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MODERNISATION OF TERTIARY SERVICES PROJECT

**NATIONAL PLAN FOR THE EFFICIENT
AND EQUITABLE DEVELOPMENT
OF TERTIARY AND REGIONAL HOSPITAL SERVICES**

June 2004

Updated Version

**Modernisation of Tertiary Services Project Team
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EXECUTIVE SUMMARY

1. Background

Government financing of the health sector has since 1996 in real terms been experiencing a downward trend, thus placing the provision of tertiary and quaternary care in the public hospital sector under enormous pressure. Also adversely affected are regional hospitals, which are increasingly becoming financially "squeezed" between primary health care and tertiary and regional hospitals. The Review of Highly Specialised Services conducted by the National Department of Health in 2001 and the National Health Accounts Project of 2000 highlighted some of the problems experienced by these levels of care.

It has thus become apparent that serious change and potentially major shifts in the way in which the public hospital system provides tertiary care are needed. Consequently, the Health MINMEC and PHRC decided that a project geared towards modernising tertiary, highly specialised and regional services should be undertaken by the National Department of Health.

2. Objectives of the Modernisation of Tertiary Services

The Modernisation of Tertiary Services (MTS) seeks to develop a credible, long-term plan for the provision of tertiary and highly specialised care within the South African public health system, where these services are both modernised and reconfigured. The aim is to ensure that such services are optimally reconfigured to provide equitable access to efficient, high quality and cost effective care, in a manner that is both affordable and sustainable in the medium and long term. The MTS has been developed as part of the Integrated Health Planning Framework.

3. Desired Outputs

The primary output of the MTS is a service development and relocation plan for tertiary and regional services that is agreed upon by both the provincial and national Departments of Health and all relevant stakeholders. The key components of which are an agreed target configuration for all national referral, provincial tertiary and regional health services, by service/ specialty, province and institution, funded human resources,

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capital and procurement plans to achieve the said configuration, appropriate recurrent funding vehicles for both the transition period and the longer term, and an implementation and transition plan, with designated responsibilities for all components.

4. General Approach

The approach adopted is one that integrates stakeholder inputs, technical analysis and modelling, and consensus building. The key activities that were integrated to develop the MTS Planning Model consist of stakeholder input of clinical experts from fifty specialties and subspecialties, a Strategic Framework based upon the synthesis of critical messages and information gathered from reports prepared by the clinicians, a cost model whose results were used as baseline data for the MTS planning model, a Patient Travel and Referral Analysis Model which constructs Thiessen and drive-time polygons to determine the catchment population to be served by a hospital at different levels of care and calculates the travel time and costs of travel between different hospitals, HR Information from Vulindlela, Persal and the Gauteng Province and finally the IHPF and Hospital Revitalisation Plan.

A technical consensus has been built via the following activities:

- Two rounds of consultative workshops with the MTS specialty groups during 2002 and 2003
- Detailed comment by and consultation with specialty groups on the Draft Strategic Framework document, and wider consultation on the Strategic Framework via the MTS website
- Two detailed briefings of provincial Heads of Health at PHRC in November 2003 and March 2004
- Two rounds of one-day workshops with provincial managers in each province to consult and take feedback on drafts of the plan, in January - February 2004 and April - May 2004
- National technical workshops with provincial managers on the Strategic Framework and MTS models in March 2003 and June 2004

The MTS Project Team is confident that this process is one of the most extensive consultative planning exercises ever undertaken in the South African public health

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sector; extensive improvements to the work have taken place following every stage of the consultation, highlighting the value of prioritising the consultative planning approach.

5. Guiding Principles

A set of principles and values were developed to guide the future development and reconfiguration of public referral hospitals in South Africa. These principles have been distilled from existing policy, from legislative and constitutional principles, and from the stakeholder consultation process. They are the following:

- Government must actively work to realise progressively the right of access of all South Africans to appropriate, high-quality referral hospital care, given available resources
- Current centres of excellence in tertiary care must be preserved and not undermined by change. The reduction of inequalities must explicitly involve the strengthening and development of services and should not be a crude process of “redistribution”.
- Ensuring equitable access to care does not always require that services must be evenly distributed in geographic terms. The health system should facilitate the health service user in accessing services, be that by local provision or by the provision of transport to ensure that patients can travel safely to distant treatment centres

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- Any reconfiguration of services must ensure that service and care quality is of the highest attainable level at all times given available resources
- Public referral hospitals must become the employer of choice for health professionals, through comprehensive action on remuneration, working conditions, and development of clear career paths.
- Health professionals training, especially that of medical specialists must be more closely linked to the requirements of the public health system, to allow the production of personnel with the required skills
- Clinical equipment and physical infrastructure must be modern, fully functional, adequately maintained and replaced on a regular basis. A particular focus must be placed on expanded investment in appropriate and up-to-date diagnostic radiology equipment, as current deficits in this specialty hamper activity across a wide range of services.
- Services must be adequately and sustainably funded.
- Service delivery must be efficient, effective, and well managed, offering value for money in the use of public funds. Management and funding arrangements must support and promote the smooth operation of an integrated referral system, and not reinforce divisions between levels of care or across provincial boundaries
- Reconfiguration of tertiary hospital services cannot be considered in isolation from the adequacy of regional hospital services

6. The Modernisation of Tertiary Services Planning Model

The MTS planning model is based directly on the organisation of services across levels of care. The most important features of the services to be provided at each level are as follows:

Regional Hospital Services – ensuring that every regional hospital provides a specialist-led service (with at least one full-time specialist per discipline available on site by 2009, and a minimum of two per discipline by 2014) in each of the eight core specialties, namely Anaesthetics, Radiology, Medicine, Surgery, Mental Health, Obstetrics & Gynaecology, Orthopaedic Surgery, and Paediatric Medicine, in line with the Draft Regional Hospitals Package of Care. The fundamental difference between the proposed model and the current situation lies in the stipulation that each regional hospital must employ at least one specialist per discipline. This development will

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fundamentally transform the capability of regional hospitals to provide specialist-led care in relatively close proximity to the patient's residence.

Tertiary Hospital Services – providing a comprehensive set of specialist-led services to a defined geographical catchment population (determined by transport access criteria, and not by provincial borders). These include key referral specialties not available at regional hospital level, such as ENT, Infectious Diseases, Ophthalmology, Paediatric Surgery, Plastic & Reconstructive Surgery, Urology, and Vascular Surgery. Each Tertiary Hospital would act as the hub for the provision of specialised emergency and trauma care within its catchment area, providing a specialised Major Trauma Centre, a full ICU service under the supervision of a specialist Intensivist (including dedicated Paediatric ICU), and a dedicated Burns Unit. It would also house a multidisciplinary Rehabilitation Centre, incorporating dedicated stroke care and spinal injury beds.

It will take several years of sustained investment to develop the full range of Tertiary Hospital Services. Thus, an interim target has also been developed. Various hospitals will be designated as “**Developing Tertiary Hospitals**”. During this period, a number of smaller specialties would be provided by outreach from the parent National Referral Hospital, until such time that local services and staff were in place. Additional resources are allocated to the relevant National Referral Hospitals to provide this support.

National Referral Hospital Services – a set of sub-specialty or highly specialised, purely referral services, taking referrals from a network of Tertiary and regional hospitals (including the Tertiary Hospital at which they are located), and generally serving a population drawn from more than one province. Sub-specialty services provided at this level would include Cardiology and Cardiothoracic Surgery, Neurology and Neurosurgery, Oncology (medical, radiation and surgical), Nuclear Medicine, Renal Transplant, and a range of Paediatric sub-specialties.

Central Referral Units – the ultimate tip of the referral chain, providing access at one or two locations nationally to extremely specialised and expensive services (e.g. heart and lung transplant, bone marrow transplant, liver transplant, PET scan, cochlear implant etc.).

The plan uses this categorisation of desired referral hospital services as the building blocks for developing the future configuration of regional and tertiary and regional hospitals. It is assumed that - where provided - National Referral Hospital Services will always be co-located with Tertiary Hospital Services (in order to reduce duplication of

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essential services). Similarly, it is assumed that Central Referral Units will always be "bolted on" to National Referral Hospital Services.

The MTS Travel and Analysis Model was used to measure the proportion of the population that does not have access to both regional and tertiary hospital services. Based on the outcomes we were able to reconfigure services in a manner that ensures that a large proportion of the population can access services thus reducing inequities.

The key output of the MTS planning model is the generation of resource requirements in 2009/10 and 2014/15 for each hospital, by level of care and by province, specifically, total costs per specialty, level of care and hospital, total number of beds required, total number of health professionals required (with a special focus on medical specialists) and the capital costs of upgrading facilities and equipment and downgrading or downsizing hospitals as required by the particular scenario.

