making recommendations based on the analysis to the provincial health management for the equitable redistribution of finance and staff to achieve equity between districts.

November 2004

DECLARATION

I declare that *An assessment of equity in geographical allocation of resources relative to need, in public primary health care services in the Northern Cape in South Africa* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Ajith John Philip   November 2004

Signed……………………………

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GLOSSARY

Adjusted dependent population (ADP). This is the dependent population consisting of the sum of the dependent people after all weighting of indicators.

Budgeting. The process of deciding the actual concrete use of financial resources.

Dependent person. This is a person equivalent that primarily uses public primary health care services (Scott et al 2004). It is calculated by adding a proportion of the people with medical aid coverage (health insurance) to the public sector dependent population.

Dependent population. This is the sum of all dependent persons living in a geographical area (Scott et al 2004).

Economics. Defined by Samuelson (1970) as "the study of how men and society end up choosing, with or without the use of money, to employ scarce productive resources, which could have other uses, to produce various commodities and distribute them for consumption, now or in the future, among various groups in society".

Equitable allocation. This is the planned distribution of resources, based on principles of equity.

Expenditure per capita (Health). The amount of money allocated by the government for the maintenance of health services and for the provision of health care to every citizen in the country within a specific period.

Health need. The need for promotive, preventative, curative and rehabilitative health services and the possibility of benefiting from those services.

HIV prevalence (%). Percentage of the population estimated to be HIV positive.

Indicator. A measure which converts raw data into useful information to allow comparison between two variables.

Indicators of increased need. In the equity context, these are indicators which are large cost drivers and which show differing levels of need between sub districts.

Medical aid coverage. The percentage of the population covered by medical schemes.

Need. In health economics context can be defined as "the ability to benefit from the best available health care service".

PHC. Stands for primary health care and is the first level of contact which an individual has with formal health services. Includes preventive, promotive, curative and rehabilitative health care services.

Planning. The decisions made for the future with the aim of ensuring that present and future resources are optimally used for providing appropriate, efficient and equitable health services.

Primary care services package. The essential package of services, agreed upon nationally, to be offered within each sub district at primary care facilities.

Public Sector Dependent population. This is an adjustment of the total population to a number assumed to be dependent primarily on health care services in the public sector. Its estimation is based on medical aid (health insurance) coverage and is calculated by subtracting the number of people who have medical scheme cover (health insurance) from the total population.

Resources. In the equity context, includes both financial and human resources.

Variable. A measure that varies geographically and with time.

Weighting an indicator. Adding extra weight to an indicator, making it count for more or less.

ABBREVIATIONS

AIDS - Acquired Immune Deficiency Syndrome

ANC – Antenatal Care

CTEG - Cape Town Equity Gauge

DHIS - District Health Information System

DoF - Department of Finance

DSE - Department of State Expenditure

FFC - Financial and Fiscal Commission

GDP - Gross Domestic Product

GEAR - Growth, Employment and Redistribution

HIV - Human Immune deficiency Virus

MTEF - Medium Term Expenditure Framework

PHC - Primary Health Care

QALY - Quality Adjusted Life Years

SAHR - South African Health Review

TB - Tuberculosis

WHO - World Health Organisation

ILO - International Labour Organisation

UNICEF - United Nations Children's Fund

1. <u>Introduction</u>

South Africa has one of the most unequal societies in the world with regard to income, socio-economic status and the distribution of key social services like education, water and sanitation, energy, health and welfare. Much of these inequalities, which are also reflected in its health sector and the general health status of its different population groups, can be attributed to the discrimination and systematic disadvantaging of certain race groups under the apartheid rule. Racial segregation, fragmentation and separation of facilities under different 'homelands', also affected the provision of health care services resulting in inequitable, fragmented and uncoordinated provision of health services.

Geography plays an important role in equity concerns, as many systems of health care are organised on a geographical basis and can be closely associated with variations in equal access to health care or equal health outcomes. This also concerns the geographical basis of allocation and distribution of health resources and the principal methods of allocating health care finance to geographical regions, both being key elements in the adjustment of health care resources between different geographical areas. The geographical allocation of resources refers to the process whereby resources, particularly financial resources, are distributed from a central level to peripheral levels, with the essential aim of ensuring that all available resources are fairly distributed between health districts and efficiently utilised (Green, 1992; Reagon, Makan and McIntyre, 1997).

Government resource allocation decisions are largely geographically based and the fiscal federalism, currently used in South Africa has been recognised by many researchers for its incompatibility of promoting equity across national sectors (McIntyre, Thomas, Mbatsha & Baba, 1999a). Though inter-provincial allocation of health budgets are set through the medium term fiscal framework process and are monitored for equity, most provinces still use historical budgets when making resource allocations at the district level (McIntyre, Thomas, Mbatsha and Baba, 1999b; Mbatsha and McIntyre, 2001), resulting in many rural areas and health districts being under-resourced. Such systems of health financing based on historical or empirical models of expenditure patterns, which do not cater to the changing demographic and health needs of different populations, are unlikely to be useful in estimating health finance and thus may not help in resolving unacceptable variations in health outcomes. It is therefore essential to measure and monitor the allocation of resources relative to need within provinces.

Equitable and efficient utilisation of resources by PHC requires adequate planning and budgeting for different types and amount of services to be delivered depending on the health needs of the population. Successful implementation of geographical resource allocation also requires health districts to be capable of managing a decentralised financial and general system. As indicated earlier, addressing historical inequities left behind by the apartheid era, in the allocation of health resources to different geographical areas is a major challenge, which requires proactive efforts and proper monitoring.

2. <u>Primary Health Care (PHC) – An overview</u>

The government of South Africa is committed to providing primary health services as a fundamental right with the aim of promoting the health of all South Africans through a caring and effective national health system, based on the PHC approach and assumed the responsibility to ensure access to such services. Free health services as part of the national health care plan are available at primary health care facilities such as clinics, community health care centres and local governments with the aim of directing patients away from large hospitals (Burger, Beard and Kromberg, 1999). PHC services in South Africa are rendered by trained nurses and at some facilities by medical doctors.

2.1 <u>The historical, socio-economic and health context of PHC</u>

Between the 1950's and 60's the world witnessed rapid industrialisation and economic growth in the western industrial countries. The 'concept' of development moved from a conventional phase to a more specialised, intricate and rather utopian phase where development was often equated with industrial development and economic growth (Nealer, 2003). The western countries were regarded as already developed industrial countries and were modelled in capital projects and various development programmes by the so-called developing countries in an attempt to catch up and achieve the same economic and political growth, termed the modernisation approach to development. However, the modernisation approach to development was slow to bring about the so-called 'trickle-down' effect and soon there were significant differences in development between different countries. As quoted by Ebrahim and Ranken (1988) in Nealer (2003), "the dream of economic miracle was turning into the nightmare of permanent debt and dependency". While some schools attributed these differences in development between different countries to internal political and economic inefficiency

and socio-cultural reluctance and incapacity, other schools viewed the attempt at modernisation as a process of exploitation by the developed countries.

Nevertheless, by the late 1960's it became clear that the so-called modernisation approach to development in the third world was unsuccessful and by the early 1970's there were reports by the WHO and ILO of apparent contradictions and inequalities in the levels of development of health services between member countries. The failure of the modernisation approach led to more emphasis being placed on practical strategies and person centred approaches to deal with human needs in specific communities and to increase efforts to expand access to health services. This eventually led to the The International WHO-UNICEF Conference on Primary Health Care (PHC) in Alma-Ata, Kazakhstan, in 1978, which brought together 134 countries and 67 international organizations. The conference defined and granted international recognition to the concept of primary health care (PHC) as a strategy to reach the goal of 'Health for All' by the year 2000.

2.2 Defining Primary Health Care

Primary Health Care (PHC) in its narrow definition denotes the first level of contact, which an individual has with formal health services. The broader definition of PHC, as declared at Alma-Ata in 1978, however does not only refer to the first contact of care, but is rather a philosophical statement towards healthcare. According to the broader definition, PHC is

> "Essential healthcare based on practical, scientifically sound and socially acceptable methods and technology, made universally accessible to individuals and families in the community through their full participation and at

a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination" (WHO-UNICEF, 1978 as cited in Walt and Vaughan, 1981, p.1).

This definition of PHC is broader in its description of PHC and distinguishes it from the earlier narrower perceptions of primary health care.

2.3 <u>Primary health care services in South Africa</u>

The following services are provided at primary care facilities (Burger et al., 1999):

- Immunisation

- Communicable and endemic disease prevention

- Maternity care

- Screening and growth monitoring of children

- Integrated Management of Childhood Illnesses and child health care

- Health promotion

- Youth health services

- Counselling services

- Management of chronic diseases

- Diseases of older persons

- Rehabilitation

- Accident and emergency services

- Family planning

- Oral health services

2.4 <u>The Primary health care approach and its implications</u>

The broader definition of PHC underlines the five principles of equitable distribution of health services, active community participation and involvement, focus on preventive and promotive services, the use of appropriate technology and a multi-sectoral approach to healthcare. This broader view of PHC is often referred to as the primary health care approach and advocates the provision of frontline, first contact services within the framework of the above five principles (Walt and Vaughan, 1981). Implementing the primary healthcare approach within the framework of the five principles has its implications in political, economic, planning, management and resource allocation spheres of both the public/governmental and the private/non-governmental sector. According to Frankish (undated), adopting the primary health care approach requires that the governments adopt a multisectoral developmental approach; cost effective strategies and policies that promote equity; and demonstrate political commitment to a total developmental strategy. The primary healthcare approach essentially requires the shift of health resources between sectors in an attempt to achieve equity. As Green (1992, as cited in Reagon et al., 1997) states, "the principles of PHC suggest that decisions on how resources are used should be decentralised as far as possible". This requires a strong political will and wider constituencies of support warranting political support at all levels. Financial implications may be profound where no services exist and in rural areas or when an expansion of services is required, resulting in increased competition for limited financial resources. In countries with dominating or considerable private provision of health care services, the provision of primary care services may be more innovative and flexible making it difficult for the government to implement its policies or gain adequate control over the sector (Walt and Vaughan, 1981).

2.5 <u>Financing and resource allocation in primary health care</u>

Primary health care financing comprises of a mixture of direct funding and transfers from the province and own revenue generated by the local government. Funds are allocated to the provinces and local governments by the National Treasury in the form of block grants and conditional grants. Provincial treasuries then allocate these funds across different sectors through their own budget process, which is explained in more detail in the section on the budget process. Provincial Departments of Health receive their share of the budget and allocates it to different activities and levels of care. Provincial Departments of Health also contribute to the funding of services through their direct expenditure and also by way of transfers to local governments. Local governments also raise their own funds for health care through local taxes. However, there is no formal mechanism, which protects the amount of funds available for primary health care at any stage during the process of resource allocation (Thomas, Mbatsha, Muirhead, and Okorafor, 2004).

Resource allocation decisions in health focus largely on the distribution of financial resources (budgets) as resources follow budgets. The equitable distributions of financial resources at local levels require that it be based on the key principles of equity, efficiency and affordability. When planning resource allocation, factors such as population; the need and demand for services; the current distribution of facilities; personnel and services; the service delivery norms; and the current level of funding need to be taken into consideration. Good planning and implementation together with the identification of challenges and priorities and the coordination of plans and budgets are required to solve inherited inefficiencies and inequities in resource allocation. Different approaches have been used in the planning of resource allocation at district levels. Approaches used include the historical approach (basing future budget allocations on previous budgets or expenditure levels, an approach criticised for its ignorance of the changing needs of the population and insufficient for making

significant impacts on inherited inequities); the formula based approach (allocation of budget based on a formula, as block grants which are distributed at the discretion of district managers); and the service platform approach (the effective and equitable distribution of facilities and services being decided first based on a formula and the budgets follow) (Reagon et al., 2004). Though different formulae have been proposed and some being used at different levels of government in an attempt to achieve a more equitable distribution of public sector health care resources between and within provinces (Reagon et al., 1997; McIntyre et al., 1999b; Muirhead, 2000), as stated earlier, many researchers are of the opinion that district level resource allocations are still made on the basis of historical budgets without adequately considering the needs of the population (McIntyre, Thomas, Mbatsha and Baba, 1999b; Mbatsha and McIntyre, 2001) resulting in an inequitable distribution of resources within different health districts.

3. Profile of the Northern Cape

3.1 Geographical characteristics

The Northern Cape is one of the nine provinces of the Republic of South Africa and is situated in the North Western part of the country with Namibia and Botswana bordering on the north of the province. The province lies to the south of the Orange River, which provides the basis for its healthy agriculture. Its western boundary is formed by the Atlantic Ocean.

The Northern Cape is a place of many small and large towns surrounded by vast arid plains with outcroppings of haphazard rock piles. The province consists of four districts namely Namakwa, Siyanda, Karoo and Frances Baard and a cross-border area named Kgalagadi, shared with the Northwest Province. The Northern Cape is

mostly formed of urban areas with an urban percentage of 73 and a non-urban percentage of 23 (Statistics South Africa, 2003). The Province is serviced by an excellent road network, which makes its interior easily accessible from South Africa's major cities, harbours and airports. Kimberly, the capital situated in the Frances Baard district, is the wealthiest city in the province. Other large towns in the province are Upington in Siyanda district which is the centre of the Karakul sheep and dried fruit industries and the most northern wine-making region in South Africa; De Aar in Karoo district which is the hub of the South African railway network; Springbok in Namakwa district; Sutherland, the coldest town in the country; the sheep farming towns of Carnarvon, Colesburg, Kenhardt and Prieska; and Kuruman in Kgalagadi, which is the cross border area (Burger et al., 1999). The major airports are situated in Kimberley and Upington. The province is a semi-arid region characterised by cold and frost in winter and extremely high temperatures in summer. Apart from the narrow strip of winter-rainfall area along the coast, the province receives very low summer rainfall. The province is also home to many national parks, conservation areas and natural ecosystems in the world (Burger et al., 1999).

3.2 The population

The population of the province has been estimated to be 816,273 (Statistics South Africa, 2003). There has been a decrease in population compared to previous years. About 69% of the people speak Afrikaans. Other languages spoken are Setswana, IsiXhosa and English. The province covers an area of 361,023 square kilometres, the largest of all the provinces, representing 29% of the total landmass of South Africa, but is least populated (about 2% of the population of South Africa) with a population density of 2.6 people per squared kilometre and an average household size of 3.7 (Department of Health, 2001). Frances Baard is the most densely populated district in

the province. 49% of the population is male and 51% female. The Northern Cape's child and youth makeup 42% of the population while the working or productive group make up 54% of the population (Department of Health, 2001).

3.3 <u>Socio-economic profile and literacy rates</u>

The Northern Cape contributes 2% of the national gross domestic product (GDP). The main contributors to GDP are mining and quarrying; government and community services; trade, wholesale and accommodation; transport, storage and communication; finance, insurance, real estate and business services. The economy of the province is primarily based on mining and agriculture. The top five employment sectors are agriculture, hunting, forestry and fishing; community, social and personal services; wholesale and retail trade; private and households and mining and quarrying. The current unemployment rate is 41% and poverty prevalence is 38.2%. The illiteracy rate of the province is 18.2% with 18% of the population having had no schooling, 8% having completed primary, 17% matric and 6% higher education (Department of Health, 2001).

3.4 <u>Health status</u>

The province has an Infant Mortality Rate of 46 per 1000 births, an Under 5 Mortality Rate of 72 per 1000 births and an adult mortality rate of 44% in men and 32% in women. The life expectancy in years for men is 56 years and women are 62 years. The prevalence of HIV among Antenatal clinic attendees in 2002 was 15.15% and that of the total population was 8.4%. The incidence of all cases of TB in the province is 954.4 per 100,000 of the population, which is higher than the national average. The total percentage of people with disabilities in the province is 5.7% of the total

population (Day and Hedberg, 2004). The top ten causes of death in the Northern Cape between 1999 and 2001 are illustrated in Table XI in appendix.

3.5 Demographic and socio-economic determinants of health

The difference in health status among geographical areas and population groups replicate differences in demographic socio-economic conditions. 31% of the population of the Northern Cape is under 15 years of age and 8.2% over 60 years. About 20% of the population live in informal homes, 60% use electricity as the primary source of energy for cooking and 70% have access to refuse removal services. About 17% of households do not have onsite water and 11% have no toilet facility. 31% of households have access to a telephone (Statistics South Africa, 2003).

3.6 Health resources

3.6.1 Health administration

Prior to 1994, the Northern Cape's health administration was managed from Cape Town with "relatively menial management information and health information systems, …there were few well-accepted norms and standards and the Northern Cape did not exist as an entity "(Broomhead, 2004, p.9 & p.15). The lack of maintaining proper health information during the period resulted in poor data sources prior to 1999. Following democracy in 1994 a number of new systems were introduced which were progressively elaborated to the electronic management of information systems. Significant improvements in information management in the last few years have resulted in a wealth of information, which now forms the basis of health planning and management.

3.6.2 <u>Health facilities</u>

There have been dramatic improvements in health infrastructure and equipment since 1994. The province now has a total of 235 public health facilities, which includes 3 specialised hospitals, 2 regional hospitals and 24 district hospitals. There are also 16 community health centres, 83 clinics, 59 satellite clinics and 48 mobile services in the province (Day and Hedberg, 2004). The province also has an extensive network of emergency medical rescue and ambulance services spread across the province.

3.7 <u>Cross border flows</u>

There is anecdotal evidence of cross border flows between Kuruman (Northern Cape) and the surrounding villages of the Northwest Province. Much of the anecdotal evidence support flows between the catchment areas of Kuruman Hospital (Northern Cape) and Tshwaragano District Hospital (North West Province), both which are first level hospitals. A map of the Northern Cape Province showing four districts and the cross border area between Kuruman and the Northwest Province is included in Figure 5 of the appendix.

3.8 <u>Human resources</u>

The numbers of personnel providing health services in the Northern Cape have significantly increased since democracy. Yet the province faces a variety of health personnel problems including the lack of adequately trained personnel in different areas of the health sector, inability to attract health personnel to rural areas, the impact of HIV/Aids on human resources and the attrition of highly skilled personnel (anecdotal evidence). Despite efforts to attract staff to the province, 27% of the total health professional posts still remain vacant ((Padarath, Ntuli and Berthiaume, 2003).

There is yet no concrete evidence to state if the introduction of compulsory community service and rural allowances for different health professions has helped to attract professionals to rural areas and under serviced primary health care facilities, though there are indications of significant increases in number of health professionals employed in the public sector after the introduction of such allowances (National Treasury, 2004). The distribution of public sector health personnel per 100,000 of public sector dependent population in 2002/03 was 1.87 dental practitioners, 37.5 enrolled nurses, 2.27 environmental health practitioners, 28.4 medical practitioners, 0.13 medical researchers, 2.7 medical specialists, 86 nursing assistants, 3.1 pharmacists and 127.1 professional nurses (Day and Hedberg, 2004). Though concentrated efforts like the provision of bursaries, reservation of seats and training opportunities to previously disadvantaged black students have been taken to boost the production of black health personnel, the process has been slow. A comparison of the number of health personnel per 100,000 of the population in different provinces of South Africa is shown in the table below,

	EC	FS	GP	KZN	LP	MP	NC	NW	WC	ZA
Dental Practitioners	0.99	1.50	2.79	0.70	1.01	1.75	1.87	1.49	3.35	1.58
Enrolled Nurses	45.1	24.7	38.6	89.2	59.3	47.7	37.5	35.6	52.2	53.3
Environmental Health Practitioners	2.35	2.31	0.32	2.44	4.03	2.97	2.27	2.00	0.48	2.02
Medical Practitioners	12.7	23.1	25.4	21.3	14.3	17.9	28.4	11.5	31.9	19.7
Medical Researchers	0	0.30	0.15	0.04	0.22	0	0.13	0	1.94	0.35
Medical Specialists	2.3	9.2	19.7	6.0	1.0	0.7	2.7	1.5	32.6	8.9
Nursing Assistants	71.0	98.5	75.4	70.1	68.6	46.5	86.0	73.8	118.2	74.8
Pharmacists	2.2	3.2	3.7	3.2	2.2	2.7	3.1	2.1	6.4	3.1
Professional Nurses	98.5	130.7	115.1	107.3	119.3	93.7	127.1	88.9	113.9	107.1
Physiotherapists	0.48	2.14	2.22	2.03	1.03	1.41	1.61	1.06	2.75	1.62

Key: EC – Eastern Cape, FS – Free State, GP – Gauteng Province, KZN – Kwazulu Natal, LP-Limpopo Province, MP- Mpumalanga, NC – Northern Cape, NW – Northwest, WC – Western Cape, ZA – South Africa. *Source: Day and Hedberg, 2004.*

3.9 <u>Public sector health expenditure and financing</u>

There has been a substantial increase in real funding of health services over the years. This has been coupled by a steady increase in per capita expenditure in the Northern Cape since 1998 with the per capita expenditure for the 2003/04 financial year being Rand 1180. This is higher than the national per capita expenditure of Rand 969. There has also been a steady increase in provincial health expenditure since 1998 (Blecher and Thomas, 2003). The dispersion of the population and the resultant increased cost could be the reasons for the increased per capita expenditure, which may not essentially suggest improved services.

3.10 <u>Racial inequalities in the Northern Cape</u>

There are substantial differences between different population groups with regard to basic amenities, education and income, which have an impact on health. Coloureds account for 52% of the population, Africans for 36%, Whites for 12% and Indians for 0.28%. Children under 5 years of age are most among the African population, while adults aged above 50 years are most among the coloured population group. Unemployment is much higher among Africans with 17.3% unemployed compared to 13% of the Coloured population group, 8% of the Indian population group and 2.3% of the White population group (Statistics South Africa, 2003).

79.1% of the African households live in formal housing compared with 88.8% of the Coloured, 91.2% of Indian and 98.6% White households. Less than 1% of White and 2% of Indian households have no toilet facility while 12.4% of African and 13.9% of Coloured households have no toilet facility. Only 48% of African households have a television while over 51.5% of Coloured and over 83% of Indian and 89.9% of White households have television.

Energy source is also strikingly different according to the population group. About 71.4% of the African households use electricity for lighting but only 46.5% uses it for cooking and 42.1% for heating. 72.7% of Coloureds use electricity for lighting, 58.6% for cooking and 51.9% for heating, while more than 85% of Indians and Whites use electricity for all activities.

5.6% of African, 3.2% of Coloured, 0.7% of Indians and 0.9% of Whites have no access to refuse removal services. 22% of African, 18.5% of Coloured, 6.7% of Indians and 5% of Whites do not have access to onsite water. 14% of Africans, 11% of Coloureds, 5% Indians and 1% of Whites have had no schooling while 1.6% of Coloureds, 2% of Africans, 9% of Indians and 16% of Whites completed higher education. There are also inequalities in the distribution of income among different population groups. 65% of Coloureds, 64% of Africans, 56% Indians and 44% of Whites have no income (Department of Health, 2001; Statistics South Africa, 2003; Day and Hedberg, 2004).

4. Inequalities in South Africa; a legacy of the past

In the Northern Cape, wide inequalities exist in education, health, employment, income and socio-economic status between different population groups, as is evident from the above paragraphs. Such inequalities are not restricted to the Northern Cape and are evident all over South Africa. As stated previously, much of these disparities have been the direct result of the racial segregation and fragmentation during the apartheid regime. The apartheid rule also had a profound effect on the health care services afforded to the public. Many researchers have highlighted substantial disparities in allocation of resources between provinces since the late 1980's (Klopper and Taylor, 1987; Dorrington and Zwarenstein, 1988; McIntyre, Bloom, Doherty and

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Brijlal, 1995; Makan, McIntyre and Gwala, 1996; Doherty and van den Heever 1997; Reagon et al., 1997; McIntyre, Baba and Makan, 1998 and Thomas, Muirhead, Doherty and Muheki, 2000). Recent studies by Thomas et al., (2004) have pointed out the inequitable distribution of resources within provinces (between districts). These disparities in allocation of resources between and within provinces have been discussed in section 9.

5. <u>The awakening</u>

Following the first general elections in 1994, the newly elected democratic government committed itself to reducing such inequities and in consultation with different health departments initiated the process of redistribution of resources between previously disadvantaged areas with the goal of achieving inter-provincial equity in per capita distribution of health budgets within a five year period (McIntyre et al., 1995; Doherty and Van Den Heever, 1996; Makan et al., 1996; Reagon et al., 1997). The government introduced a wide range of health sector and broad macro-economic policies, which impacted on the patterns of health expenditure and financing (McIntyre, Baba and Makan, 1998b). The new policies formed a good platform for addressing disparities of the past. Later, changes were also made to the budget process, which also had an impact on equitable resource allocation. Though such a commitment by the government and health departments towards reducing disparities triggered monitoring in resource allocation, studies from time-to-time point out that wide inequality still exist in the allocation of resources between and especially within provinces. With the introduction of decentralised district health systems and new local government structures in South Africa, attention has been re-focussed on intra-provincial resource allocation and has opened doors for addressing these historical inequities in health and health care.

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6. Key policy developments since 1994

As stated above, various policies were developed which influenced financing and expenditure within the health system. New policies relating to the distribution of revenue between different spheres of the government and between provinces were proposed. Population based formulae for determining the equitable allocation of resources between provinces was developed by the Financial and Fiscal Commission (FFC) and the Department of Finance (DoF) in 1996 and 1997. The government's macro-economic policy called GEAR (Growth, Employment and Redistribution) was drafted in 1996 and new fiscal polices implemented to reduce the budget deficit without increasing the levels of tax relative to GDP (McIntyre et al., 1998). A document outlining the official government health policy called the 'White Paper for the Transformation of the Health System in South Africa', was issued by the Department of Health in 1997 with the objective of amalgamating fragmented health services and reducing disparities and inequities in health services. The Medium Term Expenditure Framework (MTEF) was introduced by the Department of Finance (DoF) in 1997. The MTEF initiated three-year rolling budgets for all national and provincial departments allowing the government to make strategic policy choices between expenditure priorities (McIntyre et al., 1998b). After a long incubation period, the National Health Bill was signed into an Act, the National Health Act (Act 61 of 2003) in July 2004. The new Act replaced the Health Act of 1977, which was widely considered to be a policy of the apartheid regime. The National Health Act provides a framework for a structured and uniform health system with the goal to improve universal access to quality health services, taking into account the obligations imposed by the Constitution (Government Gazette, 2004).

7. <u>Key changes in the budget process since 1994</u>

The South African budget process dramatically changed following the 1994 elections and particularly following the new constitution, which was introduced in 1997. Prior to the elections in 1994 and until 1997, the budget process was highly centralised and the national Department of State Expenditure (DSE) played the key role. The DSE had to negotiate budgets with various agencies like the functional committees, which existed for specific sectors such as health and education, and individual departments with functions relating to the national level. Thus within the health sector, the responsibility of drafting the health budget and submission to the DSE was laid upon the Health Function Committee. Prior to the elections, the Health Function Committee used a historical budget process, where small adjustments were made to the previous years budget, in determining allocations to national, provincial and self governing territorial health departments. After the 1994 elections a 'needs based formula' was introduced. The formula made use of the provincial population size weighted by an indicator of disparities in per capita income between provinces. Thus provinces with lower per capita incomes would receive higher weighting due to their increased public health sector dependent population. Certain allowances for research, training and specialised services were also made. The important feature of this budget process was that the Health Function Committee almost solely determined the overall allocation of the health budget between different national, provincial and territorial health departments.

Following the introduction of the new constitution in 1997, there were radical changes in the budget process, though some of these changes were initiated even earlier to the new constitution. The Department of Finance (DoF) gradually assumed increasingly important roles in the budget process and drafted a macro-economic policy called 'Growth, Employment and Redistribution' (GEAR) with the view of

reducing the budget deficit by primarily constraining government expenditure. The Budget Council, which was established, became central to the budget process. The Financial and Fiscal Commission was established as a non-legal-binding advisory body to the parliament and provincial legislature on matters of equitable allocation of resources between different spheres of the government. The new constitution by way of decentralisation moved the allocation of overall provincial budgets and the power to make decisions regarding their distribution between functions or sectors, to the provincial levels, which has been termed as fiscal federalism (McIntyre et al., 1998b).

8. The current budget process

According to the current budget process, overall government spending limits in any financial year are decided in accordance with the medium-term fiscal framework, which also takes into account the budget deficit and the tax to GDP ratio targets set by the government's macro-economic policy (GEAR). As per this fiscal federal system, centrally collected resources are first divided between different central, provincial and local government levels, a process known as vertical division.

From this overall limit, global provincial budgets are set using an 'equitable shares' formula developed by the Department of Finance. Additional funds called 'conditional grants' (which may only be used for the purpose specified) are then added to the provincial budgets to supplement them. The province has full authority of deciding on the distribution of this budget between different sectors within the province such as health, welfare, education, administration and agriculture, a process termed horizontal division or 'intra-provincial resource allocation'. Certain norms and standards, if adopted by provincial departments, could also impact on the provincial budget and on inter-provincial equity.

Intra-provincial health resource allocation involves both distributing resources between health districts/regions and the distribution of resources between different levels of care. Thus each province's health budget is currently influenced by; i) the size of the global budget set in accordance with the medium term fiscal framework and the vertical and horizontal division of the general revenue, ii) the addition of conditional grants, iii) the Medium Term Expenditure Framework (MTEF) budgets submitted by the respective health departments to the provincial treasury and iv) the final decision by the provincial treasury and Executive Council (McIntyre et al., 1999a).

Recent changes in the horizontal division of resources by way of introduction of the backlog component, changes in the population data and the health component of the formula for division, calculation of the basic component and individual weightings, coupled with a slow economic growth have all influenced the resources available for government spending (McIntyre et al., 1999a). Until recently, the health sector had to compete with other sectors such as education, administration and welfare for its share of the global provincial budget, which further added to the constrain. Provinces are now obliged to devote 85% of their budget to social services including health, education and social welfare. These health budgets that are largely determined at the provincial level influence the progress towards equity in the distribution of resources between provinces.

9. Health expenditure and per capita health budgets

By definition, per capita health budgets are the amount of money allocated by the government for the maintenance of health services and for the provision of health care to every citizen in the country within a specific period. Per capita health expenditure is the amount spent on health per person. Monitoring of per capita health expenditures is the basis to promoting equity in financial resource allocation, as it indicates

government spending towards improving the health system and the well being of citizens. Many researchers like McIntyre et al. (1998b) have in the past used equal funding per capita as the basis for measuring equity. Further, some indication as to whether money is being well spent can be obtained by comparing between per capita spending and the health status of the population. This is discussed further in different sections of the next chapter.

9.1 Trends in provincial health expenditure

Undoubtedly, the largest proportion of public sector health finances is controlled by provincial health departments (Doherty, Thomas, Muirhead and McIntyre, 2002). An analysis of trends in the expenditure of these financial resources explains the overall pattern of public sector health expenditure. The expenditure of provincial health departments increased significantly in 1996/97 owing to the large increase in wages, over expenditure and severance costs. This was followed by the government's macro-economic policies (GEAR) introduced in 1997, which resulted in real budgets declining between 1998/99 and 1999/00. Following this decline, an expansionary fiscal stance was adopted directing more funds to the public health sector, which has again established an upward trend in expenditure. Nevertheless, this growth in expenditure has been offset by an increase in population, especially the uninsured population (public sector dependent population), which is growing at a rate of 2.2% annually (Blecher and Thomas, 2003).

9.2 Trends in inter-provincial health expenditure

Figure 1 in appendix shows the trends in provincial health per capita expenditure over an eight-year period starting from 1998/99 projected to 2005/06 in 2003 real prices. Overall Western Cape is the highest funded and Limpopo, the lowest funded province

per capita. However, the per capita expenditures of Gauteng and the Western Cape have been considerably reduced over the years. This could be the result of population movements into these provinces as much as actual redistribution of funds. The per capita expenditures of the Eastern Cape, Mpumalanga, Northern Cape and the Northwest have largely increased. There has not been any significant change in the per capita expenditure of the Limpopo Province. Changes in the Free State and Kwazulu Natal per capita expenditures have been insignificant.

9.3 Trends in intra-provincial health expenditure

There is a lack of comparable and conclusive information regarding the trends in intra-provincial health expenditure. However a recent study by Thomas et al. (2004) showed per capita expenditures ranging between below Rand 50 and Rand 300 across health districts in South Africa.

10. Achieving equity in public sector health care financing and expenditure

Compared to other middle-income countries, South Africa spends a relatively larger amount of money on health care. Yet our health outcomes are poor (McIntyre, 2000). Currently, the public health sector is almost entirely dependent on the general tax revenue for health care financing, which has an impact on the extent of health care financing available to the health sector. Overall government spending have been constrained by low economic growth, budget deficits and the current fiscal policies of reducing budget deficits without increasing the levels of tax relative to GDP, all which have translated into declines in real per capita government budgets. However, the health sector has been relatively protected due to the provincial government's obligation to spend 85% of their budgets on social services, which also includes health. Researchers like McIntyre et al. (1998b) are of the view that considerable

progress was made in reallocating health budgets between provinces during the first two years after the 1994 elections, when the Health Functions Committee was responsible for determining the provincial budgets. They maintain that following the introduction of the new constitution and the government's macro-economic policy and fiscal federalism, there has been less progress in addressing inter-provincial inequities in health budgets.

When taking into account equity in public sector health care financing and expenditure, it is important not only to evaluate the distribution of resources between provinces, but also how those resources are allocated within provinces (McIntyre et al., 1999a). As far as equity is considered, public sector financing and expenditure still faces many challenges. Some of these challenges include the geographical distribution of public sector health resources between and within provinces, the redistribution of resources between levels of care, reducing barriers to the access to primary health care and seeking alternative sources of finance for public health services to lighten the dependence on the general tax revenue as it constrains the extent to which, and the speed with which inequities can be redressed (McIntyre et al., 1998b).

Provincial resource allocation decision-making processes have a major impact on intra-provincial resource patterns. In order to promote equitable distribution of resources within the province, the head office of the provincial health department has to play an important resource allocation decision-making role, by establishing guideline budget allocations to districts based on the relative needs of districts for health services and taking into account the plans and budgets prepared at the district level (McIntyre et al., 1999a).

11. Equity in distribution of health personnel

Health personnel form a significant component of the health system and the equity in distribution of health personnel affects the equity in health expenditure to a larger extent due to the fact that salaries and wages account for 60 to 70% of total health expenditure. Of the many health personnel problems faced by South Africa include the overall lack of key personnel, including specialists, in different areas of the health sector; an inequitable distribution of available health personnel between public and private sectors in urban and rural areas due to a high concentration within higher levels of care in urban areas; an inequitable distribution between formal urban and informal peri-urban areas and between primary and tertiary levels of care. Of the many reasons to this are the poor infrastructure, inadequate facilities and lack of appropriate housing and schools in rural settings as well as the migration of skilled health professionals to other developed countries and South Africa's stringent immigration policies which control the influx of skilled personnel into the country (Padarath et al., 2003). Though the introduction of compulsory community service and rural allowances to different health professionals have helped to attract some professionals to rural areas and under serviced primary health care facilities, inequities in distribution still exist between and within provinces.

11.1 Inter-provincial distribution of health personnel

Figure 2 in appendix shows distribution of public sector health personnel per 100,000 of the public sector dependent population by province in 2003. The figure displays wide disparities in distribution of key health personnel. Overall, the Free State and the Northern Cape have the highest number of Professional Nurses, while North West and Mpumalanga having the least number of professional nurses per 100,000 of

dependent population. Western Cape and Gauteng have the most number of dental practitioners, while Kwazulu Natal and the Eastern Cape have the least. The Western Cape and the Northern Cape have the most number of medical practitioners while the least number of medical practitioners are in the North West and the Eastern Cape. Pharmacists working in the public sector are more in the Western Cape and Gauteng while least in the North West province.

Little is known about the intra-provincial distribution of health personnel.

12. Equity – a global concern

Recent concerns about equity have been a global phenomenon. This is evident in the vast international literature available on issues of equity. Equity in health reforms has been a critical element of debate in much of the published literature. Decentralisation is currently one of the most promoted health reforms internationally. The allocation of resources within decentralised systems is being recognised as one of the most important influences to the impact of decentralisation on equity (Collins and Green 1994; Russel and Gilson 1995; Kohlemainen-Aitken and Newbrander 1997; McIntyre, Muirhead, Gilson, Govender, Mbatsha, Goudge et al., 2001). A critical element in any decentralised structure is the mechanism through which resources can be channelled from a central or national level to peripheral/sub national levels (Cassels, 1995; Gilson and Mills 1995; Gilson and Travis 1997; Mills 1998; McIntyre et al., 2001). In the absence of such channels, inequities are likely to increase.

According to Thomas et al. (2004), decentralisation may pose threats to the equity in health care financing across geographical populations as local financing sources become increasingly important when decentralisation progresses to the lower levels of the system. While this encourages the generation of additional resources at the local

level, the absence of cross subsidisation between wealthier and poorer populations may cause an increase in inequities (Collins et al., 1996 as cited in Thomas et al., 2004). There are also views that decentralisation in the absence of efficient overall coordination may result in fragmentation of funding (Brijlal et al., 1998 and Mills et al., 1990 as cited in Thomas et al., 2004).

Clearly, a study on intra-provincial equity in South Africa will further add to the debate of equity in resource allocation within provinces and may be useful for other middle-income countries with a similar fiscal federal structure.

Chapter 2- Literature review

In this chapter the views of other researchers and the debates around equity have been examined. Some of the concepts in equity have also been reviewed. The literature review is divided into ten sections. The first section discusses the different definitions of equity and provides an overview of the common understanding of equity. The second section discusses the philosophical and political concerns in equity, while providing a brief insight into those concerns. The third section is on horizontal and vertical equity where the differences and the concepts and debates around these approaches have been discussed. The fourth section is on measuring need and it covers the concept of need, the proportional need, areas of increased need, the determinants of need, indicators, ill health and need for public health care services. Section five is on measuring resources and it discusses the views of other researchers regarding health resources. Section six of the literature review is on measuring equity and it provides an overview of the equity equation, equity and equality, the different approaches and methods used in measuring equity in other studies and their outcome. Section seven is on equity in primary health care and covers the debates around equity in access, efficiency, cost effectiveness and the distribution of resources in primary health care. Section eight describes the geographical inequities in health and health care and the importance of geography in equity. It also discusses the debates around structure, access and allocation of resources. Section nine is on the geographical allocation of resources and it describes the debates around resource allocation to different areas and its implication on large and small areas. The last section is on shifting real resources at the local level and its implications. A short summary of the literature review is also included at the end of this section.

1. Equity definitions

There have been many debates around defining equity and its expected outcome and various interpretations and definitions of equity in health and health care. There is no consensus in the literature on the definition of equity. According to Whitehead (1990, p.7) "equity in health implies that ideally everyone should have a fair opportunity to attain their full health potential and, more pragmatically, that no-one should be disadvantaged from achieving this potential, if it can be avoided." A common definition of equity in the public health literature is that the primary determinant in the use of services should be the need for them. Other factors such as income, race, location of residence and so forth should not play an important role in selecting who receives care and who does not (Berman et al., 1989 as cited in Equinet, 1998). The International Society for Equity in Health (ISEqH) (2001, p.1) defines equity as "the absence of potentially remediable, systematic differences in one or more aspects of health across socially, economically, demographically, or geographically defined population groups or subgroups." Pereira (1993) questions the possibility that equity could be defined in a manner that is easily understood, that would enable clear policy solutions, is specific and rigorous, subject to empirical variation and intuitively and widely acceptable. However, common to most definitions of health equity is the idea that certain health differences are unfair or unjust. Fair distribution is desirable for its own sake, as it will help to maximise the value a society receives from its investment in health care and also to secure the widespread popular support for public health services, that is needed to remain viable (Rice and Smith, 2001).

2. Philosophical concerns in equity

The principles of equity have been derived from the different fields of philosophy, ethics, economics, medicine, public health, and other social sciences. The philosophical concept of equity and the approaches to defining equity have been well discussed and critically appraised by Pereira (1993). According to Equinet (1998, p.9),

> many of the debates around the different philosophical approaches in Pereira's paper concern the balance between aggregate gain and distributive goals, between absolute and relative status and between aggregating individual health gains to addressing social aversions to inequalities in health.

Concepts of equal access to health care or equal health outcomes reflect Aristotelian principles of horizontal and vertical equity in respect of health care. Equity concepts also relate to a number of political philosophy concepts such as egality or the equalising of individual net benefits and opportunities for such benefits; providing for distribution of goods or services according to entitlement; providing a decent minimum standard or level of goods and services; utilitarianism, or the maximising of aggregate gain with resources (Equinet, 1998); the Rawlsian maximin, or maximum benefit to those who are least advantaged and the Marxist theory of distribution on the basis of need rather than ability (Reagon et al., 1997). Such concerns with equity have laid the ethical basis for the design and implementation of different health care reforms.

3. Horizontal Vs. vertical equity

Another topic of debate has been whether health sector decisions should be guided by vertical or horizontal equity goals. Horizontal equity seeks to ensure comparability or equivalence in health inputs between those whose needs are the same (Equinet, 1998), by equal treatment of equals. Much of the health economics literature have taken horizontal equity as a primary matter of service provision which is reflected in the goals of equal service inputs and access or utilisation for equal need (McIntyre at

al., 2001). On the contrary, vertical equity, which refers to the unequal and equitable treatment of people whose needs are different by provision of different inputs according to the differing needs, has been generally taken to reflect the equity principle of differential payment according to ability (Wagstaff and Van Doorslaer, 1993). There have also been some debates around distributive and procedural equity. Procedural equity is concerned with the process by which negotiations and decisions occur. It advocates fairness with respect to processes such as access and financing rather than outcomes. Distributive equity on the other hand, looks at outcomes. It advocates the distribution of health outcomes across individuals and groups within society (Mooney and Jan, 1997).

The main focus on equity issues until recently had been on achieving horizontal equity, with the exception of some studies focusing on issues of vertical equity in health financing (McIntyre et al., 2001). Increasing concern about the need for preferential allocation of resources to those with the worst health status has recently triggered debates on the issue of vertical equity. This is evident in arguments by Mooney (1996), on the need for emphasis on vertical equity in countries with substantial differences in health status between different groups in society. In his argument, Mooney (1996) maintains that in normal cases, ill health is not randomly distributed across different groups in the society. Hence the society might want to give preference, on vertical grounds, to those groups who on average are in poor health, thus implying preferential allocation of health care resources in favour of those with greatest need.

In line with the concept of vertical equity, if we are to reduce inequity in health status over time, it is also necessary to give a greater weighting to the potential health gains of those with very poor health status (Equinet, 1998). Vertical equity is of more interest to this study as the achievement of geographical equity in resource allocation and the

re-distribution of resources between geographical areas requires preferential allocation based on increased need. Especially in a country like South Africa with gross inequities in health, vertical equity, or the provision of different inputs according to different 'needs', would seem to be the most important principle to ensure that those with greatest health needs obtain and access greater public inputs for improved health.

4. <u>Measuring need</u>

According to Starfield (2001, as cited in Macinko and Starfield, 2002, n.p.) equity in health services "implies 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)." This raises the question of how need can be measured. Measuring the need for public health services is often a complex and difficult process and the basic measure of using the number of people for whom those services are intended is insufficient as a person has the choice to use either private or public health service and health departments have only control over public sector services (Reagon, 2004). Using morbidity rates to measure need also has its shortfall. Reagon (2004, p.3) defines the need for health care services as the "ability to benefit from the provision of preventive, promotive, curative and rehabilitative health care services", thus implying that need should not be equated to ill-health (McIntyre et al., 2001) as everyone has the capacity to benefit from one or more of the four categories of health services listed above. Thus, it may be fairly assumed that public health services are provided to everyone residing within the boundaries of any given 'health region' and that population numbers are the primary determinants of need.

This then raises the question of how to objectively assess the 'differential degree' of need amongst individuals within the population. Internationally, equitable allocation of resources has been accomplished by means of 'needs-based formulae'. Such formulae make use of important indicators like population size and need for health services on deciding how much resources each district should receive. Equity being more concerned with 'fairness in distribution', the major concern then would be to identify those factors which affect an individual's need for health care services that are unfairly distributed amongst the population and to group the population according to those factors (Reagon, 2004).

The basic determinants of health being socio-economic conditions, the lack of basic services can be used to predict ill-health and greater needs for health services. Socio-economic variables may thus form indirect measures of health needs. As health needs vary according to different age and gender groups, demographic variables may also be used as indirect measures of health needs. Further, increased illness (morbidity) and death (mortality) in a community denotes an increased need for health resources and hence health status may also be used as a direct measure of health need. The difficulty in measuring morbidity and comprehensively covering all ill-health conditions have often lead to some morbidity indicators being used as proxies for all morbidity. McIntyre et al. (2001) caution that the common use of mortality as a proxy for health need may be an inadequate measure for health need if the above definition of 'ability to benefit' is used.

When considering need for public health care services in the Northern Cape, one has to always bear in mind the low population density of the province. As a result, the population would be more spread out in rural areas than in urban towns and hence districts with rural areas will require more resources (for instance transport, staff, pay allowances and housing to attract staff to rural areas), which consequently increase

the cost of providing services to those areas. According to the Financial and Fiscal Commission (2000), due to its uniquely low population density, which inherently influences its budget, the Northern Cape province cannot hope to capture the economies of scale comparable to other provinces in South Africa.

4.1 The proportional need of medical aid members for public health care services

The public sector dependent population, also known as the 'uninsured population' or the 'population dependent on public health', is an adjustment of the total population to a number, which is assumed to be dependent on the services of the public sector. Based on the estimates of medical scheme coverage, it is calculated by subtracting the number of people with medical insurance from the total population (Day and Hedberg, 2004). As mentioned earlier, a large percentage of South Africans primarily utilise the private health care sector for their health care needs and the majority of this population are members of medical aid schemes, often defined as 'medical aid members'. Yet, when planning public health care services, medical aid members cannot be completely excluded under the pretext that they would use only private health care services. Some of the reasons for this are that medical aid members also benefit directly or indirectly from certain public health services (like environmental health, health promotional services and immunisation and contraception services); they may be forced to use public health care services due to issues of accessibility or facilities; may have limits imposed by their medical schemes or turn to public health care services once their medical aids have been exhausted. Further, access to primary health care cannot be denied to any person, as it is a constitutional right. Hence, the need for public health care services of medical aid members would also have to be considered when taking account of the population dependent on public health services.

According to Reagon et al. (1997), needs-based resource allocation formulae for South Africa should take account of the population dependant on public health services, rather than the total population. Reagon (2004, p.4) states that

> In South Africa, using total population numbers as primary determinants of need (as stated previously) is not feasible due to the large percentage of the population using mainly private sector health services, often defined as 'medical aid members'. Assuming that members of medical aid schemes primarily utilise the private health care services, hence the primary determinant of need has to be the population dependent on public health services plus the population on medical aid, weighted by a factor proportional to their need for public sector health care services, the weighting factor termed the 'proportional need'.

4.2. Areas of increased need

The provision of enhanced health services or more resources where greater health needs are present (vertical equity) requires one to identify areas of increased need in relation to the chosen base population. This is done by identifying indicators of increased need and weighting them according to their increased costs and burden on health services. Thus indicators characterised by significantly large costs and with differing needs across different communities or sub-districts may be identified as indicators of increased need (Scott, Reagon, Stern and Sanders, 2004).