The MTS Cost Model was also used to assess the degree of underfunding of current services. If current regional and tertiary hospital services were to be funded at levels adequate to accommodate demand for drugs and consumables, and to ensure that infrastructure and equipment are maintained and replaced adequately, funding for regional hospitals would need to increase immediately by 38%, and for tertiary and regional hospitals by 35%.

The required funding levels involve very large increases relative to current expenditure. To achieve the target level of provision and quality improvement by 2009 would require annual average real funding increases of 8.5% between now and the end of the decade. However, over the period to 2014, sustained real annual average growth of 6% would be sufficient to yield these targets. The scale of these increases is less daunting if they are viewed in terms of their share of Gross Domestic Product. The GDP for the year 2005/06 was R1,108 billion. Baseline expenditure on regional and tertiary hospitals was 1.4% of GDP. If relatively modest real GDP growth rates are assumed over the next ten years (4% and 6%), the plan's funding requirement would represent only 1.4 to 1.5% of GDP in 2009, and 1.5% to 1.6% in 2014.

Extensive international evidence indicates that national health expenditure displays positive income elasticity both across countries and over time. In all developed countries, the share of total economic output (Gross Domestic Product, or GDP) devoted to health has consistently risen as GDP rises – i.e. as a country gets richer, it spends relatively more on health. Thus the sooner health receives a realistic allocation that is not based on historic activity but future developments that are in line with the country's

economic output, can we then realise one of the key goals of the Department of Health that of ensuring better health for all South Africans.

1. Background

Government financing of the health sector has since 1996 been experiencing a downward trend in real terms. The chronic under-funding of the health sector has placed the provision of tertiary and quaternary care in the public hospital sector under enormous pressure. It has also led to the health system's inability to keep up with the ever-increasing demand for services and consequently compromised quality of care and efficiency in service delivery. Thus undermining the vision of the National Department of Health, which is to provide "a caring and humane society in which all South Africans have access to affordable, good quality health care"¹.

The Review of Highly Specialised Services conducted by the National Department of Health in 2001 highlighted some of the problems experienced by these levels of care. It identified a variety of problems that were inherent in the provision of tertiary care, the major ones being the presence of glaring geographic inequalities in access to tertiary care, duplication of services and problems relating to the efficiency and sustainability of current providers.² Also, many tertiary and specialised services, especially for major disciplines tended to manage patients below the level of care for which they are designated, hence the inefficient use of resources³. At the same time, the National Health Accounts Project⁴ identified that regional hospitals were increasingly becoming "squeezed" financially, falling outside both the policy imperative of targeting resources to primary health care services and the ring-fenced conditional grants for tertiary and regional hospitals.

Experience over the last five to ten years has also indicated that high quality tertiary hospital services have important indirect benefits for the health system as a whole. Tertiary and regional hospitals serve as centres of excellence for the dissemination of quality improvements, and as hubs for professional development and leadership. It is

¹ Department of Health. Health Sector Strategic Framework, 1999 – 2004.

² Department of Health. Research Findings and Policy Implications of the Review of Highly Specialised Services in the Public Hospital Sector, 26 June 2001.

³ Vallabhjee, K.N. & Jinabhai, C.C. et al. Levels of Health Care at Academic and Regional Hospitals in KwaZulu-Natal, South African Medical Journal, 1997: vol. 87 (10)

⁴ Thomas S, Muirhead D. National Health Accounts Project: the public sector report. Pretoria, Department of Health, 2000.

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increasingly clear that – whether or not they receive an appropriate share of resources relative to lower levels of care – tertiary and regional hospitals are the capstone of the public health system. They cannot stand in isolation; but without the presence of high quality and well-resourced referral centres, primary health care and lower-level hospital systems will become dysfunctional and will fail in their missions.

Thus, it has become apparent that serious change and potentially major shifts in the way in which the public hospital system provides tertiary care are needed. Consequently, the Health MINMEC and PHRC decided that a project geared towards modernising tertiary and highly specialised services should be undertaken by the National Department of Health.

2. Objectives of the Modernisation of Tertiary Services

The Modernisation of Tertiary Services project (MTS) seeks to develop a credible, long-term plan for the provision of tertiary and highly specialised care within the South African public health system, where these services are both modernised and reconfigured. The aim is to ensure that such services are optimally reconfigured to provide equitable access to efficient, high quality and cost effective care, in a manner that is both affordable and sustainable in the medium and long term. The MTS is being developed as part of the Integrated Health Planning Framework.

3. Desired Outputs

The primary output of the MTS is a service development and relocation plan for tertiary and regional services that is agreed upon by both the provincial and national Departments of Health and all relevant stakeholders. The key components of which being:

- An agreed target configuration for all national referral and provincial tertiary health services, by service/ specialty, province and institution,
- A funded human resources plan to achieve the said configuration, including appropriate changes to incentives and career pathways,

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- A funded capital and procurement plan to achieve the configuration,
- Appropriate recurrent funding vehicles for both the transition period and the longer term, and
- An implementation and transition plan, with designated responsibilities for all components.

4. General Approach

The approach adopted is one that integrates stakeholder inputs, technical analysis and modelling, and consensus building, which feeds into the MTS planning model used in the development of a feasible and sustainable plan. The following are the key activities that were integrated to develop the MTS Planning Model:

4.1 Stakeholder input

Between August 2002 and March 2003, the Modernisation of Tertiary Services team of the National Department of Health convened a series of workshops for clinical experts from fifty specialties and subspecialties from the public sector, health sciences faculties and other allied health professions, funded by the European Union. Over 500 health professionals participated in these workshops. These experts were given an opportunity to discuss the current status of service provision, likely future developments in their specialties and identify the best way forward for the provision of tertiary services given current and future economic, social and epidemiological realities facing South Africa. Using a structured reporting format that was provided, the specialty groups were asked to provide a detailed written report on the outcomes of their discussions.

4.2 Strategic Framework

The detailed reports prepared by the different focus groups of specialists formed the basis of the Strategic Framework for the Modernisation of Tertiary Hospital Services⁵. The Strategic Framework is attached as Appendix A. The Strategic Framework is a synthesis of both the critical messages and information that were gleaned from these reports, and arranged into specific options and scenarios of organisational and structural changes to tertiary care service delivery. The Strategic Framework was then converted into a number of detailed, costed options that are part of the planning model, which specify the necessary locations, resource, funding and capital investments that are required.

4.3 Cost Model

To inform the modeling and planning exercises, a step-down costing study of a number of regional and tertiary level hospitals viz. Boitumelo, Witbank, Universitas, Pelonomi, Kimberly, Red Cross, Groote Schuur and Tygerberg was conducted. All recurrent and capital costs were matched to cost centres (clinical, administrative and support). Administrative and support overheads were then allocated step-wise to lower cost centres and ultimately, end-user cost centres i.e. clinical specialties and sub-specialties. Thus enabling the calculation of the full cost per cost centre per unit of activity for both inpatient and outpatient activity. The results were then used as baseline data for the MTS planning model.

4.4 Patient Travel and Referral Analysis Model

Poor referral systems between regional and tertiary hospitals, and lack of patient transport coupled with poor management thereof, are often cited as major contributors to continuing inequitable access to specialised services. Changes in service configurations, operation and location of many tertiary services that may result from the MTS process will have huge implications for patient travel times, thus should be properly accounted for in the planning model and travel costs should not be shifted to patients. Using European Union funding, AFRICON Consulting were engaged to develop a Travel and Referral Analysis geographic information system model (known as TRA hereafter). The model constructs Thiessen and drive-time polygons to determine the catchment

⁵ National Department of Health, Strategic Framework For The Modernisation of Tertiary Hospital Services, May 2003.

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population to be served by a hospital at different levels of care and calculates the travel time and costs of travel between different hospitals.

4.5 HR Information

Reconfiguration of services entails ensuring that there are adequate and appropriate health professionals available to render services. Part of the MTS process was to identify where the professionals are, and whether they are working at hospitals that are of appropriate levels of care where their skills can be fully utilised. This proved to be surprisingly difficult, as most provinces and hospitals were not able to provide detailed breakdowns of data on specialist staff by discipline by hospital (far less on groups such as specialised nurses). Indeed, only Gauteng Province was able to provide comprehensive data on specialists by discipline. Thus, Gauteng data were used as the basis for the specialist-staffing model developed by the team. Aggregate information was gathered from Vulindlela and Persal, from which data were obtained on health professionals in post as of February 2006.

4.6 IHPF and Hospital Revitalisation Plan

To ensure that the MTS is consistent with other planning initiatives within the Department, assumptions that were used in the planning model are the same as those used in the Integrated Health Planning Framework and the Hospital Revitalisation Plan. The MTS plan is explicitly designed to be a component part of the IHPF, allowing full integration of planning for all levels of care.

4.7 National Tertiary Services Grant Review

Following the recent review of the National Tertiary Services Grant, it was decided that decisions on any changes to the future allocation of funds for tertiary services should be deferred until the MTS Plan had been completed. This will allow funding decisions to be based upon a holistic strategy that accommodates future developments, and not simply on historic activity levels.

4.8 Technical Consensus Development

A technical consensus has been built via the following activities:

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- Two rounds of consultative workshops with the MTS specialty groups during 2002 and 2003
- Detailed comment by and consultation with specialty groups on the Draft Strategic Framework document, and wider consultation on the Strategic Framework via the MTS website
- Two detailed briefings of provincial Heads of Health at PHRC in November 2003 and March 2004
- Two rounds of one-day workshops with provincial managers in each province to consult and take feedback on drafts of the option appraisal and plan, in January - February 2004 and April - May 2004
- National technical workshops with provincial managers on the Strategic Framework and MTS models in March 2003 and June 2004

The MTS Project Team is confident that this process is one of the most extensive consultative planning exercises ever undertaken in the South African public health sector; extensive improvements to the work have taken place following every stage of the consultation, highlighting the value of prioritising the consultative planning approach.

5. Key issues from the Strategic Framework

The Strategic Framework spells out in detail the challenges facing the tertiary hospital sector, and the problems that must be resolved to ensure that the hospital system becomes sustainable in the long term. In summary, the core policy problems, which must be addressed, are the following:

- Reducing geographical inequities in access to regional and tertiary hospital services, without destabilising services in established centres of excellence
- Recruitment and retention of health professionals with the appropriate training and expertise
- Achievement of a more appropriate balance between regional and tertiary hospital services, and achieving a more integrated management of the referral system – both to improve efficiency and equity
- Ensuring that those services which are to be offered will be adequately and sustainably funded, and to overcome the negative effects of current under-funding

6. Guiding Principles

In developing a plan to guide the future development and reconfiguration of public referral hospitals in South Africa, the MTS Project Team has developed a set of principles and values to guide the exercise. These principles have been distilled from existing policy, from legislative and constitutional principles, and from the stakeholder consultation process. They are the following:

1. Government must actively work to realise progressively the right of access of all South Africans to appropriate, high-quality referral hospital care, given available resources. Thus, preventable inequalities in access to care must, over time, be minimised or eliminated.
2. Current centres of excellence in tertiary care must be preserved and not undermined by change; thus, reduction of inequalities must explicitly involve the strengthening and development of services, and must not be a crude process of "redistribution". Far from promoting improved access to services, undermining existing tertiary centres is likely to result in significant negative consequences for the functionality of district and regional health services.
3. Ensuring equitable access to care does not always require that services must be evenly distributed in geographic terms (although, in terms of emergency care, geographical distribution is an important factor). The key principle is that the health system should facilitate the health service user in accessing services, be that by local provision or by the provision of transport to ensure that patients can travel safely to distant treatment centres. Considerable strengthening of patient transport systems must therefore underpin any development plan.
4. Any reconfiguration of services must ensure that service and care quality is of the highest attainable level at all times given available resources.
5. Public referral hospitals must become the employer of choice for health professionals, through comprehensive action on remuneration, working conditions, and development of clear career paths.
6. Health professionals training, especially that of medical specialists must be more closely linked to the requirements of the public health system, to allow the production of personnel with the required skills.
7. Clinical equipment and physical infrastructure must be modern, fully functional, adequately maintained and replaced on a regular basis, to avoid the problems of obsolescence and break down which are too prevalent at present. A particular focus must be placed on expanded investment in appropriate and up-to-date diagnostic

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radiology equipment, a current deficit in this specialty hamper activity across a wide range of services

8. Services must be adequately and sustainably funded.
9. Service delivery must be efficient, effective, and well managed, offering value for money in the use of public funds. Management and funding arrangements must support and promote the smooth operation of an integrated referral system, and not reinforce divisions between levels of care or across provincial boundaries.
10. Reconfiguration of tertiary hospital services cannot be considered in isolation from the adequacy of regional hospital services; requirements for strengthening of regional hospitals will therefore be an integral part of the plan.

7. The Modernisation of Tertiary Services Planning Model

Currently, tertiary hospital services (and, indeed, regional hospital services) are very disparate in nature; and in only a few hospitals is a fully comprehensive range of services offered. Certain hospitals currently funded by the NTSG provide only a handful of genuinely specialised services, with the vast bulk of their activity clearly being that of regional hospital specialties. By contrast, the largest central hospitals provide most specialty and sub-specialty services. A key output of the stakeholder consultation process was the generation of a consensus view on a comprehensive package of specialties and services to be provided in different types of tertiary (or referral) hospitals. Appendix A presents the products of this effort (based on “Model C” as developed in the MTS Strategic Framework). It outlines in detail the services to be provided at four different levels of the hospital system, namely:

Regional Hospitals Services - services to be provided at every Regional hospital

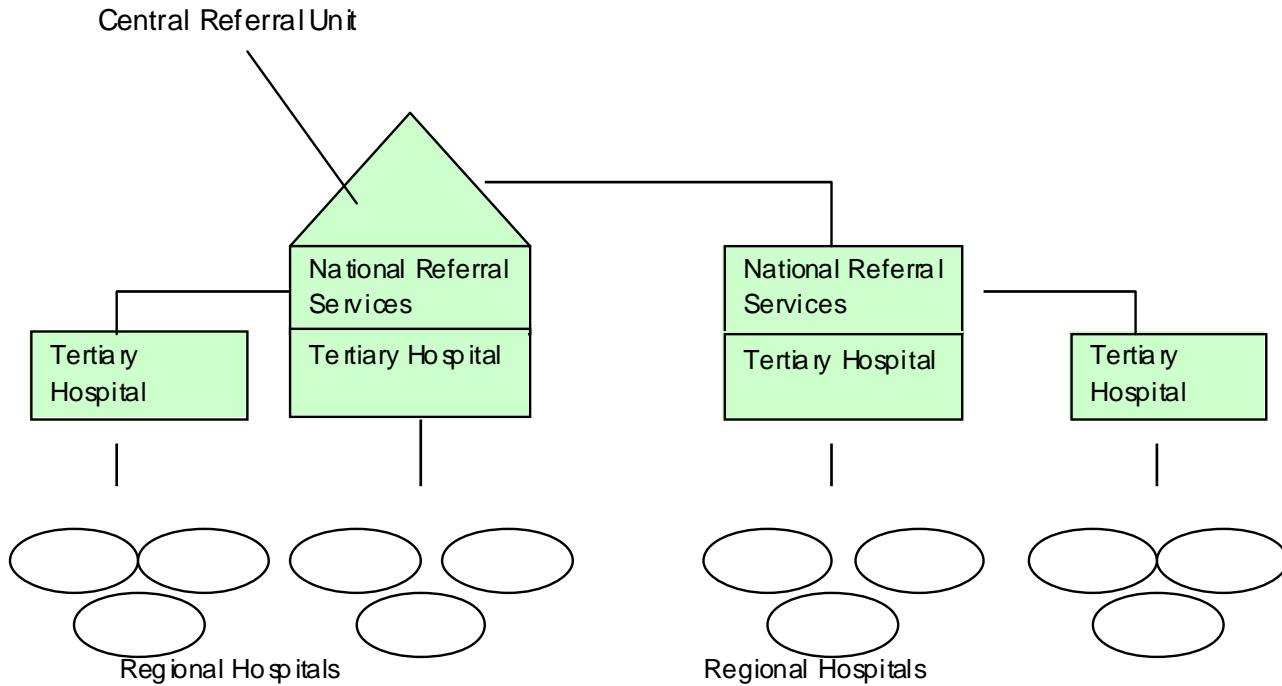
“Developing” Tertiary Hospital Services - a limited set of supra-regional services to be developed at a hospital *en route* to offering “Fully Developed” Tertiary services (see next point)

Fully Developed Tertiary Hospital Services (“Tertiary 1”) – a full set of supra-regional services to be provided at each referral hospital serving a network of regional hospitals, centred around a strong core of specialists in the main specialties. A key element of this level will be the provision of specialised 24-hour specialist-led trauma services to support regional hospitals

National Referral Hospital Services (“Tertiary 2”) – a set of very specialised, supra-provincial services, which would be provided at a small number of sites nationwide (which would be added “on top” of Tertiary Hospital Services at a handful of hospitals)

Central Referral Units (“Tertiary 3”) – super-specialised national referral units to be provided at one or perhaps two locations nationally

The diagram below shows the relationships between these different levels of hospital services, and the nature of the referral pathway from regional to tertiary hospital, and from tertiary hospital to national referral service, and thence to central referral unit.