Many authors have criticised the indicators used in equity measurements (Musgrove, 1986; Taylor, Sanders, Basset and Goings, 1993; Krieger and Moss, 1995; Equinet, 1998). Due to the difficulty in measuring need, often one resorts to measuring some indicators of need such as income, employment, housing, water, sanitation, mortality, morbidity or education. As the main impacts on health arise from these broad socio-economic and environmental determinants, rather than the availability of health

services, inequalities in these sectors result in gross inequities in health across districts. Currently, there is no consensus in the literature on the equity indicators that allow for comparison within and between countries in Southern Africa. The QALY (Quality Adjusted Life Years) indicator used by some authors has been criticised for not adequately incorporating distributional concerns, calling for selected weightings to reflect equity concerns (Equinet, 1998). Taylor et al. (1993) suggest the use of selected indicators that are discrete, readily analysed and easily understood, which include measurement of inputs (access), process (use) and outcome (impact), at the same time being limited to only the most necessary items. As health indicators empirically indicate an equal or unequal health status between individuals, communities, and nations (Chang, 2002), monitoring equity requires comparing indicators of health and its social determinants among social groups with different levels of underlying social advantage (Braveman, 2003).

There are many indicators that can be used in an equity gauge, with differing criteria for their selection. The following are potential indicators that may be used in equity studies:

- Population
- Demography: e.g. % under 5 years of age, % above 50 years of age
- Public sector dependent population
- HIV prevalence
- TB incidence
- Inadequate access to water
- Mortality rate
- Infant mortality rate
- Trauma rate
- Inadequate access to sanitation

- Type of dwelling

- Literacy rate

- Income levels

- Unemployment rate

Information and data on all of the above indicators is relatively available in South Africa or can be derived from a number of national and local data sources including the census, the October Household Survey, the Labour Force Survey, the Income/expenditure survey, routine district monthly reports, the District Health Information System (DHIS), Birth and Mortality registers, local survey reports, Provincial Antenatal Surveys, Provincial TB Directorate, Electronic TB registers, and Provincial HIV reports.

Scott et al. (2004, p.23) suggest the following criteria for assessing indicator feasibility, validity and accuracy:

- Data is readily available and/or resources are available for the collection of any extra data regularly

- The data is collected at least every two to five years

- Data quality is good

- Consensus among major stakeholders regarding importance of the variable in measuring health need

- Measures health needs with large resource implications or large cost drivers

- Ability of the variable to measure a differing need between groups being compared, e.g. health sub districts

- Independent contribution of the variable to increased need, whether being a direct or indirect measure of health need

- Indicators not duplicating others

In checking the quality of the indictors, the Equity Gauge Group (2003, p.2) suggests that the indicators should comply with the RAVE criteria as follows;

- R – Reliable or reproducible

To be reliable, they should measure need accurately, with repeated measurements giving the same results

- A – Acceptable and appropriate

Acceptability of indicator agreed upon and consensus reached by stakeholders

- V – Valid for use in Equity Gauge

Must be true measures, or approximate true measures of health need

- E – Easily produced

Easy and ready availability of component variables with staff knowledge of producing indicators from the component parts

5. Measuring resources

Health resources are mainly considered in relation to financial resources and human resources. In measuring resources, most authors have assessed the financial resources available to a facility or geographical region, thereby equating health

resources to financial resources. According to Reagon et al. (1997), *"the reason for the emphasis on allocation of financial resources is that the combined expenditure on the 'physical' resources used in the delivery of health services (such as buildings, vehicles, equipment, personnel, medicines and other consumables) provides a useful general measure of the total physical resources"*. Authors like McIntyre et al. (1998b) have studied the trends in per capita health expenditure as a method of assessing the equity in resource allocation between geographical areas. This view of using expenditure data to assess resources has been supported by other authors like Tyler (2004). According to Tyler (2004, p.12), "using 'expenditure' to define 'resources' has the advantage that it is relatively easy to determine, providing a way of bringing all resources to a common value that is 'real'." Considering the use of expenditure figures in equity measurements, Reagon et al. (2004) are of the opinion that it is the operating expenditure which should be used to assess present inequities as it reflects the total amount of resources available in money for the provision of services. According to the authors, capital expenditure, used for the provision of infrastructure and equipment with which to provide services, cannot show inequities, but "can be used to assist in reducing inequities by providing facilities and equipments in areas where they are lacking" (Reagon et al., 2004, p.7).

6. <u>Measuring equity</u>

Equity has been an underlying concept in many health targets with equity goals ranging from equal health status and access of health care services to equity in distribution of benefits and burdens (McIntyre et al., 2001). Achieving greater equity in health is often considered as a measure of progress towards better health (Equinet, 1998). The terms 'equity' and 'equality' have both been used in the literature to represent fairness. However equity is not the same as equality. If resources are equally distributed, then each person gets the same amount of resources. But as

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stated earlier, in a society in which people have differing health needs, resources should be distributed according to the needs and hence equity may not mean equal. In an equity gauge the health needs should equal the health resources, thereby ensuring that each health sub-district has a share of the overall public primary health care budget that is proportionate to the public primary health care needs of the people in the sub-district.

The published literature also contains some debates on measuring equity, determining health needs and monitoring equity. How to assess fairness has been a fundamental concern in many of the debates. Individual views include quantifying fairness by measuring societal preferences for equity as societies tend to value health equity (Williams 1997; Lindholm and Rosen, 1998; Anderson and Lyttkens, 1999), the common concern being how to assess fairness without imposing some value judgement. Whitehead (1992) adds to this by proposing that any criteria for assessing health inequalities should also consider inherent biological variations, informed individual choices and the extent to which they are remediable. There is also widespread concern as to whether health inequities should be measured at the individual or group level. Researchers like Almeida, Braveman, Gold, Szwarcwald and Ribeiro (2001) and Braveman, Krieger, and Lynch (2000) have argued that the WHO approach to measuring health inequalities (Gakidou, Murray and Frenk, 2000; Murray, Gakidou and Frenk, 2000; WHO, 2000,) being individual-based rather than group-based, are deficient in that they only measure inequalities, without providing necessary information on deciding whether or not they are inequitable. According to Macinko and Starfield (2002, n.p.), "the extent of health status inequalities appears to be sensitive to the type of health measure used and the way in which groups are defined".

Different methodologies and approaches have been used by different researchers in measuring equity. In studying the geographic patterns of deprivation and health

inequities in South Africa, McIntyre et al. (2001) used deprivation indices using magisterial districts in the study, to analyse small areas. In the study, four alternative deprivation indices were constructed with data from the 1996 census: a general index for deprivation (GID), compiled using principal component analysis which included the proportion of population who were females, children under 5, lived in rural areas, older than 25 with no school, unemployed, informal dwelling, no access to onsite water, refuse disposal, phone, electricity and living in households headed by women; a policy perspective indices of deprivation (PID) which included particularly disadvantaged groups identified by policy makers; a single variable index of deprivation (SID) which included lack of access to piped water as the variable and; a health related index of deprivation (HID) which included african, unemployed, disabled, living in informal dwellings, no access to onsite water and households headed by women. Analysis showed that the GID and SID were most highly correlated which also correlated with the PID and a lower correlation between HID and all other indices. The study suggested the use of a single variable index to be effective in identifying most disadvantaged households and communities and the inclusion of a measure of deprivation in the formula for allocating central government budget resources. The indices also identified the Limpopo Province and Eastern Cape as having the highest proportion of their populations residing in the two most deprived quintiles of magisterial districts. It was recommended that these provinces and their deprived districts receive priority allocation of public resources.

A similar analysis by McIntyre et al. (1999a), of developments affecting the allocation of total government resources and the trends in inter-provincial health expenditure and budgets (between 1995/96 and 2001/02) through horizontal division, demonstrated slowing or reversal of progress towards equity in inter-provincial budget allocation, after the introduction of fiscal federalism in 1997 (see Figure 3 in appendix). The analysis revealed the Western Cape, Gauteng and the Free State to be above the

equity line, while the Eastern Cape, Kwazulu Natal, Northern Cape, Northern Province and the North West to be much below the equity line in per capita expenditure. The provinces with large deviations from equity were the Eastern Cape, Gauteng, Mpumalanga, Limpopo, Northwest and the Northern Cape. Though the analysis revealed that Mpumalanga, Western Cape and Kwazulu Natal were moving closer to their equitable share, it demonstrated that due to the fiscal policy of reducing the budget deficit and the low economic growth, real per capita budgets for all provinces were declining.

In a study by Wolfson and Rowe (2001), the authors present an alternative approach to measuring health inequalities, in contrast to the methods used in the World Health Report, 2000. According to the authors, health inequalities can be conceived of in two different ways; the univariate or unconditional approach which looks only at the health of individuals and which views inequalities in health as the dispersion of health status within a population and the bivariate or conditional approach which seeks to establish the distribution of health within a population, but conditional on another factor. The authors criticize the world health report for advocating a univariate approach due to their weakness in the proposed data collection strategy based on small area data and state that the use of small area data has several conceptual and methodological shortcomings, which render it non-representative of the general population. Instead the authors propose the use of longitudinal cohort based data combined with micro-simulation-based life table analysis as a more fruitful analytic strategy.

In a study by Gissler, Keskimaki, Teperi, Jarvelin and Hemminki (2000) in Finland, the authors investigated the extent to which regional health differences among Finnish children could be measured by using the population-based longitudinal administrative register data. All children born in the year 1987 were included in the study and followed-up until the age of seven. The outcome measures included mortality, morbidity and the use of health services. The study demonstrated statistically

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significant regional variations for all health indicators except diabetes and significant variations in the use of health services. The authors concluded that administrative registers offered a relatively inexpensive and quick means to monitor health equity. Another study by Kinman (1999) links equity with a temporal and spatial analysis of clinic users, which is then supplemented by a community survey. Spatially, utilisation shifted away from the targeted service area and the community survey revealed that place of origin, length of residence and language spoken at home differentiated clinic users from non-users. The author concluded that spatial analysis of output measures were imperfect and did not necessary deal with all the access issues related to acceptability.

Manor, Matthews and Power (1997) compared several methods of measuring social inequalities within different socio-economic groups in Britain. Health equity measures included a) the slope or beta weight in multiple regression; b) odds ratios and; c) Agresti's alpha methods. Each of these measures was compared using data from the British birth cohort. Inequalities in self-rated health, limited long standing illness, psychological health, respiratory symptoms, asthma and obesity were calculated based on one of the two measures of social position: class at birth and educational attainment. Results demonstrated that the magnitude of health inequalities did not differ significantly based on the type of health inequality measure used. Thus the authors concluded that how social classes were specified made differences in drawing inferences about the magnitude of inequalities.

Another study by Musgrove (1986) discusses several approaches to measuring the equity in resource distribution using data from Peru to illustrate each technique. The author demonstrates techniques for measuring equity in: a) the distribution of health care resources such as physicians and hospital beds per capita within different geographic regions; b) probabilities of treatment given medical need – which is

sensitive to differences in type of illness studied, age group examined and type of treatment examined; c) financial measures such as differences in expenditure adjusted for health need, or as a proportion of a household's total budget; and d) indices such as the Gini coefficient for health care expenditures and the availability of medical care. The author concludes that because assessments of equity require judgements about what is to be considered unfair, summary indicators of the overall health system inequity that do not capture the many ways in which inequity can be manifested are unlikely to inform interventions geared towards the improvement of inequities in health.

Equity studies by the Cape Town Equity Gauge (CTEG) (Scott et al., 2004) have compared health expenditure to health needs data to identify inequities in primary health care resource allocation. The methodology used secondary data in equity calculations. The CTEG used the population dependent on public health services rather than the total population in their studies, which has been proved to be feasible in a country like South Africa. By identifying areas of increased need through the use of different indicators and weighting the indicators, the CTEG was able to calculate a composite measure of need for a health sub district. This measure of composite need was compared with the expenditure per person and per district to measure the distance from equity for each sub district. The methodology proved to be useful in identifying gross inequities in the city of Cape Town.

A recent study by Thomas et al. (2004) suggests serious problems of intra-provincial inequities. The authors compared the financing per capita of non-hospital primary health care (PHC) services in each health district with the need in each district, calculated using a deprivation index (see Figure 4 in appendix). The study showed per capita expenditure per year ranging from under Rand 50 to Rand 300 between different districts. The top five best-funded health districts were Cape Town, Egoli

(Johannesburg), Ekurhuleni (East Rand), Durban and DC12. The study found the financial resources for non-hospital PHC being concentrated in Gauteng, Kwazulu Natal and the Western Cape. However, the most deprived districts were concentrated in the provinces of Kwazulu Natal, the Eastern Cape and to a lesser extent in the Limpopo. Moreover, five of the top ten most deprived districts were found to be in Kwazulu Natal and the least deprived districts concentrated in Gauteng and the Western Cape. According to the authors (p.17) "the sheer scale of the imbalances would seem to indicate that financing of non-hospital PHC is currently done without any reference to the principles of equity."

7. <u>Equity in primary health care</u>

Much of the topic of debate in primary health care equity has been around access, efficiency, cost effectiveness and distribution of resources. There is broad consensus in the literature that primary health care plays an important role in the equitable delivery of health care services. Though not grown into national health systems, primary health care is still considered the most appropriate, cost effective health care system to ensure an equitable distribution of health resources, and a level of health for all citizens to lead a socially and economically productive life (Ransome-Kuti, 1997). Taylor (1992) presents evidence from international experience that primary health care can be made more effective and efficient through equity. In his paper, Taylor provides the major arguments for equity, taking equity in PHC to mean the distribution of benefits according to demonstrable need rather than on the basis of political or socioeconomic privilege.

With efficiency driven perspectives dominating international health policy debates (Gilson, 1997), the rapid development of approaches aimed at cost effective rationing of scarce resources in primary health care have in some instances implied conflict

between equity and efficiency, thereby confusing equity goals with efficiency measures (Vagero, 1994). With inadequate evidence that reforms in allocative efficiency and cost-effectiveness have actually increased efficiency in the health sector (Mills, 1996), equating reduced unit costs to increased efficiency may be incorrect and in reality reflect worsening quality of care (Bijlmakers and Chihanga, 1996 as cited in Equinet, 1998). The authors also note that "mechanisms for enhancing efficiency, such as budget decentralisation, contracting out and purchaser-provider performance contracts are poorly explored in the literature for their equity implications, perhaps because they are relatively new in many African countries (p.35)".

8. <u>Geographical inequities in health and health care</u>

The debate on geographical inequities has been about structure, access and allocation of resources with some debate on the ethical issues of geographical equity in health. Important variations in access to health care and health outcomes have been associated with geography, giving rise to profound ethical concerns (Rice and Smith, 2001). Rice and Smith (2001) further state that in making operational the principles of horizontal and vertical equity, geography becomes important for three reasons. First, that many systems of health care are organised on a geographical basis, thus making territorial equity a central issue in the distribution of resources. Second, that irrespective of the systems of health care in place, health care facilities including clinics and hospitals are concentrated at specific locations, implying the central importance of geographical considerations in determining access to health care and health outcomes. Third, that there is considerable evidence that geographical inequalities in health in the form of 'area effects' may exist beyond social class and income inequalities and that such 'area effects' on health, health care and health care utilisation result in geographical disparities. It has also been noted that

sections of population in some areas are prejudiced in their access to essential health care, merely by virtue of their place of residence (McIntyre et al., 1990; DHSS, 1976)

9. <u>Geographical allocation of resources</u>

There has recently been an increased interest in issues of geographic resource allocation. The allocation of health care finance to different geographical areas forms the key to adjusting health care resource levels. International experience have shown that the allocation of health resources is frequently determined in an arbitrary manner reflecting historical inertia and often influenced by powerful lobbies (DHSS, 1976; Mays and Bevan, 1987; Segall, 1991; Green, 1992). Most commonly, resource allocation decisions have been based on prevailing supply and demand patterns (McIntyre et al., 1990; Green, 1992) with allocations based on previous year's expenditure with an increase for inflation and sometimes adjusted for previous over or under spending (Reagon et al., 1997).

When health care is organised geographically, the extent to which, the level of such financial resources should be allowed to vary between geographical areas, has been an area of concern (Rice and Smith, 2001) and raises the issue of how resource allocations for health can be made on the basis of need (rather than demand), and to the balance of power between bureaucratic providers, professionals and communities in health care decisions (Equinet, 1998). This requires a mechanism for identifying those with greater needs and allocating significant additional health-related resources while contributing to a wider set of policies aimed at redistributing societal and health resources (Gilson, 1997). Health care is affected both by the level of public spending, the composition of the health infrastructure and community use of health services, as noted by Ogbu and Gallagher (1992). This view has been supported by Yach and Harrison (1994) in their argument that it is not '*how much*' a country spends as much

as '*how'* it spends its resources that determine the health status of its population. These statements further reinforce the view that "per capita expenditure is a poor indicator of health care and that greater analysis is needed of how health resources are spent" (Equinet, 1998, p.35).

While equity can be constrained by absolute shortages in funding, it is also equally important to investigate issues with the distribution of available resources, as noted by McIntyre et al. (1996) that in spite of South Africa having substantial resources for meeting health needs, the resources are poorly distributed. If in the past, the emphasis has been on promoting equity in the allocation of resources between large geographic areas (such as regions or provinces), with the shift of emphasis from horizontal to vertical equity (Mooney, 1996) more attention is now being focused on the potential usefulness of micro-geographic areas in resource allocation decision making (Equinet, 1998). According to McIntyre (1997, as cited in Equinet, 1998, p.36) it "is easier to identify small geographic areas with high poverty levels, poor health status and inadequate health and other social services for differential resource allocation purposes than to attempt to target individuals."

10. Shifting resources at the local level

Resource allocation at the local (district) level involves shifting real resources, especially staff (human resources), as the financial re-allocation is primarily done at provincial level. Health being labour intensive, with about 70% of the expenditure on staff, shifting staff on its own can result in major shifts towards equity of service delivery. However, it is necessary to consider the specialised functions performed by staff in order to make the re-allocations more efficient. This can be done by categorising staff in terms of the specialised work performed by each category and shifting staff within the same category based on the distribution of services using

agreed staffing norms as a precaution against disrupting the delivery of service. The distribution of resources should also take into account the actual and projected utilisation levels.

Summary of literature review

Equity is of particular concern to South Africa due its history of racial segregation and fragmentation during the apartheid regime. Addressing historical inequities left behind by the apartheid era, in the allocation of health resources to different geographical areas is a major challenge which requires proper monitoring and proactive efforts towards redistributing available resources. In spite of a commitment by the health departments and different stakeholders in monitoring resource allocation to reduce such inequities, wide disparities still exist in the allocation of resources between and especially within provinces and this has been documented by many researchers.

Government resource allocation decisions are largely geographically based and the fiscal federalism, currently used in South Africa has been recognised in many ways for its incompatibility of promoting equity across national sectors. Though inter-provincial allocation of health budgets are set through the medium term fiscal framework process and are monitored for equity, most provinces still use historical budgets when making resource allocations at the district level, resulting in many rural areas and health districts being under-resourced.

Vertical equity is more important in the South African context as the provision of different inputs according to different 'needs', seems to be the most important principle to ensure that those with greatest health needs obtain and access greater public inputs for improved health. As equity is concerned with 'fairness in distribution', the major concern is to identify those factors that affect an individual's need for health

care services that are unfairly distributed amongst the population, and to group the population according to those factors.

As it is not feasible to use the total population as the primary determinant of need in calculations for equitable resource allocation, the primary determinant of need has to be the population dependent on public health services plus the population on medical aid, weighted by a factor proportional to their need for public sector health care services. The provision of enhanced health services or more resources where greater health needs are present (vertical equity) requires one to identify areas of increased need in relation to the chosen base population. This is done by identifying indicators of increased need in relation to the chosen base population and adding weighting factors to the identified indicators depending on their costs and burden to the health services.

In measuring equity, the primary concern has been how to assess fairness. Different researchers in measuring equity have used different methodologies and approaches. Some of the studies have also documented inequities between and within geographical areas, both nationally and internationally.

The literature finds consensus in that primary health care plays an important role as the most appropriate, cost effective health care system to ensure an equitable distribution of health resources. Many researchers have stated that geography becomes important in making the principles of equity operational as the allocation of health care finance to different geographical areas forms the key to adjusting health care resource levels. The common trend in resource allocation is to base decisions on previous year's expenditure with an increase for inflation and sometimes adjusted for previous over or under spending and in many cases are determined in an arbitrary manner often influenced by powerful lobbies. This has raised the issue of how resource allocations for health can be made on the basis of need (rather than

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demand), and to the balance of power between bureaucratic providers, professionals and communities in health care decisions. The allocation of resources based on supply demand patterns or historical/empirical models of expenditure patterns do not cater to the changing demographic and health needs of different populations and are unlikely to help in resolving unacceptable variations in health outcome. It is therefore important to measure the allocation of resources, relative to need and to monitor shifts in the equitable allocation of resources.

1. Problem statement and rationale

So far, many researchers have assessed the inequities in resource allocation between provinces in South Africa. But little is known about the inequities in distribution of health resources within provinces and especially in public primary health care services. Most of the studies on inter-provincial equity have pictured the Northern Cape as being better funded/resourced compared to other provinces with large deviations from equity. If this is the case, then a more nagging question is whether health districts are getting a fair share of these resources allocated to the province. With the focus now on decentralisation and primary health care, one often asks the question of whether resources allocation to primary health care is done according to the needs of the districts and if the available resources are distributed equitably. There are no documented studies yet which provide a clear picture of whether the allocation of resources, especially financial resources is according to the actual needs of different districts. Further, the extent of inequities in the distribution of health resources, relative to need, between districts within the Northern Cape Province is also unclear. It is therefore important to obtain a clear picture regarding the same, as it will empower policy makers, health district managers and the provincial authority to move the resource allocation process in accordance with the findings from such an assessment.

2. Purpose of the study

This study seeks to contribute to the current debate around equity in health care resource allocation by measuring the current allocation of resources, relative to need in the Northern Cape. It will document the level of inequities in health

financing/expenditure and staffing at the primary health care level between different districts of the Northern Cape. The study will also culminate in a set of recommendations, which should assist the provincial health management in the redistribution and/or future allocation of resources in an equitable manner.

3. Conceptual framework

This section is built around the principle that to ensure equity in primary health care services, health resources have to be allocated on the basis of the need of the population who are dependent on those services. Thus achieving equity in resource allocation would require preferential allocation and re-distribution of resources based on increased need, in line with the principle of vertical equity, to ensure that people with greater health needs obtain access to greater resources. Preferential allocation requires determining the need for public health care services, based on basic indicators and indicators of increased need, weighted according to their costs and extra demand placed on the health system. This is explained in more detail in sections that follow below. Once the need is determined, efficient redistribution of human and financial resources can be effected to achieve equity in service delivery. The diagram below provides an overview of the process.

Determine Need (Need – Increased Need – Weightings)	→	Redistribute to achieve equity
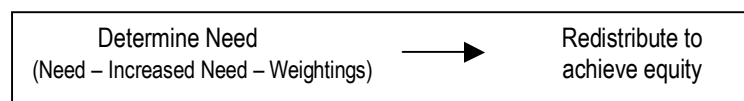
3.1. Vertical equity and its importance in the Northern Cape

As mentioned earlier, vertical equity refers to the unequal, but equitable treatment of people whose needs are different by providing different resources according to differing needs. This implies that enhanced health services are provided where

greater health needs are present by preferentially allocating resources to those with the worst health status. The Northern Cape is one of the poorest provinces in the country with gross inequalities in income, quality of life, employment, education and health status between racial, class and geographical groups. Achieving equity in resource allocation would thus require the re-distribution of resources between different geographical areas by way of preferential allocation of resources based on increased need, ensuring that people with greater health needs obtain access to greater resources.

3.2. Basic indicator of need

The most basic indicator of need is the number of people requiring public health care services.

3.2.1. Public health sector dependent population

The Northern Cape has a large percentage of people on medical aid and it is assumed that the people who mainly utilise public primary health care services are the people who are not members of medical aid or health insurance. Except for some specialised services, most of the people with medical aid mostly utilise private health services for primary health care needs. Thus it may be assumed that the population primarily dependent on public sector primary health care services are the people who are not covered by medical aid.

3.2.2. Proportional need of people on medical aid for public sector primary health care services

Non-medical aid members rely fully on the public health sector while medical aid members often chose between public and private health sectors. Often, medical aid members also seek public health sector services for reasons of accessibility, speciality, and affordability, and when they exceed their medical aid annual limits. It is therefore not justifiable to completely exclude medical aid members from the population dependent on public health care services. A logical solution would be to measure the proportional need of people on medical aid for public health sector services and to add that proportion to the population primarily dependent on the public health sector. A valid measure of their proportional need for public health services could be reached by estimating the average utilisation of public health care services by the people on medical aid.

Hence, the population dependent on public sector primary health care services (termed in this study as the 'Dependent Population') would be the population not on medical aid incremented/weighted by a proportion of the people on medical aid.

3.3. Indicators of increased need

Socio-economic (housing, water, sanitation, income, education, employment) and demographic (age and gender) conditions may be viewed as the basic determinants of good health as they adversely affect the health of the population. They form indirect measures of health need, providing a basic level of predictability on the health status of a community and their health needs. Morbidity and mortality information on the other hand provide a direct measure of health need by indicating the level of sickness and death in a community. Thus it may be assumed that a communities' need for

primary health (preventive, promotive, curative and rehabilitative) care can be determined from these variables/indicators.

Communities have differing needs, as the above variables are not equally distributed among the population. Some communities have higher incidences of morbidity or mortality or other socio-economic or demographic variables, which lead to an increased need for those health services. Thus the increased need for health services in a community will depend on the type and mix of those variables.

However, the above indicators do not comprehensively measure need. They are only proxy measures of need covering some aspects of need for health and hence we need a mixture of the above indicators covering almost all aspects of overall need.

3.4. Weighting indicators of increased need

The indicators of increased need measure the extra need for primary health care services over and above what is required on the basis of population numbers. This is because people with extra need for services due to socio-economic, demographic or health status anomalies need resources to cover their usual need (common to the dependent population), plus extra resources to cover for services they require due to the anomaly. Further, it is necessary to individually weight these indicators of increased need for the following reasons:

- They are measured in different ways and on different scales
- They have different impacts on health services in terms of utilisation and cost

Hence, the weighting given to each indicator should logically be proportional to the amount of extra health services that are required to attend to the extra need presented by each indicator. Where the cost of the extra demand placed on health services by diseases and by other determinants of health and their consequent burden on health are known, indicators can be weighted by direct calculation. In the absence of such costing data or studies, weighting of indicators may be done by reasoned estimation, by making educated estimates of the utilisation rates and the costs.

3.5. Shifting real resources at the local level to achieve equity

Shifting real resources at the district level requires shifting staff, since financial resources are controlled at higher, especially provincial levels. Staff shifts may be based on the equitable number of people dependent on public sector health services per nurse or based on calculated norms for the number of each staff category required per district. As stated earlier, health services are labour intensive, which account for about 65 to 70% of total expenditure and so shifting staff on its own will result in major shifts towards or away from equity. Hypothetically, small equipments, supplies and drugs will follow staff shifts. However, there are certain considerations and obstacles to shifting resources at this level. An abrupt and total shift of staff between districts is not feasible and may further have a 'seesawing' effect on the equity graph. Other important consideration would be the cost and time lag of the shift against the likely benefits. It is especially important to consider norms, utilisation levels and workload when shifting staff. Population density may also be considered to account for the increased staff and other resources required in providing services to outspread populations in rural areas. The non-availability of adequate infrastructure to accommodate the increase in staff numbers and increased cross-border flows between districts may pose obstacles to the shift. The size and speed of shifts are

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also important considerations. Reagon et al. (2004) suggest adjusting the shift of staff at the local level on the following basis,

- *Adjusting staff based on the total resource level of the district*: According to this adjustment, an under-resourced district in terms of total expenditure cannot lose staff in a category, even if that staff category is over-resourced. Similarly, an over-resourced district in terms of total expenditure cannot receive staff in any category even if they are under-resourced for that staff category.

- *Adjusting staff shifts based on workload*: An over-resourced district with a very low, low or average workload can lose many staff, while the same with a high or very high workload can only lose few staff. Similarly, an under-resourced district with an average, high or very high workload can receive many staff, while the same with a low or very low workload should only receive few staff.

- *Adjusting staff shifts based on the speed of the shift*: This involves setting a percentage capping/ceiling on the movement of staff in a particular category in a year. Thus an over resourced district may only lose the capped percentage of staff in a year. Similarly, an under-resourced district may also only receive the capped percentage of staff in a year.

- *Adjusting staff shifts on the basis of zero sums*: This requires that the number of staff shifted to an under-resourced district to equal the number of staff shifted from an over-resourced district.

4. <u>Aim of the study</u>

The aim of this study was to measure the equity in health expenditure and staffing relative to need between districts of the Northern Cape and to make recommendations to the provincial health management on the equitable redistribution of health resources.

5. Objectives

The aim was further stratified into the following objectives;

a) To determine the population dependent on public health services in each district.

b) To select indicators of need for public health services based on the available information.

c) To weight indicators of increased need based on estimated weighting factors

d) To compare health expenditure data with health needs data in order to identify inequities in health financing between districts.

e) To suggest redistribution of finance and staff to achieve equity between districts.

1. <u>Research design</u>

There are different possible approaches and methods, which could have been used in assessing the equity in public primary health care resource allocation in the Northern Cape. In understanding equity, one could take a positivistic approach and follow a quantitative or qualitative study to understand the extent of the problem and its impact on communities or follow an action research in an attempt to rectify the problem. Methods such as analysis of secondary data, community surveys, cohort studies and correlation could be used in such studies. An interpretivistic approach on the other hand, may have helped to obtain an in-depth understanding of what equity meant to a community.

This study took a positivistic approach and aimed to quantify the extent of inequities by way of a descriptive study, analysing secondary data that was routinely collected or available. Analysing secondary data provided the study with the advantage of time, but also the limitation of lower accuracy.

2. <u>Measurement tools used in the study</u>

The equity calculations, including some of the concepts for the calculations have been developed based on the guidelines and the following tools designed and propagated by the Cape Town Equity Gauge (Scott et al., 2004) for the purpose of equity measurements.

- The Equity Measurement Tool - the measurement of the distance to equity between districts by comparison of health expenditure at the Primary Health Care level to health need in each of the districts of the Northern Cape was developed from this tool. The equity measurement tool is a comprehensive tool developed by the Cape Town Equity Gauge for the purpose of equity calculations and in identifying gaps in equity and interpreting the extent of expenditure inequities between sub districts. The tool compares health expenditure at the primary health care level to the calculated health need in each health district and in doing so, it measures the equity in health expenditure between health districts. As an essential framework for the collection and further analysis of data, the tool is simple and straightforward in application and makes use of demographic, socio-economic and health indicators, which are freely and easily available (secondary data), in calculating the need for public health care services in a given health district. Expenditure data, required for comparisons is also freely available. The use of secondary data and its free availability, the limited time available for the study and the ease of application of the tool were reasons behind using this approach to identifying inequities. However, the low accuracy of secondary data was a concern and would require the exercise of caution when using such data.

- The Equity Resource Allocation Tool – concepts around planning staff allocation and the redistribution of staff in a manner that was equitable and efficient was drawn from this tool. The equity resource allocation tool, which was also developed by the Cape Town Equity Gauge (CTEG), is a comprehensive tool for the allocation of resources according to the identified and calculated needs of a health district. The tool, which addresses inequity in a practical way, helps in planning staff allocation in a manner that is equitable,

efficient and sensitive to workload (Scott et al., 2004). When considering staff shifts to achieve equity, this study deviates from the CTEG tool in that it recommends a 20% capping limit per year on shift of a major category of staff (professional nurses) compared to the 10% capping limit on the total number of staff shifted as applied by the CTEG. There were reasons for this deviation. The study planned to achieve significant progress in equity between health districts in a period of five years, without making any abrupt or radical changes and disrupting the delivery of service with regard to function. As the shifting of financial resources were controlled by higher authorities and were difficult to achieve and due to the fact that staff wages accounted for two-thirds of the health care expenditure, it was assumed that the shifting of staff alone based on the dependent population, as an indirect measure of need would result in major shifts towards equity. To smoothen the impact of such shifts on service delivery, the shifting of personnel with broad skills and that of a major category of personnel was assumed to be the best strategy. Due to the nature of the specialised functions performed by health staff, it was also necessary to categorise staff in their categories of specialised work. Since professional nurses constituted a major category of health personnel and had broad and specialised skills with regard to patient care, it was assumed that the shifting of professional nurses irrespective of rank was appropriate. Hence a model of shifting professional nurses based on a 20% capping limit per year, for five years, in an attempt to achieve 100% shifts by year five was adopted.

3. Data collection

The study involved the collection and analysis of data on the basic indicator as well indicators of increased need (secondary data). The use of secondary data in this

study has the limitation of inaccuracies. However these inaccuracies have been kept to a minimum by,

- Comparing different sources of information for consistency
- Determining how the information was collected to check if they were comparable
- Comparing information in similar areas to each other
- Comparing time trends of information
- Comparing different but related information

The data was obtained (and/or derived) from a number of national and local sources including the National Census, the October Household Survey, the District Health Information System, the provincial health departments and office of Statistics South Africa in Kimberley, the routine monthly provincial health department reports, provincial health department tuberculosis reports and provincial health department HIV/AIDS reports.

4. Data analysis

The data analysis involved step-by-step calculations in order to,

i. Measure the distance to equity between districts
ii. Plan and suggest the equitable redistribution of available resources relative to need

5. <u>Methodology</u>

5.1. <u>Determining the population base for equity calculations</u>

As the study dealt with the general primary health care services, the equity calculations were based on the total health sub district populations of the whole province, which included all age groups and both men and women.

5.2. <u>Determining the dependent population in each district</u>

The population data was obtained from the mid 2004 population estimates of the South African Health Review 2003/04 (Day and Hedberg, 2004). The dependent population was then calculated as the population not on medical aid incremented by a proportion of people on medical aid.

5.3. <u>Selecting indicators of increased need.</u>

Indicators of increased need were selected from a list of potential indicators. The following considerations were made in selecting the indicators,

- Information on extra need already available at the district level
- Indicators that fulfilled the RAVE criteria
- Indicators that fulfilled the criteria by Scott et al. (2004)
- Indicators covering as many aspects of overall health needs

5.4. <u>Determining weighting factors for indicators of increased need.</u>

Calculations of weighting factors were based on the assessment of extra cost and demand placed by the indicator of increased need on the health system. Where good

costing studies and data were already available, weighting factors were directly calculated from the extra cost. Where costing information was not available, weighting factors were calculated by way of reasoned estimation, drawing from the methods of similar studies in other provinces.

5.5. Adjusting the dependent population for weighted extra need in each district.

Adjusting the dependent population for need, involved calculating a composite measure of need for a health sub district. This was the sum of the weighted extra needs added to the dependent population in each sub district.

5.6. Correcting the adjusted dependent population for weighted need in each sub district to represent the actual population.

The adjusted dependent population was a virtual population (extra need within each sub district having been expressed as extra people as need is seen in relation to population) based on the need within each sub district. As they had no relation to the actual populations of each sub districts, they were reconciled with the total actual population.

5.7. Comparing health expenditure data with health need data

The final audited expenditure report for the financial year 2003/04 (per district) was obtained from the provincial department of health in a completed template format, categorised as per standard expenditure items. Only outpatient primary health care expenditure was included in the study. The following categories of expenditure (standard expenditure items) were included in the template - administrative expenditure (advertisements, ISP connections, telephone charges, accommodation, levies, subsistence and travelling allowances, transport, licence registrations,

insurance, fuel, postage and franking), equipment (computer, furniture, rental of equipment, surgical and medical equipment, domestic equipment), inventory (cleansing/laundry materials, office consumables, food and other domestic supplies, maintenance material, medicine, medical/dental/surgical requisites, medical gasses, stationery, vaccines, fuel and lubricants, linen, paper products, X-ray consumables, toiletries, human blood and preparations, laboratory requisites, tools, electrical and technical supplies, packaging material, coal), land and buildings (rent on land and buildings. Capital expenditure was excluded), personnel expenditure (salaries and wages, employer contributions, bonuses, leave discounts, transfer costs, recurrent and non-recurrent personnel expenditures), professional and special services (catering, cleaning, computer services, water, electricity, refuse removal, printing and reproduction, laboratory services, specialised maintenance, mechanical and contracting services, rates and taxes, repairs).

The data was then compared, checked and cleaned with the help of the provincial finance officer and by using the following methods suggested by Tyler (2004, p.2),

- The initial data collected was controlled to categorise expenditure under standard headings or expenditure items (by use of a standard template format)
- Checks were built in with relevant spread sheets to identify any input errors
- Audit checks of the collected data were conducted to the original documentation provided by finance officer
- Ratios between salary/allowance cost and total cost per facility were reviewed for outliers
- Salary/allowance costs and the level of staffing per facility were compared
- Had the finance officer review and comment on expenditure calculations
- Had managers comment on the reasonableness of overall expenditure figures

- Standardised recharges and allocating charges of shared services across districts

Once reliable annual expenditure data was available at hand, it was compared with the expenditure per person (equity per person) and per health district (distance from equity) and presented in graphs and tables.

5.8. Determining the number of professional nurses in each district

Data on the number of professional nurses in public service per district was obtained from the provincial health human resource department.

5.9. Determining the equitable number of professional nurses per district and comparing that equitable number with the actual number to identify inequities

The number of dependent people per professional nurse for the province was taken as the equitable number of dependent people per staff member. The equitable number of nurses per district was then calculated in proportion with the above. The distance from equity could then be found by subtracting the equitable number of professional nurses from the actual number of nurses and was presented in graphs and tables.

5.10 Comparison of distance from equity calculated using the dependent population alone and the corrected final dependent population

A comparison of the results on 'distance from equity' obtained from the calculations using both the dependent population (the population dependent on public sector health care services) and the corrected final dependent population (the dependent population after all weightings for areas of increased need). This calculation is not part

of the objective of this study, but is to determine if there are significant differences in the estimated inequities between both approaches.

5.11. <u>A discussion of the results and recommendations based on the findings for the equitable redistribution of resources and future equitable allocation of available resources.</u>

The discussions and recommendations would include the following;

- A discussion on the equitable allocation and redistribution of financial resources towards achieving equity
- Shifting of staff (Professional Nurses) based on equity and costing of the shifts
- An assessment of the impact of recommended equity shifts and the new distance from equity after redistribution.

6. <u>Reliability and validity of the results</u>

The study had obvious face validity in that it actually measured the equity in expenditure and staffing within the province. The validity and acceptability of the Cape Town Equity Gauge (CTEG) equity measurement and resource allocation tools (Scott et al., 2004) among other researchers was established prior to the study and the minor deviations from the tools justified. The use of different indicators and their weightings were based on direct calculations and reasoned estimations, in line with other similar studies. The indicators, which were selected from a range of indicators using recognized criteria to assess their feasibility, validity and accuracy, have been proposed as potential indicators for equity studies by other researchers and have been successfully used in other studies for the purpose of measuring inequities. The weighting factors were estimated by direct calculations based on data from similar

studies and in cases were data was not available, were calculated by way of reasoned estimation following the methodology used in other similar studies. The mathematical calculations and graphical interpretations were correct. Though measures were adopted to minimise any inaccuracies, use of secondary data had the limitation of low accuracy that could have affected the validity of the results. The degree of reliability could have been established by repeating the calculations and the study under the same settings. This was however not done due to time constraints. The actual findings/results represent the population of the Northern Cape and due to the unique environment of the province, are not generalisable to other provinces in South Africa. However the methodology employed in the Northern Cape could be generalisable to provinces with similar settings.

7. Ethical considerations

The study used routinely collected population data that was freely, though not easily, available and therefore did not reflect many ethical concerns. However, sensitive information including HIV statistics was handled responsibly. Consent was also obtained from the relevant authority to use the data for equity calculations. The Higher Degrees Committee at the University of the Western Cape approved the research proposal, which also included ethics approval.

1. <u>Data accessibility</u>

Though the study involved the analysis of secondary data available from a number of national and local sources (as stated earlier), the ease of availability of the data was not as expected. Many of the data elements, though routinely collected, were not readily available. Much of the population data available on the internet were outdated and could not be used. Updated population, demographic and socio-economical data collected from different, and at times the same sources, had inconsistencies which often necessitated arduous and time consuming exploration for their justification. Health status data was obtained from the provincial department of health in Kimberley and also contained some inaccuracies. Data on staff and expenditure was also obtained from different sections of the concerned provincial departments and had inconsistencies.

2. <u>Management involvement</u>

The proposal to conduct such a study promptly gained the interest of some provincial managers and was readily approved by one of the senior managers in the provincial Department of Health. However, the initial enthusiasm and interest showed by the managers was short lived, partly due to their work commitments and partly for the reason that the senior officer who sanctioned the study moved office, shortly after. Many of the frontline managers and especially the health information and financial officers in the provincial department showed a special interest and were supportive throughout the period of the study.

3. Equity calculations based on expenditure

The population of each district, the geographic size as well as well as the population density per area has been shown in Table 1 in Appendix.

3.1. Estimation of the population on medical aid in each district using a cut-off income bracket based on overall percentage of people on medical aid in the province.

The 1999 October Household Survey estimated the medical aid coverage for the Northern Cape Province as 19.1% and this is the latest and most reliable information on medical aid coverage in the province. As the medical schemes have reported not much change in medical aid memberships over the years, this percentage was taken as the medical aid percentage for the province. Assuming that the people on medical aid schemes are those people with the highest income levels, the number of people in each district who belonged to the highest 19.1% income bracket was estimated. This helped to reach a cut-off income level of Rand 710.00 for medical aid members. The number of people on medical aid was then estimated by adding the people with an income above Rand 710.00. The income brackets and estimations are shown in Table II & III of the appendix.

3.1.1 <u>Estimated Medical aid coverage per district.</u>

DISTRICT	ACTUAL POPULATION	MEDICAL AID COVERAGE %	POPULATION COVERED BY MEDICAL AID	POPULATION NOT COVERED BY MEDICAL AID
Kgalagadi	37061	26.92	9969	27092
Namakwa	107591	22.40	24100	83491
Karoo	159312	15.51	24693	134619
Siyanda	210310	18.08	38066	172244
Frances Baard	301999	19.55	59192	242807
Northern Cape	816273	19.07	156020	660253

Notes:

▪ *Population covered by medical aid = actual population X medical aid coverage %.*

▪ *Population not covered by medical aid = actual population - population covered.*

3.2. <u>Estimation of the proportional need of people on medical aid for public primary health care services</u>

The Cape Town Equity Gauge (CTEG) (Scott et al., 2004) recently estimated the proportional need of people on medical aid for public primary health care services.   In consultation with experienced health managers and other stakeholders, the CTEG estimated the average utilisation (need) of public sector primary health care services by the population on medical aid in five broad health service categories. The five health service categories included environmental health services, health promotion services including counselling and community outreach services, prevention services including immunisation and contraception, acute curative care and chronic curative care including rehabilitation. The average cost (as a percentage of the total cost) of providing each category of health service was also estimated. By weighting the need

in each category of health services by the average cost of providing those services and adding the resultant proportional need in each category, the CTEG estimated the overall proportional need for public primary health care services by those on medical aid to be 10%. This estimate was generalised to the Northern Cape based on anecdotal evidence and in consultation with the Equity Gauge Group.

3.3. Calculated dependent population in each district

A	B	C	D
DISTRICT	POPULATION NOT COVERED BY MEDICAL AID	10% OF THE POPULATION ON MEDICAL AID (PROPORTIONAL NEED OF THE POPULATION ON MEDICAL AID)	DEPENDENT POPULATION (POPULATION INCREMENTED / WEIGHTED FOR MEDICAL AID)
Kgalagadi	27092	997	28089
Namakwa	83491	2410	85901
Karoo	134619	2469	137088
Siyanda	172244	3807	176051
Frances Baard	242807	5919	248726
Northern Cape	660253	15602	675855

Notes:

- D: derived by adding B and C

3.4. <u>Selected indicators of increased need</u>

The following indicators were chosen from the potential list of socio-economic, demographic and health status indicators for the following reasons:

INDICATORS OF INCREASED NEED	REASON FOR SELECTION
Demography: % of population under 5 years of age	• Have increased need for health services; often differing need for immunisations, recurrent infections and periodic monitoring for growth • Data readily/easily available, fairly accurate and of good quality. • Data is frequently collected and used for various programs
Demography: % above 50 years of age	• Have increased need for health services, especially for chronic diseases, with large cost implications • Needs of old age are more specific and do not duplicate other indicators • Data readily/easily available, fairly accurate and of good quality • Data is frequently collected and used for management decisions
Health status: HIV prevalence	• Large cost implications • Different rates across health sub districts • Good quality and valid estimations of data possible; data is also frequently collected • Widely used for managerial purposes
Health status: TB incidence	• Large cost implications • Different rates across health sub districts • Data is frequently collected and used for management decisions • Data quality is fairly good
Socio-economic: Inadequate access to water	• As an indirect measure of health need; indicates poverty • Large cost driver • Different rates across health sub districts • Good studies available on quantifying additional costs to households without adequate access to water • Data easily available • Data frequently and widely collected

<u>Notes</u>:

- See Tables IV to VIII in appendix for data on above indicators across districts in the Northern Cape.

3.5. <u>Estimated weighting factors for the above indicators of increased need</u>

3.5.1. <u>Estimated weighting factor for indicator-TB (by direct calculation)</u>

The extra cost of treating a patient with TB from diagnosis to cure has been estimated to be Rand 3127.00 (Buckingham, A., Cullity, J., Kelleher, F., Lagnese, D. and Raziano, D., 2001). The estimated the average cost of providing services for the usual need of a person with TB is Rand 439.00 [calculated as total operating expenditure for the year (i.e. Rand 394,988,151.00) divided by the weighted dependent population excluding weightings for TB (i.e. 899925)]. Therefore, the proportional extra need for TB was calculated by dividing 3127 by 439, which equals 7.1. Therefore each person with TB would be weighted by 712% or by a factor of 7.1.

3.5.2. <u>Estimated weighting factor for indicator-inadequate water (by direct calculation)</u>

Inadequate access to water is defined as water not being available onsite (onsite water included-piped water inside dwelling, piped water inside yard and borehole). The increased cost of providing services for different health problems due to lack of water has been documented by Palmer Development Group (2000) to be Rand 220.00. The estimated average cost of providing services for the usual need of a person with inadequate water is Rand 444.00 [calculated as total operating expenditure for the year (i.e. Rand 394,988,151.00) divided by the weighted dependent population excluding weightings for inadequate water (i.e. 890584)]. The

proportional increased need due to lack of water was then calculated as 220 divided by 444 which equals 50% or a factor of 0.50.