The MTS planning model is based directly on the organisation of services across the levels as described in detail in Model C of the Strategic Framework (p34-37). Detailed listings of the services available at each level are provided in Appendix A. The most important features of the services to be provided at each level can be summarised as follows:

Regional Hospital Services – ensuring that every regional hospital provides a specialist-led service (with at least one full-time specialist per discipline available on site by 2009, and two by 2014) in each of the eight core specialties, namely Anaesthetics, Radiology, Medicine, Surgery, Mental Health, Obstetrics & Gynaecology, Orthopaedic Surgery, and Paediatric Medicine, in line with the Draft Regional Hospitals Package of Care⁶. The fundamental difference between the proposed model and the current situation lies in the stipulation that each regional hospital must employ at least eight specialists by 2009, and doubling this target to 16 by 2014 – when most regional hospitals currently make do with less than half this number. Providing comprehensive specialist-led services in these core specialties at all regional hospitals would profoundly improve the capability and quality of care available at this level.

⁶ National Department of Health. "A regional hospital service package for South Africa: a draft proposal." July 2002.

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Tertiary Hospital Services – providing a comprehensive set of specialist-led services to a defined geographical catchment population (determined by transport access criteria, and not by provincial borders). These include key referral specialties not available at regional hospital level, such as ENT, Infectious Diseases, Ophthalmology, Paediatric Surgery, Plastic & Reconstructive Surgery, Urology, and Vascular Surgery. Critically, each Tertiary Hospital would act as the hub for the provision of specialised emergency and trauma care within its catchment area, providing a specialised Major Trauma Centre, a full ICU service under the supervision of a specialist Intensivist (including dedicated Paediatric ICU), and a dedicated Burns Unit. It would also house a multidisciplinary Rehabilitation Centre, incorporating dedicated stroke care and spinal injury beds. Existing “central” hospitals generally provide most of the required Tertiary Hospital services already (but not fully comprehensively), although most would require significant equipment upgrading.

At a number of hospitals, it will clearly take several years of sustained investment to develop the full range of Tertiary Hospital Services. Therefore, an interim target has also been developed. Various hospitals will be designated as “**Developing Tertiary Hospitals**”. They would expand their services to offer the scope of service outlined in Appendix A page 2 (“Developing Tertiary Hospital Services”) by 2009/10. During this period, a number of smaller specialties would be provided by outreach from the parent National Referral Hospital, until such time as local services and staff were in place. The modelling exercise explicitly awards additional resources to the relevant National Referral Hospitals to provide this support. By 2014/15, the first wave of “Developing Tertiary” hospitals would have expanded further to offer the scope of service set out in Appendix A page 3 (“Fully Developed Tertiary Hospital Services”). The existing central hospitals – which currently offer a much more comprehensive set of services – would all qualify for “Fully Developed” status by 2009/10. While it is envisaged that each province should possess at least one “developing” or “fully developed tertiary hospital, it is important to note that most of these hospitals will of necessity treat patients from more than one province, in order to ensure that population drive-time access targets are met.

National Referral Hospital Services – a set of sub-specialty or highly specialised, purely referral services, taking referrals from a network of Tertiary hospitals (including the Tertiary Hospital at which they are located), and generally serving a population drawn from more than one province. Sub-specialty services provided at this level would include Cardiology and Cardiothoracic Surgery, Neurology and Neurosurgery, Oncology (medical, radiation and surgical), Nuclear Medicine, Renal Transplant, and a range of

Paediatric sub-specialties. The impact on patient travel costs of providing a greater or smaller number of centres providing this level of service is explicitly modelled.

Central Referral Units – the ultimate tip of the referral chain, providing access at one or two locations nationally to extremely specialised and expensive services (e.g. heart and lung transplant, bone marrow transplant, liver transplant, PET scan, cochlear implant etc.).

The modelling that follows uses this categorisation of desired referral hospital services as the building blocks to develop a plan for the future configuration of regional and tertiary and regional hospitals (see Appendix A). Further, it is assumed that - where provided - National Referral Hospital Services will always be co-located with Tertiary Hospital Services (in order to reduce duplication of essential services). Similarly, it is assumed that Central Referral Units will always be “bolted on” to National Referral Hospital Services.

8. Components and Methods used in the Planning Model

The foundation of the MTS Planning Model is a database of the most recent nationally available information on activity, staffing and expenditure levels of each hospital currently designated as either a regional hospital or a National Tertiary Services Grant hospital. Other levels of hospital (i.e. district and specialised hospitals) have been excluded from the analysis. The model allows for each hospital to be re-categorised by the user into one of the four MTS categories described above. The Travel and Referral Analysis model was used to construct baseline catchment populations (excluding estimated members of medical schemes) for each hospital. Drive time polygons were constructed for each hospital (with a drive time of one hour for regional, two hours for tertiary, and four hours for national referral services). The TRA allows calculation of the population in areas of overlap between drive time polygons (essential in urban areas, where hospitals may be relatively close together). Thiessen polygons then map out the boundary of equidistant points between hospitals of a given level of care; the population within a given hospital's Thiessen polygon is therefore closer to that hospital than to any other. The catchment population for a given hospital thus comprises all persons in that hospital's drive time polygon (truncated where it meets another hospital's drive time polygon), plus the population of the Thiessen polygon who fall outside the drive time polygon. This method therefore assigns the entire population of the country to a hospital catchment area, while giving due weight to drive time and ease of road access. Admission rates (strictly defined as “patient separations”, rather than admissions) and

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outpatient rates per 1000 population for each specialty and service (as per the MTS categorisation of services) were then calculated for each hospital's activity level and catchment population, using Census 2001 population data. This allowed an analysis of current geographic variations in access to referral hospital services, from which benchmarks can be set to improve access in underserved areas. An analysis of current productivity (average length of stay by specialty and day case) was also undertaken, to provide best practice benchmarks for these two variables, based on current best practice (see Appendix B for details of all assumptions used).

The MTS Planning Model then projects likely population growth to 2009/10 and 2014/15; calculates the total estimated number of inpatient separations and outpatient visits in 2009/10 by level of care, based upon extrapolation of current activity levels or user-defined activity benchmarks per 1000 population; allows the user to define different configurations of hospitals by choosing the future level of care of each hospital; allocates this activity across all hospitals (given their proposed level of care), based on their catchment population; and calculates the number of inpatient admissions, day cases and bed days based on user-defined productivity benchmarks (average length of stay, day case rate and bed occupancy). The model assigns activity based on whichever is the higher activity rate: that hospital's current activity per 1000 population, or the current national 33rd percentile activity rate (in 2009/10), or the national median activity rate (in 2014/15). Thus, hospitals with high activity rates at present are not penalised, while those with low rates see their activity increased; in this way, the equity gap in access to services is reduced by "pulling up the bottom performers", rather than by pulling down top performers. The model explicitly allocates additional workload and outreach responsibilities to well-established centres to cover the development period while services are built up in underserved areas. Thus, a proportion of activities at "Developing Tertiary" hospitals are explicitly assigned to that hospital's parent National Referral Hospital.

Having allocated projected future workload; the model then combines a number of productivity and sustainability improvements (see below for details) to adjust current costs per specialty. Details of the validation testing of the MTS cost model are provided at Appendix C. The model then generates the resource requirements in 2009/10 for each regional and tertiary hospital, by level of care and by province, specifically:

- Total costs per specialty, level of care and hospital
- Total number of beds required

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- Total number of health professionals required (with a special focus on medical specialists)
- The capital costs of upgrading facilities and equipment and downgrading or downsizing hospitals as required by the particular scenario

The TRA model is then used to assess the cost of transporting the estimated number of referrals generated by each hospital to its “parent” facility (e.g. from a regional hospital to a Tertiary Hospital). The TRA uses a comprehensive database of the South African road network to establish the shortest (in terms of time) road distance between facilities, and then calculates the cost per trip for the number of patients estimated to require referral.

An option appraisal was undertaken⁷ to assess which of three scenarios offered the most cost-effective configuration of services to achieve a specified and equitable level of access to regional and tertiary hospital services for the whole population. This option appraisal assessed access, feasibility, efficiency and Net Present Value of lifetime costs, and concluded that an optimal balance between efficient operation and population access to tertiary care could be achieved with seventeen tertiary hospitals distributed across the country. Providing fewer tertiary hospitals would deprive large segments of the population of timely access to tertiary emergency care, while providing more hospitals would result in a number of very small hospitals whose clinical and economic viability would be questionable. The plan as described below is based on the “preferred option” as identified by the option appraisal, with some minor modifications following the final round of provincial consultations.

9. Key Assumptions

A detailed description of all assumptions used in the model and relevant sources is provided in Appendix B. This section briefly summarises some of the more important assumptions of which readers should be aware.

- Productivity improvements – the model assumes that, by 2009/10, all regional and tertiary hospitals are able to achieve the current performance of the best 33% of hospitals in each specialty in average length of stay and day case rate, and that of the current best 25% for 2014. The rationale for this choice is the fact that the

⁷ Modernisation of Tertiary Services Project. “Options for the efficient and equitable development of tertiary hospital services.” March 2004.

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levels of performance are undeniably achievable in the South African setting, as they are already being met by certain public hospitals.

- Drug expenditure – across the board, it has been assumed that drug expenditure will need to rise by 25% by 2009/10 in order to provide uninterrupted access to cost-effective drugs, and to ensure adequate funding for ongoing treatment of chronic conditions. Where specialty groups identified specific new drugs which will need to be accommodated in the next few years, further adjustments have been made to the cost model (e.g. in the case of Xigris for infection control in intensive care patients, statins in cardiology etc. - see Appendix B for details)
- Radiology – the model allocates significant funding for replacement and additional equipment for diagnostic radiology at all levels, as this was regarded as a key priority by a majority of the specialty group reports
- Radiotherapy – previous work (e.g. the “Review of Highly Specialised Services”) has highlighted the parlous age and condition of the equipment stock in radiooncology. Specific provision has therefore been made for a comprehensive renewal and replacement programme in this specialty at each National Referral Hospital
- Buildings and Equipment – the cost model allocates increased expenditure to reflect sustainable long-term requirements for expenditure on maintenance and replacement (in line with the Integrated Health Planning Framework and Strategic Health Facilities Transformation Model)
- Capital costs – the model allocates funding for upgrading / expansion of hospitals where required at the full cost per bed of a new-build project plus equipment costs; and for down-sizing and down-grading (at 12.5% of the cost per bed of a new-build project) to cover conversion or decommissioning costs. A limited number of new build projects (to build regional hospitals where none currently exist, and to replace a small number of tertiary and regional hospitals) have been costed, following extensive consultation with provinces
- Economies of scale in hospital operation are exhausted once hospitals exceed approximately 600 beds – thus, in terms of unit costs, there is no evidence of any cost advantage in operating a 2000 bed hospital versus an 800 bed hospital (and there may in fact be diseconomies of scale for very large hospitals)^{8 9}

⁸ Centre for Reviews and Dissemination. *Effective Health Care Bulletin: Hospital volume and health care outcomes, costs and patient access*. Nuffield Institute for Health, University of Leeds, and NHS Centre for Reviews and Dissemination, University of York 1996.

⁹ Zere E, McIntyre D, Addison T. Technical efficiency and productivity of public sector hospitals in three South African provinces. Papers submitted to *South African Journal of Economics*.

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- Level of Care - “Fully Developed” tertiary hospitals are “twinned” with a nearby large regional hospital, to operate as a complex – for example, the New Pretoria Academic Hospital and Kalafong Hospital are twinned in this fashion; similarly, Chris Hani Baragwanath will be completely redeveloped into two entirely new hospitals, one regional and one tertiary. In general, regional hospital (“level two”) workload and trauma workload will be undertaken at the regional twin, and more highly specialised activity at the tertiary twin (but with local flexibility on the precise arrangements). By contrast, the model explicitly assumes that a proportion of activity in general specialties in a “Developing Tertiary” hospital is, in effect, regional or “Level 2” activity (see Appendix B for details). Thus a “Developing Tertiary” Hospital is explicitly allocated a *regional* hospital catchment population in the analysis (which will be significantly smaller than its tertiary catchment population), in addition to the catchment populations which relate to the higher level services offered by that hospital. This decision reflects the fact that most “Developing Tertiary” hospitals were originally regional hospitals, and tend to be located in smaller cities where it would not be efficient to offer a separate regional hospital. If a Tertiary hospital is downgraded to regional hospital status, the model splits its activity between regional and tertiary levels on the same basis, with tertiary workload reallocated to the remaining tertiary hospitals. However, the model also explicitly assumes that there is no place for Level 1 or District Hospital activity in a tertiary hospital; work is ongoing with individual provinces to cost the requirements for a district hospital to be collocated with “Developing Tertiary” hospitals where none currently exists.
- Referral Rates – the model assumes that 20% of inpatients and outpatients at each level of care are likely to require referral to a higher level¹⁰
- Staffing Requirements – the model calculates staffing levels based on current Gauteng specialist, registrar and medical officer to workload ratios given the activity levels generated by the model. These rates are compared with the minimum staff complement per unit / discipline (as developed by specialty groups), and the model selects whichever is the higher.
- Staff Remuneration – the model provides for increased real salaries for health professionals and other staff, given the importance of remuneration issues in the stakeholder consultation and recent policy developments. A 3% real average

¹⁰ Centre for Health Systems Research & Development / Health Care Management Programme. “Assessment of current health care referral systems in the RSA: a study of the current referral patterns, including the views and experiences of users and providers of health services”. University of the Free State, September 2000.

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annual increase (equivalent to 16% total increase by 2009, and 34% by 2014) has been assumed for health professionals and a 2% real increase for other staff. It is the view of the MTS Project Team that these real increases should be carefully targeted towards particular skills deficits.

Readers should also note that certain hospitals in close geographical proximity to each other and which have integrated services have been grouped together as one location for ease of use within the TRA model. Such groupings include hospitals which already operate as complexes i.e. Pietersburg and Mankweng hospitals, Klerksdorp and Tshepong etc. Johannesburg and Helen Joseph / Coronation Hospitals are treated in this way, as are Groote Schuur and Red Cross Hospitals, in both cases due to proximity and service links. Grouping these hospitals avoids the creation of artificial and misleading catchment populations around individual component hospitals. This should in no way be interpreted as implying that the future plan requires the actual centralisation of these hospitals onto a single site. The development of the plan explicitly takes into account existing provincial plans as far as possible, following examination of provincial SPS documents and discussion with provincial managers.

10. Limitations of the Model

Data limitations of potential significance include the following. First, hospital Minimum Data Set activity data are still only available for the year 2001, due to incomplete submission of data by certain provinces. Second, data on referral rates remain largely absent in South Africa; the University of Free State study cited above remains the only significant source of data in this area, but the highest level of care on which it collects information was the regional hospital. Third, data are currently available on the distribution of specialists in the public sector by province and hospital by specialty or sub-specialty only for Gauteng and Free State provinces. It is thus currently not possible to compare the national requirements for specialists by discipline generated by the model with current baseline data.

This exercise has deliberately excluded consideration of district hospitals and primary health care services, on the basis that their inclusion would have become unmanageable. However, the Integrated Health Planning Framework provides estimates of provision and funding requirements for these levels of care on a province-by-province basis, allowing a comprehensive estimate of health service funding needs.

11. Current Situation

In developing the model and scenarios, an analysis was undertaken of those hospitals currently in receipt of the National Tertiary Services Grant. It identified that several hospitals receive NTSG funding, yet provide only a very limited range (less than 15%) of the service basket, which comprises the NTSG. Hence, these hospitals cannot currently be viewed as tertiary hospitals and are effectively regional hospitals which offer a limited number of more specialised services; their local populations cannot realistically be said to be able to access tertiary services at these hospitals. Hospitals in this category were Cecilia Makiwane (Eastern Cape), both Rob Ferreira and Witbank (Mpumalanga), and Rustenburg (North West). These hospitals have therefore been counted as "regional" hospitals in the baseline analysis (although Rob Ferreira is explicitly targeted for development as a tertiary centre in the plan).

Table 1:
Current Tertiary hospitals

Province	Hospital
Eastern Cape	Frere Port Elizabeth Umtata
Free State	Universitas
Gauteng	Chris Hani Baragwanath George Mukhari (formerly Ga-Rankuwa) Johannesburg & Helen Joseph Pretoria Academic
KwaZulu Natal	Durban Complex Grey's
Limpopo	Polokwane / Mankweng
Mpumalanga	Nil
Northern Cape	Kimberley
North West	Klerksdorp / Potchefstroom
Western Cape	Groote Schuur & Red Cross Tygerberg

Details of current activities by level of care are provided in Appendix I and in the text below. In summary, total activity in 2001 by level of care was as follows:

Table 2: 2005 Base line Activity

	Regional Hospitals	Tertiary hospitals
Inpatient Separations & Day Cases	1,133,666	1,119,685
Outpatient Visits	4,880,377	5,708,967

Deleted 1,043,886
 Deleted 4,442,220
 Deleted 7,176,232

The TRA suite developed for the MTS process allows analysis of the number and proportion of the South African population living within a given drive time of different types of health facilities. This analysis has been undertaken at baseline, and for each of the future scenarios. At present, as Table 3 shows, 80% of the South African population live within 60 minutes' drive of a regional hospital; 81% of the population lives within 120 minutes' drive of one of the tertiary hospitals listed in Table 1.