3.5.3. Estimated weighting factor for indicator-HIV (by direct calculation)

The total cost of caring for a patient with stage 2 AIDS at primary level has been estimated to be Rand 421.00 (Equity Gauge Group, 2003b). It has also been estimated that 15% of all people with HIV at any point of time would have AIDS and hence it is this 15% that require the extra resources. The extra cost for HIV was calculated as 15% of R421.00, which is Rand 63.00. The estimated average cost of providing services for the usual need of a person with HIV is Rand 423.00 [calculated as total operating expenditure for the year (i.e. Rand 394,988,151.00) divided by the weighted dependent population excluding weightings for HIV (i.e. 934532)]. The cost of increased resources would then be 63 divided by 423 multiplied by 100, which is 15%. Hence the weighting factor for HIV is 0.15.

3.5.4. Estimated weighting factor for population above 50 years (by reasoned estimation)

The weighting for population above 50 years is based on the estimation of extra cost due to the increased need. People above 50 years are more prone to illness and have a higher prevalence of chronic diseases. But everyone in this age group does not necessarily get ill and so we do not need to provide extra services to everyone in this age group, but a proportion of them.

Assuming that:

- This age group has 30% more chronic illnesses compared to the average person and that chronic diseases require 200% more resources than average health care services (Equity Gauge Group, 2003b),

- This age group has 20% more need for rehabilitative services compared to the average person and that rehabilitative services require 80% more resources than average health care services (Equity Gauge Group, 2003b),

Hence the calculation;

A. Percentage of extra services required for chronic illness = 30% divided by 200% = 60%

B. Percentage of extra services required for rehabilitative services = 20% divided by 80% = 16%

C. Therefore, total extra resources required = 60% + 16% (A+B) = 76%

Therefore the weighting factor for population above 50 years is 0.76.

3.5.5. <u>Estimated weighting factor for population below 5 years (by reasoned estimation)</u>

The weighting for the population below 5 years is based on the estimation of extra visits required for their age. Children under 5 years require extra preventive and

promotive health care services due to the need for immunisations and for monitoring of growth. As children become ill more frequently compared to adults, extra curative services are also required. Between the ages of 0 and 5, a child thus requires a mix of different curative and preventative services.

The average number of primary health care visits for the population of the Northern Cape is 2.9 visits and therefore any visits over and above the average would be considered to be an extra visit. For the calculation, the age period between 0 and 5 has been split into 5 one-year groups. The percentage of extra visits and the extra resources required are calculated for each group and summed to get the total extra need for each service category (see calculations two in tables below).

3.5.5.1 Calculated extra need for preventative services

A	B	C	D	E
AGE CATEGORY	% SIZE OF AGE CATEGORY	EXTRA VISITS REQUIRED*	% EXTRA NEED FOR AGE CATEGORY	% EXTRA NEED FOR CHILDREN UNDER 5 YEARS
0-1 year	20%	4 extra visits for immunisation and growth monitoring	140 %	28%
1-2 years	20%	1 extra visit for immunisation and growth monitoring	35%	7%
2-3 years	20%	Nil	0%	0%
3-4 years	20%	Nil	0%	0%
4-5 years	20%	1 extra visit for immunisation	35%	7%
Total extra need for preventative services for under 5 years				42%

Notes:

* - From estimations of Equity Gauge Group (2003)

- ▪ *D: calculated by dividing C by the average number of primary health care visits for the population multiplied by 100.*

- ▪ *E: calculated by multiplying B by D and dividing by 100.*

- ▪ *The total extra need for preventative services for children under 5 years is the sum of extra needs all age categories.*

3.5.5.2 <u>Calculated extra need for curative services</u>

A	B	C	D	E
AGE CATEGORY	% SIZE OF AGE CATEGORY	EXTRA VISITS REQUIRED*	% EXTRA NEED FOR AGE CATEGORY	% EXTRA NEED FOR UNDER 5 YEARS
0-1 year	20%	2.5	86%	17%
1-2 years	20%	2.5	86%	17%
2-3 years	20%	1.25	43%	9%
3-4 years	20%	1.25	43%	9%
4-5 years	20%	1.25	43%	9%
Total extra need for curative services for under 5 years				61%

Notes:

* - From estimations of Equity Gauge Group (2003)

- ▪ *D: calculated by dividing C by the average number of primary health care visits for the population multiplied by 100.*

- ▪ *E: calculated by multiplying B by D and dividing by 100.*

- *The total extra need for curative services for children under 5 years is the sum of extra needs all age categories.*

Therefore the total extra need for services for children under 5 years = 103% (61% + 42%). Hence the weighting factor of 1.03.

3.6. <u>Adjusting the dependent population for weighted extra need in each district.</u>

3.6.1. <u>Adjusted dependent population for extra need due to inadequate water</u>

DISTRICT	DEPENDENT POPULATION	INDICATOR OF EXTRA NEED - % HOUSEHOLDS WITH INADEQUATE ACCESS TO WATER	WEIGHTED NUMBER OF HOUSEHOLDS WITH INADEQUATE WATER	ADJUSTED (INCREMENTED) DEPENDENT POPULATION FOR EXTRA NEED DUE TO INADEQUATE WATER
Kgalagadi	28089	17.1	2402	30491
Namakwa	85901	11.8	5068	90969
Karoo	137088	18.4	12612	149700
Siyanda	176051	18.6	16373	192424
Frances Baard	248726	17.9	22261	270987
Northern Cape	675855	17.3	58461	734316

<u>Notes</u>:

- Weighting factor for the extra need due to inadequate water is 0.50.

- The adjusted dependent population for each indicator (except TB) is calculated as follows;
  i. The dependent population is multiplied by the indicator percentage to derive the actual number of people (households in case of inadequate water) affected by the indicator of extra need,
  ii. The affected number is then weighted by multiplying by its weighting factor,
  iii. The weighted number is then added to the dependent population to increment for the extra need,
  iv. The same calculation follows for all indicators of extra need below until the final dependent population (incremented for all extra need) is arrived at.

3.6.2. Adjusted dependent population for extra need due to HIV

DISTRICT	DEPENDENT POPULATION	INDICATOR OF EXTRA NEED - % POPULATION WITH HIV	WEIGHTED NUMBER OF PEOPLE WITH HIV	ADJUSTED (INCREMENTED) DEPENDENT POPULATION FOR EXTRA NEED DUE TO HIV
Kgalagadi	28089	22.7	956	29045
Namakwa	85901	10	1289	87190
Karoo	137088	10.1	2077	139165
Siyanda	176051	12.1	3195	179246
Frances Baard	248726	17.4	6492	255218
Northern Cape	675855	15.2	15409	691264

Note:

- Weighting factor for the extra need due to HIV is 0.15

3.6.3. Adjusted dependent population for extra need due to TB

DISTRICT	DEPENDENT POPULATION	INDICATOR OF EXTRA NEED - TB INCIDENCE (RATE PER 100,000 OF POPULATION)	WEIGHTED NUMBER OF PEOPLE WITH TB	ADJUSTED (INCREMENTED) DEPENDENT POPULATION FOR EXTRA NEED DUE TO TB
Kgalagadi	28089	1529	3049	31138
Namakwa	85901	857.5	5230	91131
Karoo	137088	869.3	8461	145549
Siyanda	176051	1278.8	15985	192036
Frances Baard	248726	741	13086	261812
Northern Cape	675855	954.4	45798	721653

Note:

- Weighting factor for the extra need due to TB is 7.1
- The adjusted dependent population for TB is calculated as follows;
  i. The dependent population is multiplied by the TB incidence and divided by 100,000 to derive the actual number of people affected by the indicator of extra need,
  ii. The affected number is then weighted by multiplying by its weighting factor,

iii.   The weighted number is then added to the dependent population to increment for the extra need,

3.6.4. Adjusted dependent population for extra need for the population under 5 years of age

DISTRICT	DEPENDENT POPULATION	INDICATOR OF EXTRA NEED - % POPULATION BELOW 5 YEARS OF AGE	WEIGHTED NUMBER OF PEOPLE UNDER 5 YEARS OF AGE	ADJUSTED (INCREMENTED) DEPENDENT POPULATION FOR EXTRA NEED FOR POPULATION UNDER 5 YEARS OF AGE
Kgalagadi	28089	9.9	2864	30953
Namakwa	85901	9.2	8140	94041
Karoo	137088	10.4	14685	151773
Siyanda	176051	10.5	19040	195091
Frances Baard	248726	9.5	24338	273064
Northern Cape	675855	9.9	68917	744772

Note:

- Weighting factor for the extra need for population under 5 years of age is 1.03

3.6.5. Adjusted dependent population for extra need for the population above 50 years of age

DISTRICT	DEPENDENT POPULATION	INDICATOR OF EXTRA NEED - % POPULATION ABOVE 50 YEARS OF AGE	WEIGHTED NUMBER OF PEOPLE ABOVE 50 YEARS OF AGE	ADJUSTED (INCREMENTED) DEPENDENT POPULATION FOR EXTRA NEED FOR POPULATION ABOVE 50 YEARS OF AGE
Kgalagadi	28089	13	2775	30864
Namakwa	85901	18.4	12012	97913
Karoo	137088	17	17712	154800
Siyanda	176051	14.7	19668	195719
Frances Baard	248726	16	30245	278971
Northern Cape	675855	15.8	81157	757012

Note:

- Weighting factor for the extra need due for population under 5 years of age is 0.76

3.7. Estimated final dependent population

A	B	C	D	E
DISTRICT	DEPENDENT POPULATION	WEIGHTED NUMBER OF HOUSEHOLDS WITH INADEQUATE WATER	WEIGHTED NUMBER OF PEOPLE WITH HIV	WEIGHTED NUMBER OF PEOPLE WITH TB
Kgalagadi	28089	2402	956	3049
Namakwa	85901	5068	1289	5230
Karoo	137088	12612	2077	8461
Siyanda	176051	16373	3195	15985
Frances Baard	248726	22261	6492	13086
TOTAL	675855	58716	14009	45811

F	G	H
WEIGHTED NUMBER OF PEOPLE UNDER 5 YEARS OF AGE	WEIGHTED NUMBER OF PEOPLE ABOVE 50 YEARS OF AGE	FINAL DEPENDENT POPULATION (AFTER ALL WEIGHTINGS FOR EXTRA NEED)
2864	2775	40136
8140	12012	117640
14685	17712	192635
19040	19668	250312
24338	30245	345147
69067	82412	945870

Note:

- H = Sum of B, C, D, E, F and G

3.8. Corrected final dependent population (after all weightings for extra need)

A	B	C	D	E
DISTRICT	DEPENDENT POPULATION	FINAL DEPENDENT POPULATION	% EACH DISTRICT POPULATION REPRESENTS THE TOTAL OF THE FINAL DEPENDENT POPULATION	CORRECTED FINAL DEPENDENT POPULATION
Kgalagadi	28089	40136	4.243	28678
Namakwa	85901	117640	12.437	84058
Karoo	137088	192635	20.366	137644
Siyanda	176051	250312	26.464	178856
Frances Baard	248726	345147	36.490	246619
TOTAL	675855	945870	------	675855

Notes:

- The final dependent population after all weightings for extra need is a virtual population and needs to be adjusted to represent the population dependent on public PHC services. This is done by,

    i. Dividing final dependent population in each district (C) by that of the total (C) and then multiplying by 100 to arrive at the percentage (D) each district population represents the total of the final dependent population.

    ii. Multiplying the total of the dependent population (B) by the percentages (D) derived in the above calculation and then dividing by 100.

    iii. This figure now represents the dependent population.

3.9. The equitable expenditure and the shifts required to achieve equity, can be calculated using either,

- *The dependent population* (public sector dependent population weighted for medical aid alone), when used as a less ambitious tool for merely measuring and monitoring the equitable allocation of resources, without actually taking the areas of increased need of the population and their weightings into consideration

- *The corrected final dependent population* (after all weightings for areas of increased need) when used as a more comprehensive tool, taking into account the health status of the population and their needs.

The study calculated the equitable expenditure and the required expenditure shifts for equity, using both methods as is shown below:

3.9.1. Using the dependent population alone for equity calculations

3.9.1.1. Calculated expenditure per dependent person

A	B	C	D
DISTRICT	ACTUAL EXPENDITURE PER DISTRICT (RANDS)	DEPENDENT POPULATION	EXPENDITURE PER DEPENDENT PERSON (RANDS)
Kgalagadi	19,198,719	28089	683
Namakwa	50,436,723	85901	587
Karoo	76,873,652	137088	561
Siyanda	89,801,985	176051	510
Frances Baard	158,677,072	248726	638
Northern Cape Province	394,988,151	675855	584

Notes:

- See Table IX in appendix for district operating expenditure data

- D = B divided by C

- The expenditure dependent person for the Northern Cape Province (see calculation above) is assumed to be the equitable expenditure per person in the calculation below

3.9.1.2. Calculated equitable expenditure amount per district

A	B	C	D
DISTRICT	DEPENDENT POPULATION	EXPENDITURE PER DEPENDENT PERSON (RANDS)	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)
Kgalagadi	28089	584	16415980
Namakwa	85901	584	50202894
Karoo	137088	584	80117977
Siyanda	176051	584	102889021
Frances Baard	248726	584	145362279
Northern Cape Province	675855	584	394988151

Notes:

- D = B multiplied by C

3.9.1.3. Calculated distance from equity

A	B	C	D	E
DISTRICT	ACTUAL EXPENDITURE PER DISTRICT (RANDS)	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)	DISTANCE FROM EQUITY (RANDS)	% OF ACTUAL EXPENDITURE TO BE SHIFTED
Kgalagadi	19,198,719	16,415,980	2,782,739	14
Namakwa	50,436,723	50,202,894	233,829	0
Karoo	76,873,652	80,117,977	-3,244,325	4
Siyanda	89,801,985	102,889,021	-13,087,036	15
Frances Baard	158,677,072	145,362,279	13,314,793	8
Northern Cape Province	394,988,151	394,988,151	0	0

Notes:

- D = B minus C
- The 'Distance from equity' is the expenditure that needs to be shifted to achieve equity
- E = D divided by B multiplied by 100

3.9.1.4. <u>Graphical presentation of the distance from equity (Graph A)</u>
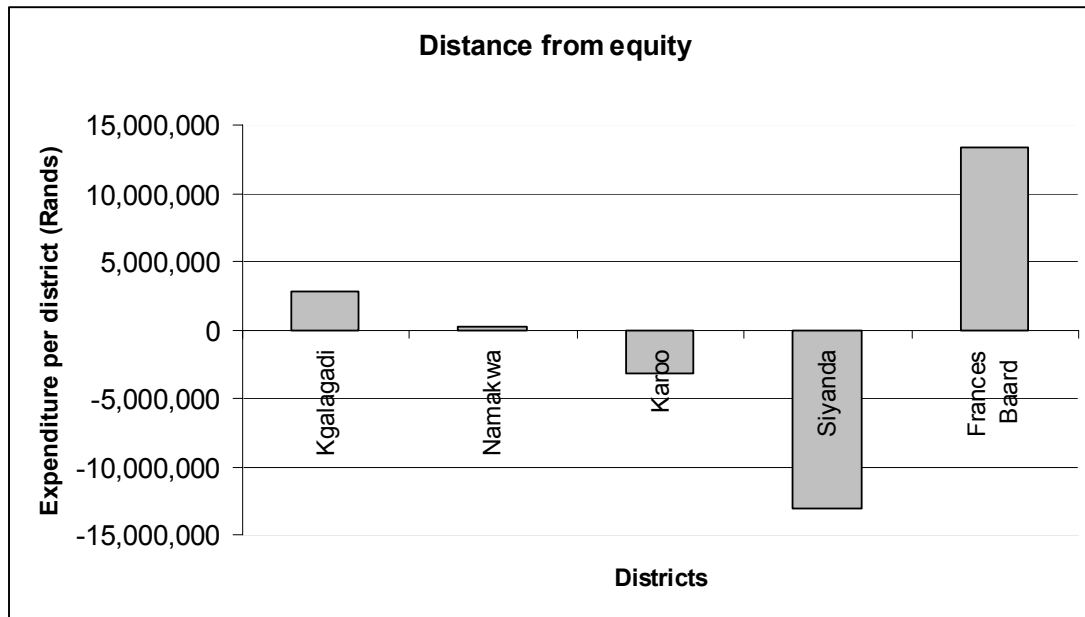
Distance from equity

Notes:

- The equity line on the graph is at 0. Districts above the equity line are above their equitable share, while districts below the equity line are below their equitable share. As districts move closer to the equity line, they become more equitable in expenditure.

3.9.2. <u>Using the corrected final dependent population for equity calculations</u>

3.9.2.1. <u>Calculated expenditure per corrected final dependent person</u>

A	B	C	D
DISTRICT	ACTUAL EXPENDITURE PER DISTRICT (RANDS)	CORRECTED FINAL DEPENDENT POPULATION	EXPENDITURE PER CORRECTED FINAL DEPENDENT PERSON (RANDS)
Kgalagadi	19,198,719	28678	669
Namakwa	50,436,723	84058	600
Karoo	76,873,652	137644	558
Siyanda	89,801,985	178856	502
Frances Baard	158,677,072	246619	643
Northern Cape Province	394,988,151	675855	584

<u>Notes</u>:

- D = B divided by C

- The expenditure per corrected final dependent person for the Northern Cape Province (see calculation above) is assumed to be the equitable expenditure per person in the calculation below

3.9.2.2. Calculated equitable expenditure amount per district

A	B	C	D
DISTRICT	CORRECTED FINAL DEPENDENT POPULATION	EXPENDITURE PER CORRECTED FINAL DEPENDENT PERSON (RANDS)	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)
Kgalagadi	28678	584	16,760,208
Namakwa	84058	584	49,125,795
Karoo	137644	584	80,442,919
Siyanda	178856	584	104,528,339
Frances Baard	246619	584	144,130,890
Northern Cape Province	675855	584	394,988,151

Notes:

- D = B multiplied by C

3.9.2.3. Calculated distance from equity

A	B	C	D	E
DISTRICT	ACTUAL EXPENDITURE PER DISTRICT (RANDS)	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)	DISTANCE FROM EQUITY (RANDS)	% OF ACTUAL EXPENDITURE TO BE SHIFTED
Kgalagadi	19,198,719	16,760,208	2,438,511	13
Namakwa	50,436,723	49,125,795	1,310,928	3
Karoo	76,873,652	80,442,919	-3,569,267	5
Siyanda	89,801,985	104,528,339	-14,726,354	16
Frances Baard	158,677,072	144,130,890	14,546,182	9
Northern Cape Province	394,988,151	394,988,151	0	0

Notes:

- D = B minus C

- The 'Distance from equity' is the expenditure that needs to be shifted to achieve equity

- E = D divided by B multiplied by 100

3.9.2.4. Graphical presentation of the distance from equity (Graph B)
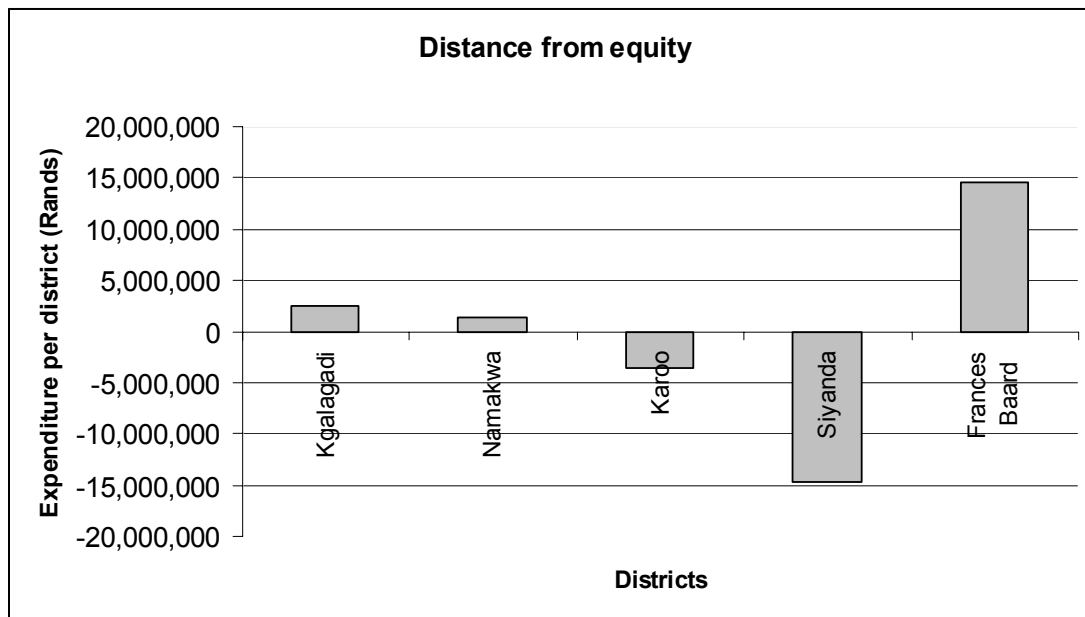
Distance from equity

Y-axis (Expenditure per district (Rands)): 20,000,000; 15,000,000; 10,000,000; 5,000,000; 0; -5,000,000; -10,000,000; -15,000,000; -20,000,000

Districts: Kgalagadi, Namakwa, Karoo, Siyanda, Frances Baard

Notes:

- The equity line on the graph is at 0. Districts above the equity line are above their equitable share, while districts below the equity line are below their equitable share. As districts move closer to the equity line, they become more equitable in expenditure.

3.9.3. Comparison of the distance from equity using both approaches

DISTRICT	CALCULATED USING DEPENDENT POPULATION ALONE		CALCULATED USING CORRECTED FINAL DEPENDENT POPULATION	
	DISTANCE FROM EQUITY (RANDS)	% OF ACTUAL EXPENDITURE TO BE SHIFTED	DISTANCE FROM EQUITY (RANDS)	% OF ACTUAL EXPENDITURE TO BE SHIFTED
Kgalagadi	2,782,739	14	2,438,511	13
Namakwa	233,829	0	1,310,928	3
Karoo	-3,244,325	4	-3,569,267	5
Siyanda	-13,087,036	15	-14,726,354	16
Frances Baard	13,314,793	8	14,546,182	9

3.9.3.1. The graphical presentation of the above comparison is given below (Graph C)
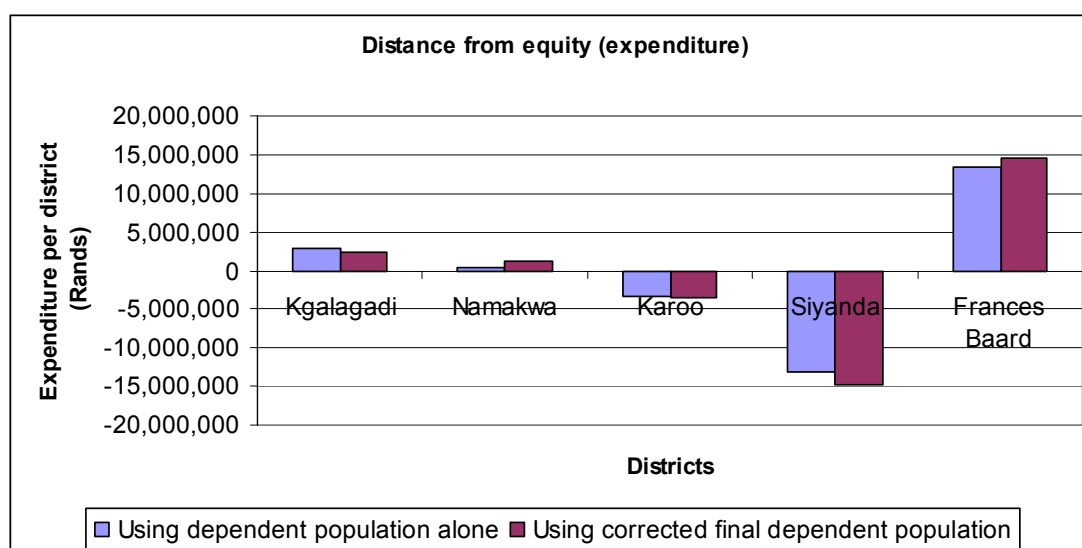
4. Equity calculations based on staffing

The assessment of equity in staffing was based on Professional Nurses, for the reason that professional nurses constituted a major category of health personnel within the health system. The assessment included all categories of professional nurses (chief, senior and basic grades).