Table 3: Population Access to Public Hospitals

Province	Regional *	Tertiary **
Eastern Cape	60 %	85 %
Free State	86 %	80 %
Gauteng	100.0 %	100 %
KwaZulu Natal	78 %	73 %
Limpopo	72 %	77 %
Mpumalanga	80 %	54 %
Northern Cape	35 %	47 %
North West	75 %	83 %
Western Cape	89 %	86 %
South Africa	80 %	81 %

* Regional: within 60 minutes' drive

** Tertiary: within 120 minutes' drive

Not surprisingly, given its dense and urban population, small area and large hospital base, 100 % of Gauteng residents have adequate access to regional and tertiary hospitals. At the opposite extreme, due to its huge area and sparse population, Northern Cape has the lowest levels of population access to referral hospital services. It is also important to note that the absence of effective tertiary hospital services in Nelspruit mean that nearly half of the Mpumalanga population (those living in the eastern half of the province) do not have 2-hour access to a tertiary centre.

Current inequities in access to referral hospital care are further highlighted by Table 4, which presents current (2005/06) inpatient and day case separations per 1000 population for the total catchment populations of hospitals by province. These catchments are not identical to provincial populations, as they frequently cross provincial boundaries if anything, the figures in Table 4 tend to understate the degree of inequity between

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provinces, as all inhabitants of a catchment area are equally likely to access hospital care (when, in fact, urban residents living nearer to hospitals are more likely to access care than rural residents living further away). Nonetheless, the table shows a greater than three-fold difference between the province with the lowest referral hospital utilisation rate (Limpopo) and that with the highest (Gauteng).

Table 4: Inpatient & Day Case Separations per 1000 Catchment Population

Province	Regional	Tertiary	Combined
Eastern Cape	10	17	27
Free State	19	46	65
Gauteng	42	31	73
KwaZulu Natal	53	15	68
Limpopo	18	6	24
Mpumalanga	25		25
Northern Cape		67	67
North West	9	36	45
Western Cape	34	40	73
South Africa	31	25	56
Ratio of Maximum to Minimum	5.9	11.3	3.4

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Actual expenditure for 2005/06 on regional and tertiary hospitals is shown in Table 5a. This is compared with 2005/06 budgets for the programmes “Provincial Hospitals” and “Central Hospitals” in Table 5b. The MTS categories of “regional” and “tertiary” are not directly analogous to “provincial” and “central” hospitals in the programme budget structure. This is because several hospitals which already receive significant NTSG funding (e.g. Frere, Port Elizabeth, Umtata, Polokwane / Mankweng) are counted as “provincial” hospitals under the current programme structure. However, the total amount displays a very close fit (1.1% variance).

Table 5a: Actual Expenditure, 2005/2006

(000s of Rand \$)	Total Expenditure
Regional Hospitals	7,659,904
Tertiary	8,810,189
Combined Total	16,470,093

Deleted 6,652,422

Deleted and regional hospitals

Deleted 8,234,920

Deleted 14,887,342

Table 5b: Budgets, 2005/06

(000s of Rand \$)	Total Expenditure
Provincial Hospitals	8,504,760
Central Hospitals	9,539,312
Combined Total	17,044,072

Before considering the funding requirements of the future plan, an analysis of current funding and activity levels was undertaken using the cost model. This analysis stripped out the large pay increases for health professionals that are assumed for health professionals under the future scenarios. It concentrated simply on assessing, at current activity levels, what level of funding would be required to provide current services sustainably (i.e. with sufficient expenditure on drugs, consumables, equipment and maintenance to ensure that services do not deteriorate). The results of this analysis are reproduced below:

Table 6: Current Under-funding of Hospital Services

(000s of Rands)	Actual Expenditure	Sustainable Level of Expenditure	Funding Deficit
Regional	7,659,904	10,589,181	38%
Tertiary	8,810,189	11,881,463	35%
Combined	16,470,093	22,470,644	36%

As Table 6 clearly shows, it would appear that both regional and tertiary hospitals are presently significantly under-funded for the mission they have been assigned and the levels of demand with which they must cope – even before any consideration is given to future needs. Overall, the public referral hospital system appears to receive only about three-quarters of the funding it currently needs to provide services of adequate quality and to avoid the deterioration of infrastructure and equipment. This brief analysis of baseline data therefore underlines the critical importance of several of the key principles of the MTS process, namely those relating to the need to improve access to care and to ensure that services are adequately and sustainably funded.

12. The Planned Future Configuration of Services

Tertiary hospitals

As described above, the Option Appraisal identified a preferred option for the overall configuration of tertiary hospital services. One further change was made to this preferred option following the final round of provincial consultation, and as a result of further analysis. This was to remove Bongani (Goldfields) Hospital in the Free State as a candidate for “Developing Tertiary” status, and to replace it with Ngwelezana Hospital in KwaZulu Natal. The MTS Project Team is satisfied that upgrading Ngwelezana Hospital would have a significantly greater impact on population access than would be the case in Bongani (Goldfields). Tables 7 and 8 below therefore spell out the planned configuration of tertiary and regional hospitals in 2009 and 2014 respectively.

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Table 7: Tertiary hospitals, 2009

Province	Hospital	Developing Tertiary Hospital Services	Fully Developed Tertiary Hospital Services	National Referral Services	Central Referral Unit
E. Cape	Port Elizabeth	Yes	-	-	-
	Frere	Yes	-	-	-
	Umtata	Yes	-	-	-
Free State	Universitas	-	Yes	Yes	-
Gauteng	Chris Hani Bara	-	Yes	-	-
	George Mukhari	-	Yes	-	-
	Johannesburg	-	Yes	Yes	Yes
	New Pretoria Academic	-	Yes	Yes	-
KZN	Inkosi Albert Luthuli	-	Yes	Yes	-
	Greys	-	Yes	-	-
	Ngwelezana	Yes	-	-	-
Limpopo	Polokwane/Mankweng	Yes	-	Yes	-
Mpumalanga	Rob Ferreira	Yes	-	-	-
N. Cape	Kimberley	Yes	-	-	-
North West	Klerksdorp	Yes	-	-	-
WCape	Groote Schuur & Red Cross	-	Yes	Yes	Yes
	Tygerberg	-	Yes	-	-
	Total	7	10	6	2

Table 8: Tertiary hospitals, 2014

Province	Hospital	Fully Developed Tertiary Hospital Services	National Referral Services	Central Referral Unit
E. Cape	Port Elizabeth	Yes	-	-
	Frere	Yes	-	-
	Umtata	Yes	-	-
Free State	Universitas	Yes	Yes	-
Gauteng	Chris Hani Bara	Yes	-	-
	George Mukhari	Yes	-	-
	Johannesburg	Yes	Yes	Yes
	New Pretoria Academic	Yes	Yes	-
KZN	Inkosi Albert Luthuli	Yes	Yes	-
	Greys	Yes	-	-
	Ngwelezana	Yes	-	-
Limpopo	Polokwane/Mankweng	Yes	Yes	-
Mpumalanga	Rob Ferreira	Yes	-	-
N. Cape	Kimberley	Yes	-	-
North West	Klerksdorp	Yes	-	-
WCape	Groote Schuur & Red Cross	Yes	Yes	Yes
	Tygerberg	Yes	-	-
	Total	17	6	2

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As can be seen from Table 7, the plan envisages building up a core of developing tertiary hospitals in the under-served regions (Port Elizabeth, Frere, Umtata, Kimberley, Klerksdorp, Ngwelezana, Rob Ferreira, Polokwane), while retaining tertiary services at the well-established centres. However, there would be some consolidation of National Referral Services, which would be removed from Tygerberg, Chris Hani Bargawanath and George Mukhari hospitals and centralised at Johannesburg, Pretoria and Groote Schuur / Red Cross. National Referral Services will continue to be developed at Polokwane Hospital, building on progress to date (and providing a platform for MEDUNSA to offer a full range of training opportunities in Polokwane, rather than the more restricted range of specialties to be offered at George Mukhari). It should be noted that in specific cases where fixed plant and equipment makes such a consolidation inappropriate (e.g. the superior radiotherapy facilities at Tygerberg), there would clearly be room for flexibility at local level; however, the general principle is clearly to reduce local duplication of high level national referral services.

Four tertiary hospitals would be completely rebuilt as new build projects: Rob Ferreira in Nelspruit, Kimberley Hospital, Chris Hani Baragwanath Hospital in Soweto and Tygerberg Hospital in Cape Town. In the case of both Chris Hani and Tygerberg Hospitals, a new, smaller scale modern tertiary hospital would be built alongside a new regional hospital, allowing more cost-effective management of caseload.

It is assumed that all Tertiary hospitals will, by 2009, achieve the current 33rd percentile activity rate per 1000 population, where this rate exceeds their current actual activity rate. This approach allows well-established centres to continue at current activity rates per 1000 population, while pulling "Developing Tertiary" centres upwards from their current low levels towards a relatively modest target, which will nonetheless lead to a significant reduction in geographical variation in activity rates.

Regional Hospitals

An explicit objective of expanding population access to regional hospital services is pursued by assuming that all regional hospitals will, by 2009, achieve at least the current median admission rate (i.e. the admission rate achieved by the top 50% of hospitals), if this is not already exceeded. The same holds for outpatient visits per 1000 population. This objective reflects the following considerations:

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- The need to reflect the growing burden of disease from the triple epidemic of HIV/AIDS and TB, trauma and violence, and non-communicable diseases, most of which will manifest itself at regional hospital level.
- A limited shift of activity out of tertiary hospitals and into the regional level
- The need to reduce geographical inequities in access to regional hospital care, as far as possible through expanding access in under-served areas, rather than by reducing access in well-served areas
- A reflection of the fact that significant strengthening of the number of specialists employed in regional hospitals and of the general capability of this level of care will itself induce increased demand for services

This assumption means that regional hospital activity effectively grows faster than tertiary activity, and reflects a deliberate policy decision to attempt to reduce inequities and improve care quality rapidly at this level of care. In addition to general strengthening of services, several regional hospitals will be completely rebuilt: Cecilia Makiwane in the Eastern Cape, and King Edward VIII, Edendale and Prince Mshiyeni in KwaZulu Natal. Completely new regional hospitals will be built in Upington and De Aar (Northern Cape), and Vryburg (North West). As noted, "twin" regional hospitals will be built alongside reduced tertiary units as part of the total redevelopment of Chris Hani Baragwanath and Tygerberg Hospitals.

13. Projected Future Workload and Capacity

Projected Workload

As described earlier, the model allows a projection of estimated workload by level of care, given factors such as population growth, improvements in the balance of care between regional and tertiary level, and efforts to improve service access in currently under-served areas. Table 9 shows aggregate inpatient and day case workload over the plan period.

Table 9: Inpatient & Day Case Separations

	Regional	Tertiary 1	National Referral	Central Units	Total Tertiary	Combined Total
Baseline	1,133,666	642,118	428,865	48,702	1,028,689	2,253,333
Plan 2009	1,592,237	580,672	101,347	13,950	695,969	2,288,226
Plan 2014	1,929,114	791,364	102,132	13,702	907,199	2,836,310

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Deleted 1,425,005

Deleted 938,612

Deleted 99,000

Deleted 6,274

Deleted 1,043,886

Deleted 2,167,883

Deleted 1,590,027

Deleted 588,031

Deleted 101,347

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Deleted 703,328

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Deleted 1,927,

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Deleted 801,195

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Between 2005 and 2009, a significant shift of workload would occur between Tertiary and Regional levels. Thereafter, regional workload would continue to increase, but due mainly to improving utilisation levels in under-served areas. Tertiary activity would increase somewhat, as the “Developing Tertiary” hospitals achieve their full potential to improve access in under-served areas. Tables 10 and 11 break down this activity by province for regional and tertiary levels.

Table 10: Regional Hospital Inpatient & Day Case Separations

Province	Baseline	2009	2014
Eastern Cape	74,053	138,750	172,157
Free State	40,691	90,753	112,619
Gauteng	368,986	466,382	533,862
KwaZulu Natal	363,764	413,661	509,680
Limpopo	75,474	127,232	165,706
Mpumalanga	61,907	67,180	86,659
Northern Cape	0	13,203	17,436
North West	14,980	79,999	104,622
Western Cape	133,811	195,077	226,372
South Africa	1,133,666	1,592,237	1,929,114

Table 11: Tertiary Hospital Inpatient & Day Case Separations

Province	Baseline	2009	2014
Eastern Cape	168,719	97,286	143,189
Free State	81,318	26,940	31,499
Gauteng	311,845	221,345	769,182
KwaZulu Natal	116,251	109,037	676,971
Limpopo	36,453	58,652	260,628
Mpumalanga	31,815	23,127	131,265
Northern Cape	49,614	22,578	50,045
North West	88,159	54,041	166,907
Western Cape	235,511	82,962	321,850
South Africa	1,119,685	695,969	2,836,313

The rebalancing of activity between tertiary and regional levels is particularly noticeable in Gauteng and Western Cape, where “tertiary” hospitals have traditionally treated a large proportion of their regional workload. However, some of this change also reflects expanding capacity in neighbouring provinces (e.g. Eastern Cape), and a reduced reliance on traditional tertiary centres.

The overall increase in inpatient activity described above would take place against a small overall reduction in outpatient activity, as shown in Table 12 below. This is the result of the parallel strengthening of district health systems over the plan period, which would enable a significant proportion of current non-referred “walk in” patients to be

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more appropriately treated in primary health care and district hospitals, for the minor ailments with which they typically present at both regional and tertiary hospital OPDs.

Table 12: Outpatient Visits

	Regional	Tertiary 1	National Referral	Central Units	Total Tertiary	Combined Total
Baseline	4,880,377	2,924,761	2,596,451	187,755	5,708,967	10,589,344
Plan 2009	3,639,497	4,027,144	1,432,869	149,779	5,609,792	9,249,289
Plan 2014	3,881,487	5,185,719	1,527,938	156,379	6,870,036	10,751,524

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14. Key Resources Required

Increasing inpatient activity loads will be accommodated in a rather smaller bed stock, due to improved length of stay, bed occupancy and increased day case treatment rates. Significant investment has been identified to support the measures required to improve bed productivity, including use of patient hotels, construction of dedicated day surgery units at regional and tertiary hospitals, and strengthening of patient transport systems to facilitate scheduling and discharge planning. Table 13 describes the aggregate beds required to manage the projected workload. Table 14 shows regional beds per province, while Table 15 shows tertiary beds per province and institution.

Table 13: Total Bed Numbers

	Regional	Tertiary 1	National Referral	Central Units	Total Tertiary	Combined Total
Baseline	17,713	10,993	2,842	2,253	16,088	33,807
Plan 2009	19,324	5,270	2,410	1,494	9,173	28,497
Plan 2014	19,722	7,964	1,067	171	9,203	28,925

- Deleted: 24,208
- Deleted: 15,590
- Deleted: 39,798
- Deleted: 19,241
- Deleted: 10,293
- Deleted: 1,895
- Deleted: 171
- Deleted: 12,359
- Deleted: 31,600
- Deleted: 20,225
- Deleted: 10,978
- Deleted: 1,441
- Deleted: 171
- Deleted: 32,816

Table 14: Regional Hospital Beds by Province

Province	Baseline	2009	2014
Eastern Cape	1,431	1,711	1,788
Free State	767	1,128	1,167
Gauteng	5,020	5,416	5,262
KwaZulu Natal	6,361	5,130	5,271
Limpopo	931	1,557	1,707
Mpumalanga	1,331	826	894
Northern Cape	0	161	180
North West	381	974	1,077
Western Cape	1,509	2,421	2,376
South Africa	17,713	19,324	19,722

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Table 15 clearly shows the scale of restructuring required at some of the largest tertiary hospitals, as large portions of workload are shifted to “twinned” regional hospitals, leaving a smaller, leaner and more technologically concentrated tertiary hospital to focus on a more complex case-mix. It is clear that, by 2014, “twin” regional hospitals should also be under development at Umtata and Polokwane, to avoid these hospitals becoming excessively large. The Polokwane / Mankweng complex already offers this potential.