4.1. Calculations based on the dependent population alone

4.1.1. Calculated equitable number of dependent people per professional nurse

A	B	C	D
DISTRICT	DEPENDENT POPULATION	ACTUAL NUMBER OF PROFESSIONAL NURSES IN PUBLIC PHC SERVICE	DEPENDENT PEOPLE PER PROFESSIONAL NURSE
Kgalagadi	28089	35	803
Namakwa	85901	117	734
Karoo	137088	139	986
Siyanda	176051	159	1107
Frances Baard	248726	309	805
Northern Cape Province	675855	759	890

Notes:

- D = B divided by C

- See Table X for data on professional nurses working in the Northern Cape

- The number of dependent people per professional nurse for the Northern Cape Province (column D above) is assumed to be the equitable number of dependent people per nurse (see calculation below).

4.1.2. <u>Calculated equitable number of professional nurses required per district</u>

A	B	C	D
DISTRICT	DEPENDENT POPULATION	EQUITABLE NUMBER OF DEPENDENT PEOPLE PER PROFESSIONAL NURSE	NUMBER OF PROFESSIONAL NURSES REQUIRED FOR ACHIEVING EQUITY
Kgalagadi	28089	890	32
Namakwa	85901	890	96
Karoo	137088	890	154
Siyanda	176051	890	198
Frances Baard	248726	890	279
Northern Cape Province	675855	890	759

<u>Notes</u>:

- D = B divided by C

4.1.3. Calculated number of professional nurses to shed/gain to achieve equity

A	B	C	D	E
DISTRICT	ACTUAL NUMBER OF PROFESSIONAL NURSES IN PUBLIC PHC SERVICE	NUMBER OF PROFESSIONAL NURSES REQUIRED FOR ACHIEVING EQUITY	NUMBER OF PROFESSIONAL NURSES TO SHED/GAIN TO ACHIEVE EQUITY	% OF ACTUAL NUMBER OF PROF. NURSES TO BE SHIFTED TO ACHIEVE EQUITY
Kgalagadi	35	32	-3	9
Namakwa	117	96	-21	18
Karoo	139	154	+15	11
Siyanda	159	198	+39	25
Frances Baard	309	279	-30	10
Northern Cape Province	759	759	0	0

Notes:

- D = C minus B

- E = D divided by B multiplied by 100

- The (-) symbol in column D indicates a need to shed/lose professional nurses, while the (+) symbol indicates a need to gain/get more professional nurses to achieve equity

4.1.3.1. Graphical presentation of 'distance from equity' in staffing (Graph D)
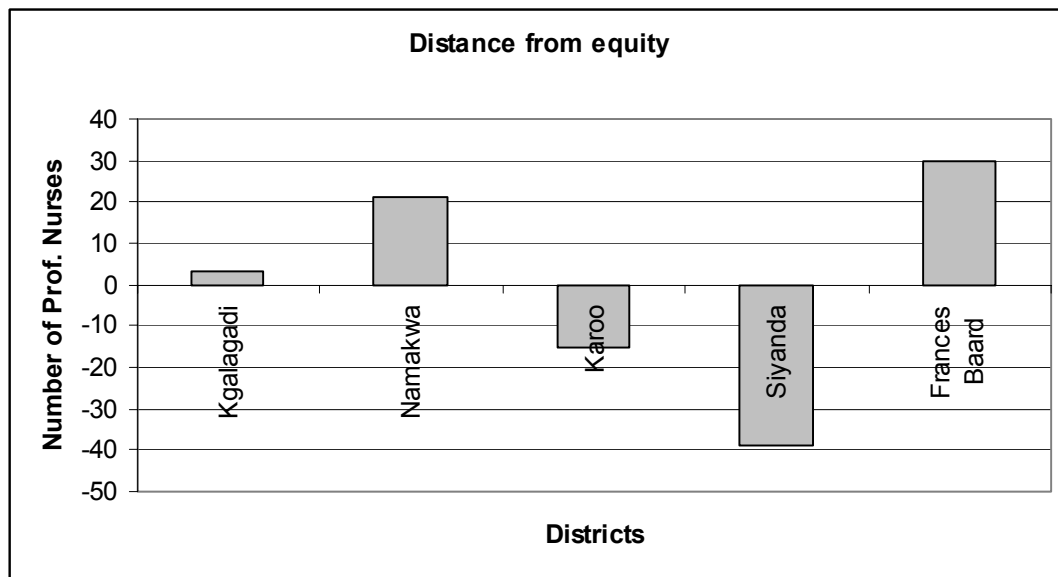
Distance from equity

Notes:

- The equity line on the graph is at 0. Districts above the equity line are above their equitable share, while districts below the equity line are below their equitable share. As districts move closer to the equity line, they become more equitable in expenditure.

4.2. Calculations based on the corrected final dependent population

4.2.1. Calculated equitable number of corrected final dependent people per professional nurse

A	B	C	D
DISTRICT	CORRECTED FINAL DEPENDENT POPULATION	ACTUAL NUMBER OF PROFESSIONAL NURSES IN PUBLIC PHC SERVICE	CORRECTED FINAL DEPENDENT PEOPLE PER PROFESSIONAL NURSE
Kgalagadi	28678	35	819
Namakwa	84058	117	718
Karoo	137644	139	990
Siyanda	178856	159	1125
Frances Baard	246619	309	798
Northern Cape Province	675855	759	890

Notes:

- D = B divided by C

- The number of dependent people per professional nurse for the Northern Cape Province (column D above) is assumed to be the equitable number of dependent people per nurse (see calculation below).

4.2.2. Calculated equitable number of professional nurses required per district

A	B	C	D
DISTRICT	CORRECTED FINAL DEPENDENT POPULATION	EQUITABLE NUMBER OF CORRECTED FINAL DEPENDENT PEOPLE PER PROFESSIONAL NURSE	NUMBER OF PROFESSIONAL NURSES REQUIRED FOR ACHIEVING EQUITY
Kgalagadi	28678	890	32
Namakwa	84058	890	94
Karoo	137644	890	155
Siyanda	178856	890	201
Frances Baard	246619	890	277
Northern Cape Province	675855	890	759

Notes:

- D = B divided by C

4.2.3. <u>Calculated number of professional nurses to shed/gain to achieve equity</u>

A	B	C	D	E
DISTRICT	ACTUAL NUMBER OF PROFESSION AL NURSES IN PUBLIC PHC SERVICE	NUMBER OF PROFESSION AL NURSES REQUIRED FOR ACHIEVING EQUITY	NUMBER OF PROFESSION AL NURSES TO SHED/GAIN TO ACHIEVE EQUITY	% OF ACTUAL NUMBER OF PROF. NURSES TO BE SHIFTED TO ACHIEVE EQUITY
Kgalagadi	35	32	-3	9
Namakwa	117	94	-23	20
Karoo	139	155	+16	12
Siyanda	159	201	+42	26
Frances Baard	309	277	-32	10
Northern Cape Province	759	759	0	0

Notes:

- D = C minus B

- E = D divided by B multiplied by 100

- The (-) symbol in column D indicates a need to shed/lose professional nurses, while the (+) symbol indicates a need to gain/get more professional nurses to achieve equity

4.2.3.1. Graphical presentation of 'distance from equity' in staffing (Graph E)
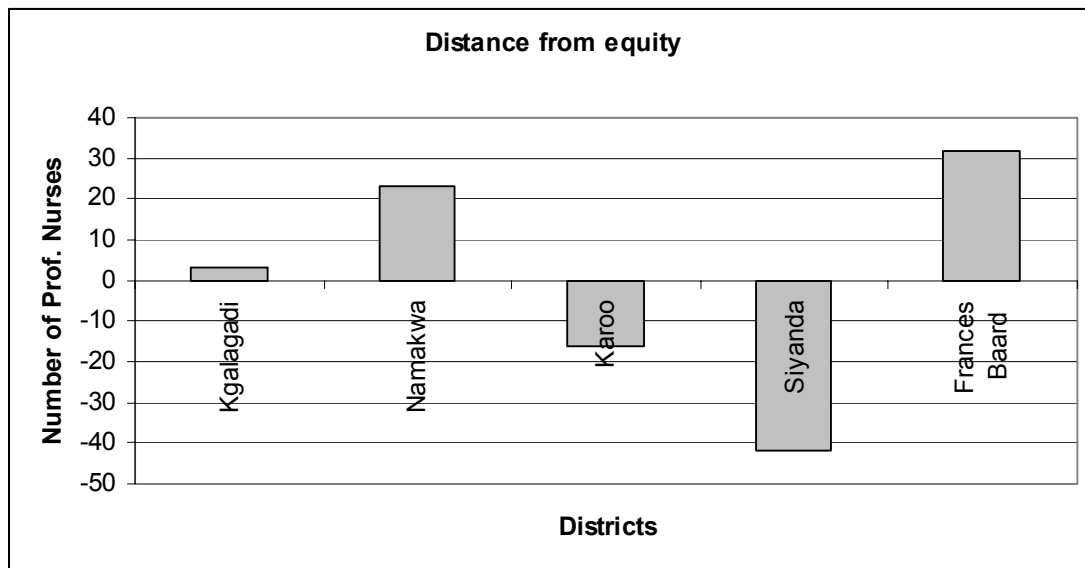
Notes:

- The equity line on the graph is at 0. Districts above the equity line are above their equitable share, while districts below the equity line are below their equitable share. As districts move closer to the equity line, they become more equitable in expenditure.

4.3. Comparison of the distance from equity using both approaches

DISTRICT	CALCULATED USING DEPENDENT POPULATION ALONE		CALCULATED USING CORRECTED FINAL DEPENDENT POPULATION	
	NUMBER OF PROFESSIONAL NURSES TO SHED/GAIN TO ACHIEVE EQUITY	% OF ACTUAL NUMBER OF PROF. NURSES TO BE SHIFTED TO ACHIEVE EQUITY	NUMBER OF PROFESSIONAL NURSES TO SHED/GAIN TO ACHIEVE EQUITY	% OF ACTUAL NUMBER OF PROF. NURSES TO BE SHIFTED TO ACHIEVE EQUITY
Kgalagadi	-3	9	-3	9
Namakwa	-21	18	-23	20
Karoo	+15	11	+16	12
Siyanda	+39	25	+42	26
Frances Baard	-30	10	-32	10

4.3.1. The graphical presentation of the above comparison is given below (Graph F)

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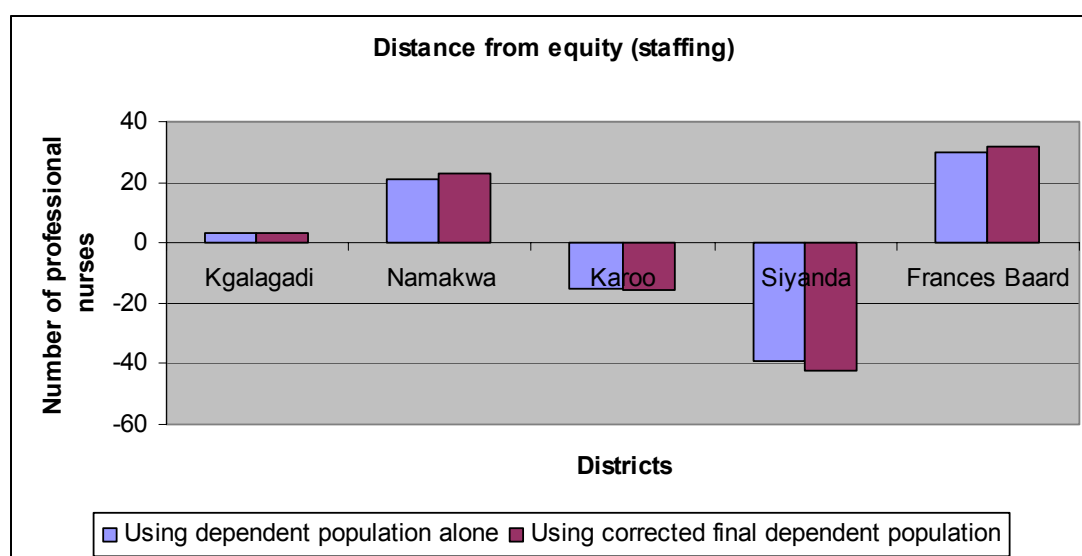
5. Shifting staff to achieve equity

5.1. Adjusting staff shifts based on the speed of the shift

The study shifted staff on a capping limit of 20% per year with a view of achieving 100% shifts and therefore equity over a five-year period.

5.2. Staff shifts in year-1

5.2.1. Cost of 20% shifts in year-1 (based on calculations on equity for the corrected final dependent population

A	B	C	D
DISTRICT	20% OF TOTAL PROFESSIONAL NURSES TO BE SHIFTED	MEDIAN PACKAGE OF PROFESSIONAL NURSE (RANDS)	COST OF THE SHIFT TO DISTRICT (IN EXPENDITURE RANDS)
Kgalagadi	-1	145,723	-145,723
Namakwa	-5	145,723	-728,615
Karoo	+3	145,723	+437,169
Siyanda	+8	145,723	+1,165,784
Frances Baard	-6	145,723	-874,338
Northern Cape Province	0	145,723	0

Notes:

- D = B multiplied by C

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- The (-) symbol in column D indicates a need to shed/lose professional nurses, while the (+) symbol indicates a need to gain/get more professional nurses to achieve equity

5.2.2. Impact of 20% staff shifts on expenditure in year-1

A	B	C	D	E
DISTRICT	ACTUAL (CURRENT EXPENDIURE)	ADD/ LESS: EXPENDITURE DUE TO STAFF SHIFTS	EXPENDITURE FOLLOWING STAFF SHIFTS	% OF ACTUAL (CURRENT) DISTRICT EXPENDITURE SHIFTED
Kgalagadi	19,198,719	-145,723	19,052,996	0.76
Namakwa	50,436,723	-728,615	49,708,108	1.44
Karoo	76,873,652	437,169	77,310,821	0.57
Siyanda	89,801,985	1,165,784	90,967,769	1.30
Frances Baard	158,677,072	-874,338	157,802,734	0.55
Northern Cape Province	394,988,151	0	394,988,151	0

Notes:

- D = Sum of B and C

- E = C divided by B multiplied by 100

5.2.3. Impact of 20% staff shifts on equity in year-1

A	B	C	D	E	F
DISTRICT	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)	EXPENDITURE FOLLOWING STAFF SHIFTS	DISTANCE TO EQUITY PRIOR TO STAFF SHIFTS	DISTANCE TO EQUITY FOLLOWING STAFF SHIFTS	% OF INEQUITY SHIFTED
Kgalagadi	16,760,208	19,052,996	2,438,511	2,292,788	6
Namakwa	49,125,795	49,708,108	1,310,928	582,313	56
Karoo	80,442,919	77,310,821	-3,569,267	-3,132,098	12
Siyanda	104,528,339	90,967,769	-14,726,354	-13,560,570	8
Frances Baard	144,130,890	157,802,734	14,546,182	13,671,844	6
Northern Cape Province	394,988,151	394,988,151	0	0	0

Notes:

- E = C minus B

- F = D minus E divided by D and multiplied by 100

5.2.4. Comparison of distance to equity prior to and following staff shifts in year-1 (Graph G)

Comparison of distance to equity
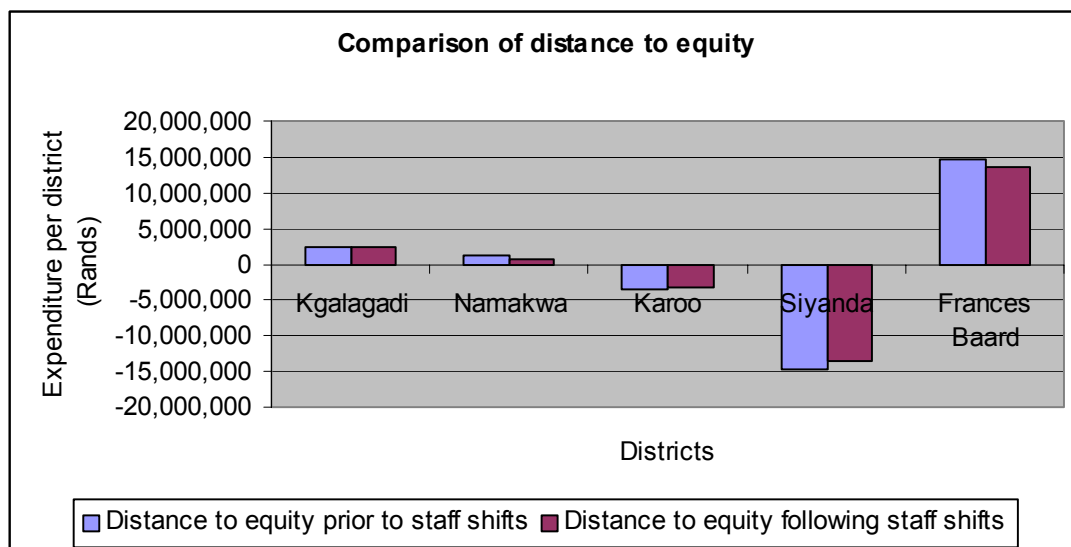
5.3. Projected staff shifts by year-3

5.3.1. Cost of 60% shifts by year-3 (based on calculations on equity for the corrected final dependent population

A	B	C	D
DISTRICT	60% OF TOTAL PROFESSIONAL NURSES TO BE SHIFTED	MEDIAN PACKAGE OF PROFESSIONAL NURSE (RANDS)	COST OF THE SHIFT TO DISTRICT (IN EXPENDITURE RANDS)
Kgalagadi	-2	145,723	-291,446
Namakwa	-14	145,723	-2,040,122
Karoo	10	145,723	+1,457,230
Siyanda	25	145,723	+3,643,075
Frances Baard	-19	145,723	-2,768,737
Northern Cape Province	0	145,723	0

Notes:

- D = B multiplied by C

- The (-) symbol in column D indicates a need to shed/lose professional nurses, while the (+) symbol indicates a need to gain/get more professional nurses to achieve equity

5.3.2. Impact of 20% staff shifts on expenditure by year-3

A	B	C	D	E
DISTRICT	ACTUAL (CURRENT EXPENDIURE)	ADD/ LESS: EXPENDITURE DUE TO STAFF SHIFTS	EXPENDITURE FOLLOWING STAFF SHIFTS	% OF ACTUAL (CURRENT) DISTRICT EXPENDITURE SHIFTED
Kgalagadi	19,198,719	-291,446	18,907,273	1.52
Namakwa	50,436,723	-2,040,122	48,396,601	4.04
Karoo	76,873,652	1,457,230	78,330,882	1.90
Siyanda	89,801,985	3,643,075	93,445,060	4.06
Frances Baard	158,677,072	-2,768,737	155,908,335	1.74
Northern Cape Province	394,988,151	0	0	0.00

Notes:

- D = Sum of B and C

- E = C divided by B multiplied by 100

5.3.3. Impact of 20% staff shifts on equity by year-3

A	B	C	D	E	F
DISTRICT	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)	EXPENDITURE FOLLOWING STAFF SHIFTS	DISTANCE TO EQUITY PRIOR TO STAFF SHIFTS	DISTANCE TO EQUITY FOLLOWING STAFF SHIFTS	% OF INEQUITY SHIFTED
Kgalagadi	16,760,208	18,907,273	2,438,511	2,147,065	12
Namakwa	49,125,795	48,396,601	1,310,928	-729,194	156
Karoo	80,442,919	78,330,882	-3,569,267	-2,112,037	41
Siyanda	104,528,339	93,445,060	-14,726,354	-11,083,279	25
Frances Baard	144,130,890	155,908,335	14,546,182	11,777,445	19
Northern Cape Province	394,988,151	394,988,151	0	0	0

Notes:

- E = C minus B

- F = D minus E divided by D and multiplied by 100

5.3.4. Comparison of distance to equity prior to and following staff shifts by year-3 (Graph H)

Comparison of distance to equity

Legend:
□ Distance to equity prior to staff shifts ■ Distance to equity following staff shifts

X-axis: Districts (Kgalagadi, Namakwa, Karoo, Siyanda, Frances Baard)
Y-axis: Expenditure per district (Rands)
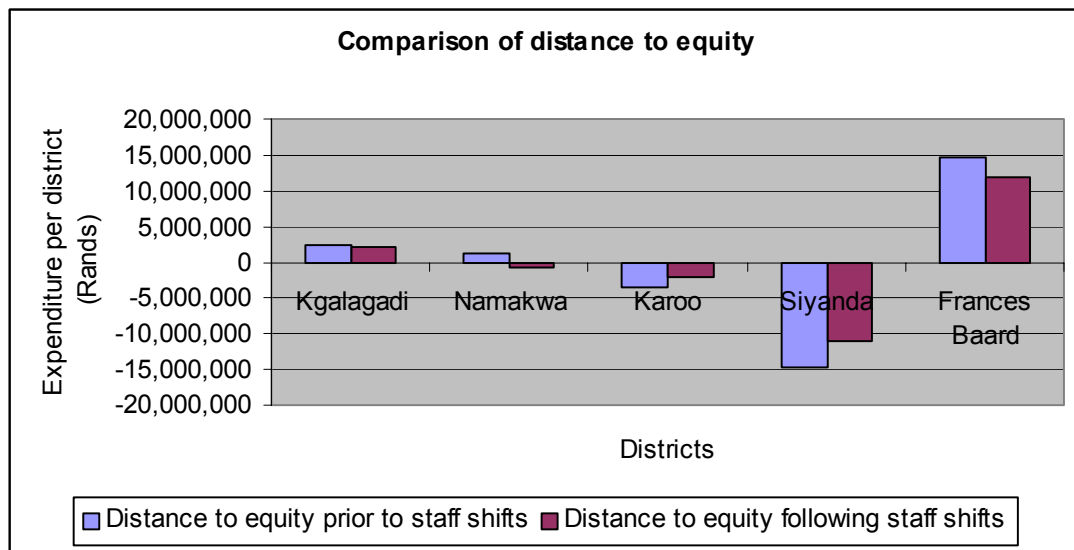
5.4. Projected staff shifts by year-5

5.4.1. Cost of 100% shifts by year-5 (based on calculations on equity for the corrected final dependent population

	A	B	C	D
	DISTRICT	100% OF TOTAL PROFESSIONAL NURSES TO BE SHIFTED	MEDIAN PACKAGE OF PROFESSIONAL NURSE (RANDS)	COST OF THE SHIFT TO DISTRICT (IN EXPENDITURE RANDS)
	Kgalagadi	-3	145,723	-437,169
	Namakwa	-23	145,723	-3,351,629
	Karoo	16	145,723	+2,331,568
	Siyanda	42	145,723	+6,120,366
	Frances Baard	-32	145,723	-4,663,136
	Northern Cape Province	0	145,723	0

Notes:

- D = B multiplied by C
- The (-) symbol in column D indicates a need to shed/lose professional nurses, while the (+) symbol indicates a need to gain/get more professional nurses to achieve equity

5.4.2. Impact of 100% staff shifts on expenditure by year-5

A	B	C	D	E
DISTRICT	ACTUAL (CURRENT EXPENDIURE)	ADD/ LESS: EXPENDITURE DUE TO STAFF SHIFTS	EXPENDITURE FOLLOWING STAFF SHIFTS	% OF ACTUAL (CURRENT) DISTRICT EXPENDITURE SHIFTED
Kgalagadi	19,198,719	-437,169	18,761,550	2.28
Namakwa	50,436,723	-3,351,629	47,085,094	6.65
Karoo	76,873,652	+2,331,568	79,205,220	3.03
Siyanda	89,801,985	+6,120,366	95,922,351	6.82
Frances Baard	158,677,072	-4,663,136	154,013,936	2.94
Northern Cape Province	394,988,151	0	0	0.00

Notes:

- D = Sum of B and C
- E = C divided by B multiplied by 100

5.4.3. Impact of 100% staff shifts on equity by year-5

A	B	C	D	E	F
DISTRICT	EQUITABLE EXPENDITURE AMOUNT PER DISTRICT (RANDS)	EXPENDITURE FOLLOWING STAFF SHIFTS	DISTANCE TO EQUITY PRIOR TO STAFF SHIFTS	DISTANCE TO EQUITY FOLLOWING STAFF SHIFTS	% OF INEQUITY SHIFTED
Kgalagadi	16,760,208	18,761,550	2,438,511	2,001,342	18
Namakwa	49,125,795	47,085,094	1,310,928	-2,040,701	256
Karoo	80,442,919	79,205,220	-3,569,267	-1,237,699	65
Siyanda	104,528,339	95,922,351	-14,726,354	-8,605,988	42
Frances Baard	144,130,890	154,013,936	14,546,182	9,883,046	32
Northern Cape Province	394,988,151	394,988,151	0	0	0

Notes:

- E = C minus B

- F = D minus E divided by D and multiplied by 100

5.4.4. Comparison of distance to equity prior to and following staff shifts by year-5 (Graph I)

Comparison of distance to equity
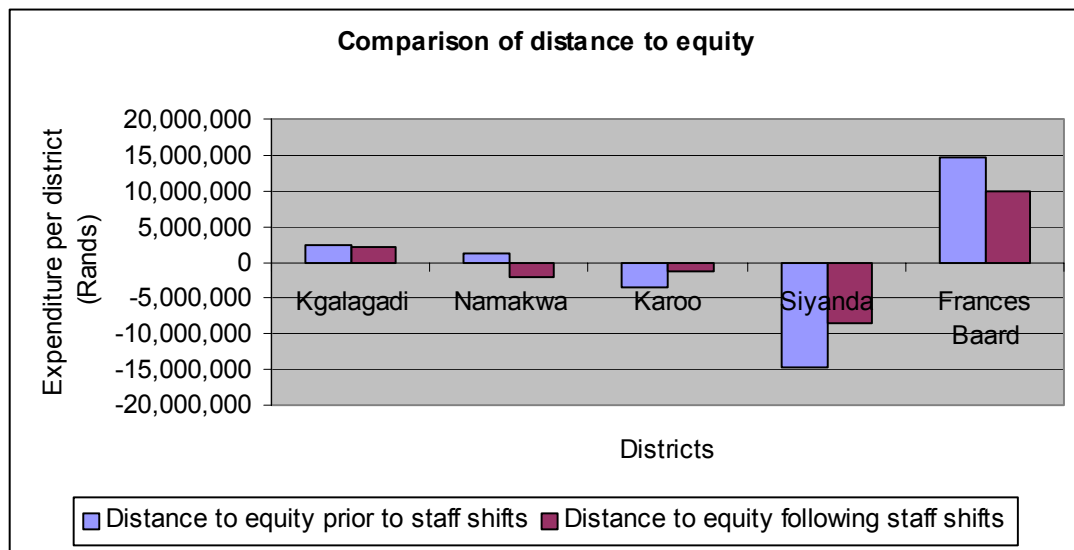
6. Discussion

The above results provide a reasonably accurate measure of equity, relative to need, between the health districts in the Northern Cape. The measurement tools used in assessing inequities are established. Further (though not an objective of the study), the study takes the equity analysis a little further and uses two different approaches to measuring equity, one relative to areas of increased need for health services, and the other which does not consider those areas of increased need, in an attempt to identify any significant differences between the two approaches and presents a comparison of the results obtained with both approaches. The quantitative values obtained from both approaches do not show significant differences but are reasonably accurate and acceptable for the purpose of equity measurements. The decision to use either of the approaches would depend on how accurate and ambitious the measurements need be. Other factors such as the availability of good quality data and the support of relevant stakeholders are important considerations in deciding which approach to choose.

The relative accuracy of the study is limited to the correctness of the secondary data used, the assumptions made and the calculations performed. Secondary data, though routinely collected, is not readily available and has its limitation in accuracy. The data on health status of the population of the Northern Cape has a lot to tell us. The already high TB rates in the province have been steadily increasing since the year 2000. The pattern of distribution of TB shows increased incidences in districts of Frances Baard, Siyanda and Karoo, which may be linked to the concentrations of mining, quarrying and other industries in those areas of the province. The cross border area of Kgalagadi though predominantly consisting of urban areas with increased population densities, has a relatively lower TB incidence compared to other districts. The HIV prevalence among ANC clinic attendees in the province has increased from 8.6% in 1997 to 16.7% in 2003. The increase in HIV in the province may be a reason behind the dramatically rising TB incidences.

While the population of all other provinces have increased, the Northern Cape's population has decreased by 2.9% since 1996. The average household size has also decreased by 21% since 1996. This decrease in population might be the result of increased migration in search of employment, to more affluent provinces like Gauteng and the Western Cape (the influx of the large numbers of people into those provinces being a reason for the apparent inter-provincial redistribution of funds, as much as the actual redistribution of funds). This movement of people back and forth between the Northern Cape and other provinces like Gauteng, which has high HIV rates, for the purpose of employment, might have also caused the increase in HIV prevalence. There is currently limited information on population shifts within the province. There is however anecdotal evidence of cross border flows that could have affected the dependent population in the equity calculations.

The concept of the dependent population in this study is built around the assumption that medical aid beneficiaries mostly access private health care services for their primary care needs and that only a proportion of medical aid users actually utilise the public sector and that the public sector needs to cater to only that proportion of medical aid beneficiaries. It is worth noting at this point that the public sector dependent population, which is the population not on medical aid, has shrunk by 2.8% in the Northern Cape since 1996. Presently in South Africa, a greater amount of money is spent on the private health sector. Over and above this, the private health sector is also indirectly subsidised by the public sector by way of generous tax deductions, medical aid benefits for civil servants and contributions towards the training of private sector health workers. Yet, when it comes to private health care, the greatest question that arises is that of affordability and still only a small proportion of the population can afford private care, taking into account that only 19.1% of the population of the Northern Cape belong to medical aid schemes. Affordability is also a question to the medical aid members as they soon reach their medical aid limits due to the high cost of private health care, and there after make use of the already overburdened and resource limited public health care sector. This further strains the facilities available to the public sector dependent population, worsening an already inequitable situation between the population enjoying access to private care and the population who unfortunately have to exclusively rely on the limited public health sector facilities, for their health needs. This raises the question of why the people on medical aid should be catered for by the public sector and on a higher note why the private sector should exist at all, at the expense of the public sector. Nevertheless to say, it is the constitutional right of every citizen to access public primary health care services and hence they have to be catered for.

The concept of the weighted dependent population (dependent population weighted for areas of increased need), is built around the assumption that some communities

and population groups have differing 'extra' health needs over and above the ordinary health needs of the general population, that must be given due (though inequitable, in literal sense) consideration when planning health services. This raises the question that why one should inequitably (literally) plan, in order to achieve equity. The reason behind such an anomaly is the already inequitable socio-economic status and demographic differences that exist within the population. The inequitable distributions of socio-economic conditions within our societies have resulted in differing health status among the people. Such socio-economic variations have a detrimental effect on the more vulnerable – the women, the children and the elderly. These differences among societies in socio-economic conditions and health status call for the inequitable planning of health services to achieve equity, by providing different inputs according to different needs, which has been termed 'vertical equity'. However, it is also worth noting that the achievement of equity in the public sector by only providing for the needs of the dependent population whether weighted or not, creates an inequitable situation in the total health services. Therefore it may be fairly assumed that the more closer the dependent population in numbers to the actual total population, the more equitable the overall health services.

The study measured the equity in health expenditure and staffing using both the dependent population and the weighted dependent population. The results of the measurements using both approaches do not show significant differences, with measured inequities being virtually the same when using both the dependent population and the weighted dependent population as the basis for equity calculations.

Differences in weighted dependent populations may arise depending on the health indicators chosen and the weighting factors used. The use of a good mix of socio-economic, demographic and health status indicators, broadly covering the overall need of the population studied, is a good choice to make. Nevertheless, one should

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be watchful of indicators that overlap each other and that are not relevant to the community studied. A genuine concern may be to use only health status indicators and to completely exclude other socio-economic and demographic indicators in such a study. The use of such indicators alone in a non-uniform society, like the Northern Cape in South Africa, could seriously undermine the quantified health needs of the population studied; as such a measure ignores the health needs arising from socio-economic and demographic variances in the same society. The use of weighting factors also has implications on the weighted dependent population. Weighting factors quantify an imperative need for service in a particular area of health and further support estimations of composite need for health services in a geographical area. Hence their estimations should preferably be based on real values and not on assumptions.

Health expenditure trends in the Northern Cape demonstrate progressively increasing real funding and comparatively higher per capita health expenditure figures since 1998. The higher per capita expenditure may partly be the result of the decreased population density of the province, the dispersion of the population resulting in increased cost of providing services, especially in rural areas due to poor infrastructure, lack of proper roads and transport and the increased cost of employing and retaining staff (rural allowances, vehicle subsidies and housing).

The analysis revealed that inequities exist within the province with Frances Baard being over resourced and Siyanda being under resourced, both districts largely deviating from equity. The analysis also revealed that Kgalagadi and Namakwa are over resourced and Karoo under resourced, but the deviations are not as significant in comparison with Siyanda and Frances Baard. There are many factors that could have created such an inequitable situation. The regional hospital in Kimberley provides both secondary and tertiary health care services in addition to primary care services. Since

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30% of the total expenditure of Kimberley hospital is on primary health care (anecdotal evidence), it may absorb a large portion of the health budget, further complementing the total health budget available to Frances Baard. It may also be noted here that primary health care services are more expensive when delivered through hospitals. The type and mix of staff categories, the level and numbers of health facilities and the use of historical budgets as the basis for funding decisions could also be some of the many reasons behind such inequities, especially in Siyanda.

In assessing the reasons behind inequities, one should also consider the demand for health services in different areas of these districts. It is likely that increased funding/resources, though historical in nature, resulted from an increased demand for health services in these geographical areas. Increased demand may have resulted from a myriad of reasons including better access to services (proximity, availability of frequent public transport, better roads) better quality of services, better facilities, lesser waiting times, attitude of staff towards clients, cultural and ethnic reasons including taboos and beliefs, as well as increased staff numbers. Facilities in urban and semi-urban areas are more likely to experience an increased demand for services due to the influx of large numbers of day workers into those areas. Facilities near banks and other commercial towns and markets may also experience a similar situation. Similar trends may also be seen in staff concentrations. The availability of rural allowances might increase staff concentrations in particular facilities, while poor infrastructure may make it impossible to attract and retain staff at some other facilities. A more detailed and closer study would be required to reach a conclusion as to the reasons behind those inequities, which is beyond the scope of this thesis.

In assessing inequities, this study compared the resources available to each district against a composite measure of the health need for that district. In doing so, it

estimated the operating expenditure for primary health care services, and used it as a proxy measure of financial resources available to the district. The use of operating expenditure provided an accurate and universal measure of the total financial resources available to the district for a particular year, against which comparisons could be made. This may then raise the question that if the health needs of districts are known and can be compared with the operating expenditure figures so as to assess the resource levels of districts, relative to need, why do provincial funding authorities refrain from providing additional funds to under resourced districts. Increasing funding to under-resource districts from a surplus fund has two advantages. Firstly it increases the resources available to those under resourced districts and secondly it would increase the equitable expenditure per dependent person consequently decreasing the amount by which over resourced districts are over resourced. However, it is worth noting that the provision of excess funds to under resourced health districts may not be the answer to inequities in every case, as they may not be capable of absorbing large increases in budgets and further, one has to also bear in mind that the change in funding to a district at the expense of another district (except when from a surplus amount of funds) may create an inequitable situation as a change in total financial resource available to one district affects the equitable share of other districts. Also, increasing funding to a particular facility or district will not necessarily increase the demand for services in those areas. Such efforts to redistribute finances should be coupled with measures to develop capacity at local levels. Infrastructure including health facilities, roads and transport will have to be developed. Other factors such as adequate staffing and quality of care should also be considered.

A similar concern would then be as to why not redistribute the funds of over resourced districts like the Frances Baard and Kgalagadi between under resourced districts like Siyanda and Karoo. While this is a hopeful solution to inequity, it may create problems

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initially as historically over resourced health districts may also be incapable of absorbing large budget cuts. Therefore, a better approach to the problem in the Northern Cape would be a gradual move towards equity by first equitably shifting non-financial resources, especially the human resources. But the shifting of human resources requires that it be based on a valid measure of need for their services due to its serious implications in terms of quality of service, efficiency and the overall delivery of services. Yet, the shift in human resources from the over resourced districts to the relatively under resourced districts is an excellent equity initiative for the very fact that staff salaries and pay packages (which form the major part of health budget) as well as the expenditure on small equipments, supplies and drugs automatically follow the shifted staff, thus compounding a major shift towards equity. This raises the question that on what basis can staff be shifted in order to achieve equity.

Currently, there are 974 professional nurses in public service in the province. This figure also includes the professional nurses working at the Kimberley regional hospital. A total of 391 professional nurses work at Kimberley hospital, which provides 60% of its services at the primary care level for which 30% of the total hospital expenditure is incurred (from anecdotal evidence and views of hospital managers). Assuming that 45% of these nurses provide primary care services at the hospital, a total number of 759 professional nurses will be providing public primary health care services in the Northern Cape. A valid method of measuring if professional nurses are distributed equitably is to measure their numbers against a standard measure of need, which then allows for comparison between districts. Such a standard measure could be the national or state norms for minimum services, which require a minimum number of nurses in each category, below which the quality of services would be seriously affected. Another measure could be the number of people who are dependent on the services of professional nurses per district, determined by dividing

the total number of dependent people by the total number of nurses in a district. Comparing this number between districts can provide a basic measure on which staff may be shifted. Staff may also be shifted based on their workloads, by measuring the workload of professional nurses per district and then shifting nurses based on the comparison of workload between districts.

High workloads may indicate increased demand, which may be the result of various factors, and hence districts with high workloads, even if over resourced in overall status cannot afford to lose staff. When considering workload, it is also important to take into account the workload of the receiving facilities in under resourced areas and whether they have the required physical structures to accommodate more staff. In reality, shifting staff from an over resourced facility to an under resourced facility will actually result in an increased workload at the releasing (over resourced) facility and a decreased or unaffected workload at the receiving facility until such time that their (the under resourced) facility utilisation rates increase or improve.

Due to its limited scope, this study did not measure the workload of staff at individual facilities, which is recommended for a more accurate shift based on workload. Instead, it measured the equity in distribution of staff between districts on the basis of the number of dependent people per professional nurse, from which the equitable numbers of nurses required per district was estimated. This 'required equitable number of nurses' was compared with the actual numbers to determine the gaps. The shifting of staff was thus based on the number of nurses to be shed or gained in order to achieve equity.

The analysis of equity in the distribution of professional nurses within the Northern Cape revealed gross inequities between districts with Frances Baard and Namakwa being over resourced with professional nurses while Siyanda and Karoo suffered

severe shortages of professional nurses relative to the need in those districts. Kgalagadi was placed at a more equitable position compared to all districts. In an effort to achieve equity between districts in the Northern Cape, the study shifted professional nurses, adjusted for the speed of the shift and based on a capping limit of 20% per year with a target of achieving 100% shifts towards equity within a period of five years. Shifts in the first year and projected shifts in the third and fifth years resulted in a total expenditure of 6.82% and 3.03% being shifted to the districts of Siyanda and Karoo, which subsequently reduced inequities in those districts by almost 50% by year 5. A total expenditure of 2.94% was shifted from Frances Baard, which also reduced the inequity by about 25% in year 5. Thus, the shifting of staff proved to be effective in reducing the inequities between districts.

However, there are obstacles to be considered when planning such shifts in the Northern Cape, the most immediate obstacle being resistance from staff and their trade unions. Ample further consideration will also be needed of national/state norms for staff categories, the equity within the shifted staff categories, the workload and skills of the staff to be shifted, cross border flows in case of Kgalagadi district which is a cross border area, the speed of such shifts and the categories and mix of staff to be shifted and the logistics and practicalities that need to be followed.

As far as possible, an equitable mix of staff categories, with due consideration to broad areas of skills should be preserved. The Northern Cape has an inequitable distribution of health professionals between geographical areas and levels of care. There is a high concentration of doctors and professional nurses in urban hospitals, especially in higher levels of care. Relocating a single doctor would equal the shift of approximately three professional nurses in terms of the expenditure shifts due to the large difference in remuneration between the two professional categories. The inequitable situation between Frances Baard and Siyanda even after shifting large

numbers of professional nurses might be an indication of over supply of doctors in Frances Baard and their scarcity in Siyanda. However, when considering more importantly the workload of under resourced districts, the shifting of nurses would be preferable to doctors. Considering the broader skills required at primary health care facilities and the uniformity required in the early stages of relocation, it is advisable to shift a major category of nurses, like professional nurses. However, professional nurses will eventually require the assistance of enrolled nurses and medical doctors, which should be considered in the later stages of redistribution. Where large shifts are required, the need for capital expenditure may also be required, as the receiving facilities or districts will have to provide physical facilities to accommodate the increased staff numbers.

The density of the population is also important when planning shifts in the Northern Cape. Due to its low population density, the population would be more spread out in rural areas than in urban towns and hence districts with rural areas will require more resources (for instance transport, staff, pay allowances and housing to attract staff to rural areas) due to the increased cost of providing services. The speed of shifts should also be planned as rapid shifting of staff could disrupt the service.

Hence, shifting staff without making provisions for these obstacles could else prove fruitless and have serious implications on efficiency of service delivery.

1. <u>Conclusions</u>

The study presents a reasonably accurate measure of inequities in the distribution of resources, relative to need in public primary health care, between districts of the Northern Cape. Apart from proposing a practical measurement of identifying inequities between districts in the Northern Cape, the study employs a methodology which could be generalisable to provinces with similar settings and suggests an easily employable model of shifting a major category of health staff based on a five year plan towards achieving considerable progress towards equity. However, it may be noted that such an achievement in equity will be at the expense of the overall equity in health services, due to the fact that the study does not take account of people who primarily seek private health services and further argues that they need not be catered for by the public sector, creating an inequitable situation here. It does make provision for a small proportion of the people who seek private care though, by means of a small weighting for their proportional needs. The study takes the stand that overall equity in public sector primary health services can only be achieved when the total populations in a geographic region are completely dependent on public sector services for primary health care needs. This may not be difficult in rural areas due to the very few private general practitioners providing primary care services, but may be impossible in an urban town.

The results obtained from the study highlights the extent of inequities in primary health care resource allocation between different districts of the Northern Cape. Based on the results obtained from the equity calculations and the five-year model of shifting staff, the study makes the following conclusions,

- There are widespread discrepancies and inconsistencies in the data available on demographic, socio-economic and health status of the Northern Cape. One of the reasons for this could be the overlapping of data due to a cross border area being shared with the Northwest Province.

- There are widespread discrepancies in the primary care expenditure per dependent person between districts ranging from R683 in Kgalagadi district to R510 in Siyanda district.

- Considerable inequities exist in financial resources available to different districts in the province. Frances Baard is most resourced with regard to finances, while Siyanda is least resourced, followed by Karoo. Namakwa district was found to be the closest to achieving equity in expenditure.

- The use of dependent population alone and the corrected final dependent population for the calculations did not show any significant differences in results. However, it is assumed that the use of the corrected final dependent population reflects a more accurate picture of the inequities as it makes provision for any areas of increased need for health care services.

- Substantial inequities exist in the distribution of professional nurses within the province. There is a high concentration of professional nurses working within primary health care in Frances Baard and Namakwa, with least numbers in Siyanda, followed by Karoo.

- By shifting staff based on the 20% capping limit per year, inequities in Siyanda and Karoo can be reduced by almost 50%, while that in Frances Baard can be reduced by 25%.

- The allocation of funds within the province is not with regard to equity and there is no formal mechanism or policy to mandate the equitable distribution of funds within the province. There is no mechanism, which protects the amounts of funds available for primary health care within the province.

- There seems to be very little done at the district and provincial levels to address inequities in the allocation of resources within the province. Resource allocation mechanisms including budgeting do not seem to be guided by measures of need.

2. <u>Recommendations</u>

It is essential that a formal mechanism, incorporating national and provincial departments of health and the treasuries, be developed which assures the equitable allocation of financial resources within provinces and which protects the amount of funds available for primary health care in order to provide the agreed package of services. The potential role of norms and standards in promoting equity in the allocation of resources should be explored.

More research has to be done on how primary health care services can be effectively translated into expenditure estimates and how the actual cost of delivering services within each district can be estimated. More studies are also needed on standardising certain cost components within primary health care.

The effectiveness and efficiency of resource allocation, the quality and quantity of services provided and the gaps in financing will have to be closely monitored. It is therefore suggested that regional monitoring authorities be formed and be tasked with the responsibility of closely monitoring resource allocation strategies. More effort will also be required towards developing a decentralised PHC system.

The redistribution of available resources should be planned based on the results of the equity analysis as a platform for the effective redistribution of resources. The redistribution of resources should result in more resources being channelled towards the districts of Siyanda and Karoo. The model for redistribution of staff using the 20% capping limit over five years may be used. According to the model, 20% staff shifts in year one will result in a shift of inequity of 56% from Namakwa and 6% from Kgalagadi and Frances Baard. Subsequent shifts of 20% should be followed every year until the fifth year resulting in a total of 50% inequity shifted from Siyanda and Karoo and 25%

from Frances Baard. This will result in a more equitable situation. The shift of other categories of staff may also be incorporated into the model for a more efficient redistribution.

The capacity of district primary care facilities will have to be improved in line with redistribution of resources. Capacity building to absorb the impact of the redistribution should include improvements in infrastructure and complementary infrastructure, training, incentives to attract staff to rural areas, adequate staff relocation plans and mechanisms, capacity to absorb both budget increases and budget cuts, support and ability to cope with changes in workload and to monitor and control expenditure. Measures to ensure efficient and effective utilisation of resources and the effective deployment of redistributed staff should also follow such shifts. The need for capital expenditure for improved infrastructure should also be considered.

Finally, as progress is made towards achieving equity in resource allocation between districts focus may be shifted to measuring and monitoring the extent of inequities within districts.

3. <u>Limitations</u>

One of the main limitations of this study is that it uses secondary data, which could contain inaccuracies. Several checks and control mechanisms were incorporated during the data collection, which have been explained earlier, in an attempt to minimise any inaccuracies. However, the study acknowledges that inaccuracies may be present in the data. The study makes several assumptions in quantifying the extent of inequities between districts and in suggesting redistribution of resources. The lack of district level data on medical aid membership coverage and affordability was not available and hence assumptions had to be made based on available data. The study selected indicators of need from a range of potential indicators after making several considerations, and covering as many aspects of overall health needs, based on available information. However, the selected indicators are not all-inclusive and their capability of comprehensively measuring the needs of individual districts has not been established.

The estimation of weighting factors for indicators of increased need was based on available data and good costing studies and where costing data was unavailable, was based on information gathered from similar studies, the accuracy of which could have affected the further estimations. Another limitation was the lack of availability of information on health expenditure funded by the local government's own revenue. Expenditure on primary care services provided by defence services were also not incorporated, but it is unlikely that the exclusion would have significantly affected the study, as those services are only accessible to defined population groups. The spending on primary care services provided by one tertiary hospital (Kimberley Health Complex) has been included in the study. Studies have indicated that the inclusion of expenditure on such levels of care can dramatically influence intra-provincial resource allocation patterns (McIntyre et al., 1999a). The study does not also take account of

indirect costs involved in the delivery of service and their impact on the inequitable situation in the Northern Cape.

The lack of studies on the impact of cross border flows on workloads of nurses in the cross border areas of the Northern Cape and Northwest Province is of concern to this study. This is due to the reason that the shifting of staff for equity has been based on the estimations of the number of dependent people per professional nurse per district, which may not be a true reflection of their workload. A more accurate measure on which to base the staff shifts could have been obtained by measuring the workload of professional nurses per district or assessing the demand for primary health care services and then shifting staff based on workload. The study does not also take account of the new workload of staff once the shifts have been completed.

Nonetheless, it is unlikely that these limitations would have dramatically influenced the overall picture of inequities in distribution of resources between health districts, as presented by the study. It is most likely that a more comprehensive analysis of inequities within the province would still find a concentration of resources in urban districts of Frances Baard and Kgalagadi and lack of resources in Siyanda and Karoo or even more disparities than documented in this study.

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APPENDIX

Figure 1 - Trends in provincial per capita expenditure between 1998 and 2006
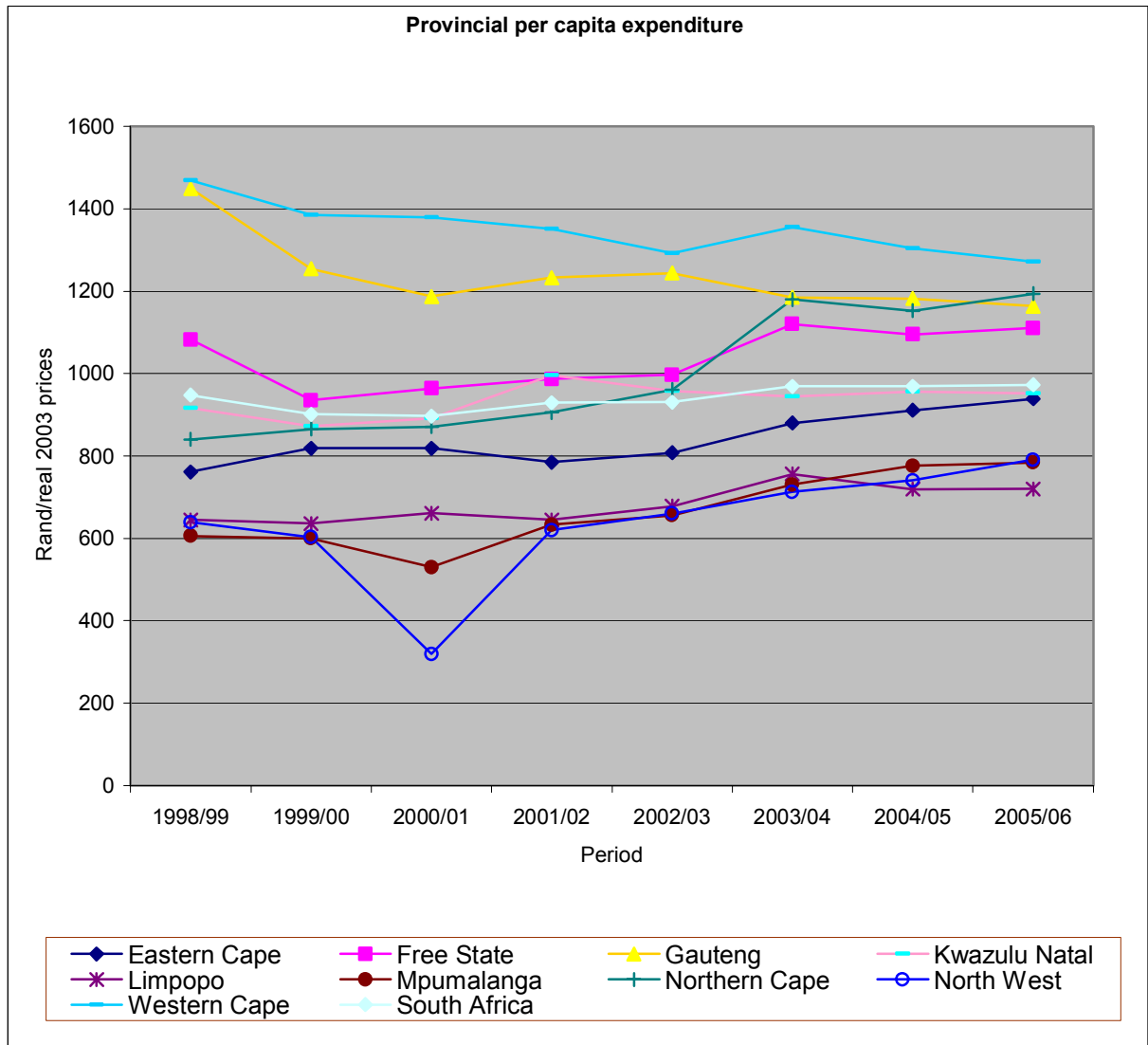
Source: SAHR 2003/04, Health Systems Trust, Durban.

Figure 2- Distribution of public sector health personnel by province in 2003

Distribution of public sector health personnel per 100,000 of the public sector dependent population by province in 2003

EC-Eastern Cape FS-Free State GP-Gauteng KZN-Kwazulu Natal LP-Limpopo
MP-Mpumalanga NC-Northern Cape NW-North West WC-Western Cape

Legend:
- Dental Practitioner
- Enrolled Nurse
- Env.Health Practitioner
- Medical Practitioner
- Medical Researcher
- Medical Specialist
- Nursing Assistant
- Pharmacist
- Prof. Nurse

Source: Graphical presentation based on data from SAHR 2003/04, Health Systems Trust, Durban.

Figure 3 – Percentage difference between real per capita total provincial health expenditure/budgets and the national average.
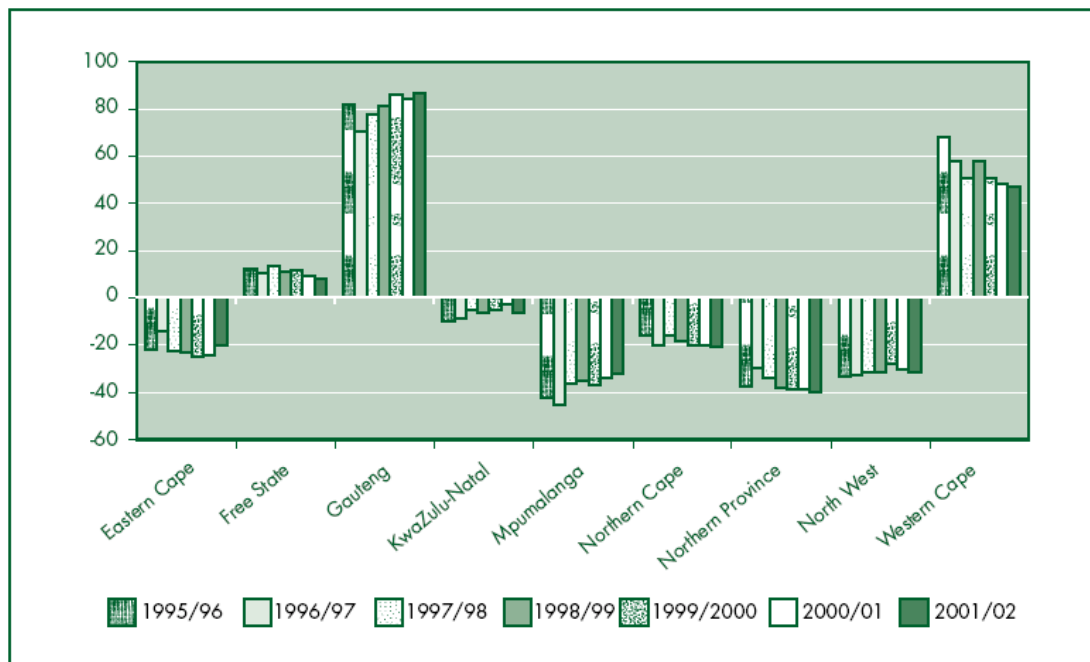
Source: SAHR 1999, Health Systems Trust, Durban.

Figure 4 - Financing per capita vs. Deprivation across health districts in South Africa
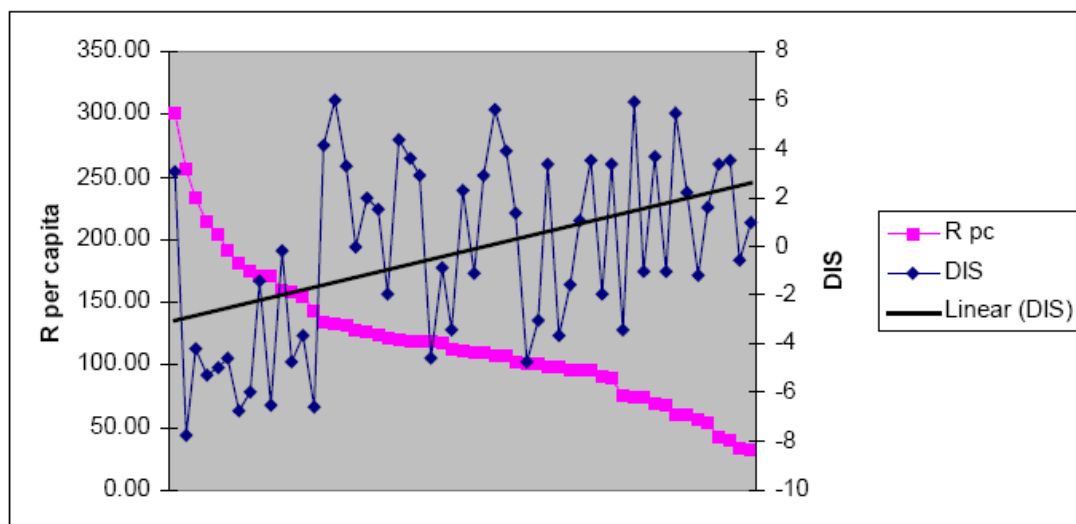
Key: DIS is deprivation index score and Linear (DIS) is a linear trend line for the DIS.

Financing per capita ranging from a high of Rand 300 to well under Rand 50 is shown by the curve from top left to bottom right. The deprivation index for each district ranging from +6 to –8 is also shown. A trend line, which makes the relationship between financing and need clearer, has also been added to the deprivation score. It can be seen from above that as financing per capita decreases, there is an overall trend for the district to have a higher deprivation score. Source: Primary health care financing and need across health districts in South Africa. Health Systems Trust, Durban.

Figure 5 - Map of the Northern Cape Province showing four districts and one cross border area
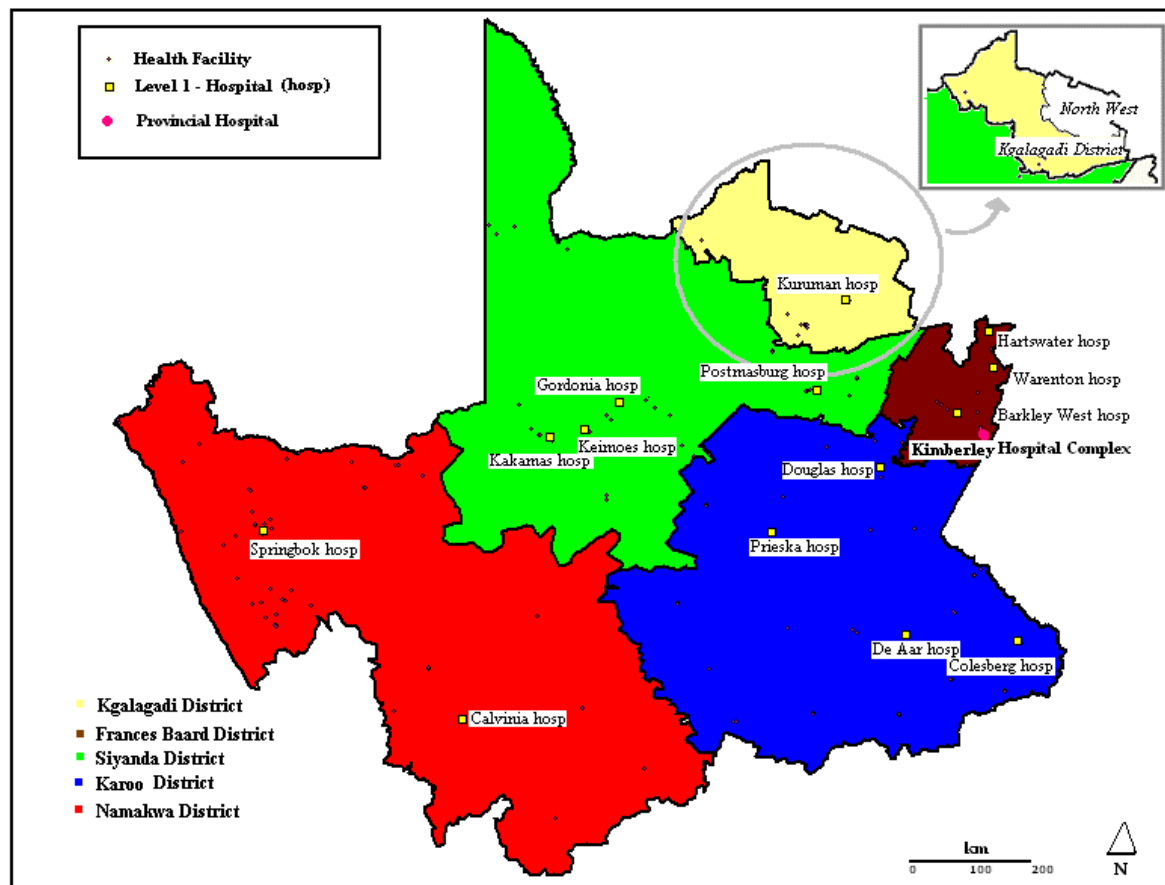
Source: Department of Health, Kimberley.

Table I - Group B Northern Cape Municipality population (Mid year 2004).

As listed below, the Northern Cape consists of five districts of which Kgalagadi is a cross border district shared with the Northwest Province. The table also lists the population, the geographic size and the population density per area.

District	Population	Area (kM^2)	Density (Pop/km^2)
Kgalagadi	37061	17697	2.09
Namakwa	107591	125884	0.85
Karoo	159312	103887	1.53
Siyanda	210310	103901	2.02
Frances Baard	301999	9654	31.28
Northern Cape	816273	361023	2.26

Source: Department of Health, Kimberley.

Table II - Northern Cape population categorised by individual monthly income per person.

Income category	Number of People in Kgalag-adi	Number of People in Namak-wa	Number of People in Karoo	Number of People in Siyanda	Number of People in Franc-es Baard	Number of people in the Northe-rn Cape	% of total popula-tion
No income	21,193	61,004	104,401	123,984	194,301	504,883	61.9%
R 1 - R 400	2,969	9,021	14,743	19,366	18,066	64,165	7.9%
R 401 - R800	3,412	17,469	24,919	36,008	39,262	121,070	14.8%
R 801 - R1600	1,953	6,118	6,760	9,476	14,255	38,562	4.7%
R 1601 - R3200	2,569	5,976	5,584	8,598	14,817	37,544	4.6%
R 3201 - R6400	2,323	4,707	4,133	6,173	11,933	29,269	3.6%
R 6401 - R12800	1,483	2,016	1,810	2,985	5,733	14,027	1.7%
R 12801 - R 25600	496	505	491	981	1,513	3,986	0.5%
R 25601 - R 51200	83	171	202	311	442	1,209	0.2%
R 51201 - R 102400	57	98	141	148	317	761	0.1%
R 102401- R 204800	45	148	105	172	190	660	0.1%
R 204801 or more	9	30	30	42	30	141	0.01%
Total	36,592	107,263	163,319	208,244	300,859	816,277	100%

Source: Statistics South Africa, Northern Cape Province.

Income category	Number of People in Kgalagadi	Number of People in Namakwa	Number of People in Karoo	Number of People in Siyanda	Number of People in Frances baard	Number of people in Northern Cape
R 710 - R 800	832	4,261	6,078	8,782	9,576	29,529
R 801 - R 1600	1,953	6,118	6,760	9,476	14,255	38,562
R 1601 - R 3200	2,569	5,976	5,584	8,598	14,817	37,544
R 3201 - R 6400	2,323	4,707	4,133	6,173	11,933	29,269
R 6401 - R 12800	1,483	2,016	1,810	2,985	5,733	14,027
R 12801 - R25600	496	505	491	981	1,513	3,986
R 25601 - R51200	83	171	202	311	442	1,209
R 51201 - R102400	57	98	141	148	317	761
R 102401 - R204800	45	148	105	172	190	660
R 204801 or more	9	30	30	42	30	141
Total	9,850	24,030	25,334	37,668	58,806	155,688
% of total population covered by medical aid	26.92%	22.40%	15.51%	18.08%	19.55%	19.07%

Table IV - Main water supply by geography for households in the Northern Cape

KGALAGADI	NAMAKWA	KAROO	SIYANDA	FRANCES BAARD	TOTAL
Piped water inside dwelling					
6583	15141	13699	20687	33491	89601
Piped water inside yard					
2906	11484	20123	24304	32141	90958
Piped water on community stand: distance less than 200m from dwelling					
615	1639	3674	4534	6137	16599
Piped water on community stand: distance greater than 200m from dwelling					
1277	1014	3058	3723	6330	15402
Borehole					
93	254	259	373	311	1290
Spring					
-	40	9	9	6	64
Rain-Water tank					
6	184	12	39	45	286
Dam/pool/stagnant water					
23	82	134	244	249	732
River/stream					
14	165	258	1257	580	2274
Water vendor					
-	27	30	18	66	141
Other					
45	457	505	713	923	2643
Total					
11560	30489	41762	55901	80279	219991

Source: Statistics South Africa, Northern Cape Province

Table V - Incidence of TB per district in the Northern Cape

District	2003 All Cases	TB Incidence Rate per 100,000 population	2001 Census population
Kgalagadi	564	1529.2	36881
Namakwa	927	857.5	108111
Karoo	1431	869.3	164608
Siyanda	2684	1278.8	209889
Frances Baard	2248	741	303239
Northern Cape Province	7852	954.4	822728

Source: District Health Information System (DHIS), Kimberley.

Table VI - <u>Percentage HIV positives per district in the Northern Cape in 2002</u>

Year	District					Northern Cape Province
	Kgalagadi	Namakwa	Karoo	Siyanda	Frances Baard	
2002	22.67	10.00	10.14	12.09	17.41	15.15
2001	18.67	9.38	14.40	12.25	18.50	15.85

Source: HIV Antenatal Survey Report 2002. Department of Health, Kimberley.

Table VII - <u>Population group by geography of persons aged 0-4</u>

	Kgalagadi	Namakwa	Siyanda	Karoo	Frances Baard	Total
African	1870	285	4484	4193	17217	28048
Coloured	1129	8966	16047	11825	9306	47274
Indian	10	14	24	20	157	225
White	636	723	1483	1078	2050	5970
Total	3645	9989	22038	17115	28730	81518

Source: Statistics South Africa, Northern Cape Province

Table VIII - <u>Population group by geography of persons aged 50+</u>

	Kgalagadi	Namakwa	Siyanda	Karoo	Frances Baard	Total
African	1830	571	6011	7038	24446	39896
Coloured	957	14964	18005	14197	11694	59817
Indian	6	24	24	21	366	441
White	2001	4327	6904	5965	10746	29943
Total	4794	19886	30945	27221	47252	130098

Source: Statistics South Africa, Northern Cape Province

Table IX - <u>Northern Cape Province: Operating Expenditure in Rands for 2003-04</u>

District: Kgalagadi

Standard Expenditure Item	Expenditure (2003-4)	% of total operating expenditure
Administrative expenditure	690,837	4
Equipment	133,477	1
Inventories	2,008,581	10
Rent: Land & Buildings	48,315	0
Personnel expenditure	13,125,817	68
Transfer payments	905,289	5
Professional & special services	2,286,404	12
Total operating expenditure	19,198,719	100

District: Namakwa

Standard Expenditure Item	Expenditure (2003-4)	% of total operating expenditure
Administrative expenditure	2,635,998	5
Equipment	529,933	1
Inventories	2,891,489	6
Rent: Land & Buildings	255,607	1
Personnel expenditure	33,850,795	67
Transfer payments	2,271,048	5
Professional & special services	8,001,853	16
Total operating expenditure	50,436,723	100

District: Karoo

Standard Expenditure Item	Expenditure (2003-4)	% of total operating expenditure
Administrative expenditure	1,816,881	2
Equipment	512,407	1
Inventories	8,819,397	11
Rent: Land & Buildings	341,622	0
Personnel expenditure	50,527,802	66
Transfer payments	4,963,614	6

| Professional & special services | 9,891,929 | 13 |
| Total operating expenditure | 76,873,652 | 100 |

District: Siyanda

Standard Expenditure Item	Expenditure (2003-4)	% of total operating expenditure
Administrative expenditure	2,441,678	3
Equipment	1,068,415	1
Inventories	10,045,540	11
Rent: Land & Buildings	116,465	0
Personnel expenditure	60,344,545	67
Transfer payments	5,614,598	6
Professional & special services	10,170,744	11
Total operating expenditure	89,801,985	100

District:Frances Baard

Standard Expenditure Item	Expenditure (2003-4)	% of total operating expenditure
Administrative expenditure	2,450,647	3
Equipment	337,139	0
Inventories	5,146,148	6
Rent: Land & Buildings	24,471	0
Personnel expenditure	40,243,516	50
Transfer payments	12,515,934	16
Professional & special services	19,848,174	25
Total operating expenditure	80,566,028	100
Kimberley Hospital Complex	78,111,044	30% of facility expenditure
Grant Total	158,677,072	

Source: Financial section, Department of Health, Kimberley.

Table X - <u>Number of professional nurses in public sector PHC service</u>

District	Number of professional nurses in public sector PHC
Kgalagadi	35
Namakwa	117
Karoo	139
Siyanda	159
Frances Baard	133
Kimberley Hospital Complex	176 (out of 391)
Northern Cape Province	759

Source: Staff sections, Department of Health and Kimberley Hospital Complex, Kimberley

Table XI – <u>Top ten causes of death in the Northern Cape between 1999 and 2001</u>.

NO.	YEAR-1999	(% OF TOTAL DEATHS)	YEAR-2000	(% OF TOTAL DEATHS)	YEAR-2001	(% OF TOTAL DEATHS)
1	Respiratory	19.9	Respiratory	21.5	Respiratory	24.8
2	Cardio-Vascular	15.4	Cardio-Vascular	15.6	Natural / Non-Natural Causes	16.30
3	Natural Causes	13.4	Cerebro-Vascular	8.9	Cardio-Vascular	12.3
4	Non-Natural Causes	11.8	Notifiable Medical Conditions	9.0	Notifiable Medical Conditions	12.0
5	Carcinoma	7.0	Natural Causes	8.0	Cerebro-Vascular	7.4
6	Notifiable Medical Conditions	7.0	Non-Natural Causes	7.2	Carcinoma	5.6
7	Cerebro-Vascular	6.1	Carcinoma	6.7	Gastro-Intestinal	4.1
8	Gastro-Intestinal	3.6	Gastro-Intestinal	4.6	Blood Disease	3.0
9	Renal	3.4	Renal	3.2	Birth Complications	0.6
10	Septicaemia	1.9	Multi Organ Failure	2.0	Circulatory	1.9

Source: Health Ten Year Review. Department of Health, Kimberley.