* Table 15a: Tertiary hospitals and Bed Requirements, 2009

Province	Hospital	Baseline	Tertiary 1	National Referral	Central Units	Total
Eastern Cape	Frere	0	382			Deleted 730... [1]
	Port Elizabeth	168	255			Deleted 389... [2]
	Umtata	978	594			Deleted 978... [3]
	Sub-total	1,146	1,231	0	0	Deleted 2,097... [4]
Free State	Universitas	437	165	231		Deleted 601... [5]
	Sub-total	437	165	231	0	Deleted 601... [6]
Gauteng	Chris Hani Bara Tertiary	2,531	1,112			Deleted 2,485... [7]
	George Mukhari	1,753	544			Deleted 763... [8]
	Johannesburg Tertiary	1,074	339	273	116	Deleted 1,673... [9]
	New Pretoria Academic	770	425	132		Deleted 920... [10]
	Sub-total	6,128	2,420	405	116	Deleted 6,831... [11]
KwaZulu Natal	Inkosi Albert Luthuli	1,135	265	414		Deleted 840... [12]
	Grey's	456	493			Deleted 514... [13]
	Ngwelezana	483	288			Deleted 384... [14]
	Sub-total	2,074	1,046	414	0	Deleted 1,738... [15]
Limpopo	Polokwane / Mankweng	500	587	190		Deleted 823... [16]
	Sub-total	500	587	190	0	Deleted 823... [17]
Mpumalanga	Rob Ferreira	308	286			Deleted 239... [18]
	Sub-total	308	286	0	0	Deleted 239... [19]
Northern Cape	Kimberley	0	286			Deleted 539... [20]
	Sub-total	0	286	0	0	Deleted 539... [21]
North West	Klerksdorp / Potchefstroom	815	543			Deleted 713... [22]
	Sub-total	815	543	0	0	Deleted 713... [23]
Western Cape	Groote Schuur & Red Cross	1,179	385	324	56	Deleted 1,229... [24]
	Tygerberg Tertiary	0	486			Deleted 2,612... [26]
	Sub-total	1,179	871	324	56	Deleted 16,193... [27]
National Total		12,587	7,435	1,564	172	

* A reduction in hospital beds can only be achieved if efficiency targets are improved

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* Table 15b: Tertiary hospitals and Bed Requirements, 2014

Province	Hospital	Baseline	Tertiary 1	National Referral	Central Units	Total
Eastern Cape	Frere	773	408			Deleted 730... [28]
	Port Elizabeth	168	333			Deleted 389... [29]
	Umtata	978	663			Deleted 1,344... [30]
	Sub-total	1,919	1,404	0	0	Deleted 2,097... [31]
Free State	Universitas	437	171	148		Deleted 601... [32]
	Sub-total	437	171	148	0	Deleted 601... [33]
Gauteng	Chris Hani Bara Tertiary	2,531	877			Deleted 2,485... [34]
	George Mukhari	1,753	555			Deleted 755... [35]
	Johannesburg Tertiary	1,074	214	184	113	Deleted 1,673... [36]
	New Pretoria Academic	770	364	89		Deleted 920... [37]
	Sub-total	6,128	2,010	273	113	Deleted 6831... [38]
KwaZulu Natal	Inkosi Albert Luthuli	1,135	232	279		Deleted 840... [39]
	Grey's	456	674			Deleted 514... [40]
	Ngwelezana	483	463			Deleted 384... [41]
	Sub-total	2,074	1,369	279	0	Deleted 1,738... [42]
Limpopo	Polokwane / Mankweng	500	804	128		Deleted 823... [43]
	Sub-total	500	804	128	0	Deleted 823... [44]
Mpumalanga	Rob Ferreira	308	431			Deleted 239... [45]
	Sub-total	308	431	0	0	Deleted 239... [46]
Northern Cape	Kimberley	0	423			Deleted 539... [47]
	Sub-total	0	423	0	0	Deleted 539... [48]
North West	Klerksdorp / Potchefstroom	815	529			Deleted 713... [49]
	Sub-total	815	529	0	0	Deleted 713... [50]
Western Cape	Groote Schuur & Red Cross	1,179	349	239	58	Deleted 1,229... [51]
	Tygerberg Tertiary	0	475			Deleted 1,383... [52]
	Sub-total	1,179	834	239	58	Deleted 2,612... [53]
National Total		13,360	7,975	1,067	171	Deleted 16,193... [54]

* A reduction in hospital beds can only be achieved if efficiency targets are improved

Central to the achievement of the quality and access improvements which form the core objective of this plan is an expansion in the number of medical specialists in the public health sector. Table 16 summarises the number of specialists required by the plan (Appendix G provides a more detailed breakdown of specialist numbers by discipline).

*** Table 16: Public Sector Specialists per Province, 2014**

Province	Baseline*	2014	
Eastern Cape	201	77	Deleted: 58
Free State	393	94	Deleted: 148
Gauteng	714	283	Deleted: 641
KwaZulu Natal	1,051	261	Deleted: 227
Limpopo	143	88	Deleted: 26
Mpumalanga	60	50	Deleted: 8
Northern Cape	29	16	Deleted: 13
North West	43	57	Deleted: 14
Western Cape	1,031	146	Deleted: 448
South Africa	3,665	1,072	Deleted: 1,583

* Baseline includes any specialists working outside regional / tertiary hospitals

* Table exclude registrars

While a doubling of the number of specialists working in the public sector by 2014 may seem a daunting target, it is important to remember that there are currently some 8,800 registered medical specialists in the country. Thus, achieving these targets will require not only enhanced training efforts to produce more specialists, but also appropriate incentives to attract personnel out of private practice – hence the strong emphasis placed on improving remuneration.

15. Recurrent Funding Requirements

In order to achieve the developments described in the scenarios, and to place service provision onto a fully sustainable basis (as described in Appendix B), very significant real funding increases will be required. Table 17 summarises the aggregate hospital operating costs by level of care in 2009 and 2014.

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Table 17: Hospital operating costs, 2009/10 and 2014/15

R Millions	Regional	Tertiary 1	National Referral	Central Units	Total Tertiary	Combined Total
Baseline	7,659,904	4,055,316	2,896,852	1,858,020	8,810,189	16,470,093
Plan 2009	10,589,181	6,835,252	4,691,283	354,927	11,881,463	22,470,644
Plan 2014	12,960,097	8,763,130	4,687,47	386,676	13,837	26,797,379

(Millions of Rands, constant 2005/06 prices)

Table 17 shows that funding for both regional and hospitals will need to grow by nearly 65% in real terms by 2014 to accommodate workload increases and required quality improvements (including the 25% increase which is already required to make good current under-funding). Regional hospital funding would need to grow by 69% over the decade, while tertiary hospital funding would need to grow slightly less, by 35%. Table 18 shows regional hospital funding requirements for 2014 by province.

Table 18: Regional Hospital Funding Requirement

Province	Baseline	2009	2014
Eastern Cape	588	871	1,081
Free State	702	602	752
Gauteng	1,886	3,042	3,591
KwaZulu Natal	2,798	2,518	3,226
Limpopo	473	824	1,061
Mpumalanga	499	440	556
Northern Cape	0	81	107
North West	273	482	630
Western Cape	439	1,724	1,952
South Africa	7,659	10,589	12,860

(Millions of Rands, constant 2004/05 prices)

Table 19: Tertiary Hospital Funding Requirement

Province	Baseline	2009	2014
Eastern Cape	573	1,075	1,545
Free State	525	882	880
Gauteng	3,634	3,660	3,619
KwaZulu Natal	1,175	2,236	2,786
Limpopo	493	1,094	1,481
Mpumalanga	0	261	502
Northern Cape	280	248	342
North West	416	445	572
Western Cape	1,711	1,975	2,107
South Africa	8,810	11,881	13,837

(Millions of Rands, constant 2004/05 prices)

Table 20: Combined Funding Requirement

Province	Baseline	2009	2014
Eastern Cape	1,161	1,946	2,626
Free State	1,227	1,484	1,632
Gauteng	5,520	6,702	7,210
KwaZulu Natal	3,973	4,754	6,012
Limpopo	966	1,918	2,542
Mpumalanga	499	701	1,058
Northern Cape	280	329	449
North West	689	927	1,202
Western Cape	2,150	33,699	4,059
South Africa	16,469	22,470	26,697

(Millions of Rands, constant 2005/06 prices)

Table 21 decomposes the sources of the increased funding requirement, to show what proportion of the additional funds needed are generated by each cost driver in the cost model. Overall, half of the additional funding requirement is, in fact, generated by workload - an increased workload in regional hospitals and the shift to a more complex casemix in tertiary and regional hospitals. Not surprisingly, the improved staff remuneration envisaged by the plan is the next most important cost driver.

Table 21: Contribution of Key Cost Drivers to Increased Funding Needs

	Regional	Tertiary	Combined
Cost Increase due to Workload Increases	53%	45%	49%
Cost Reduction due to LOS Savings	-9%	-7%	-8%
Cost Increase due to Drugs	16%	17%	16%
Cost Increase due to Sustainable Maintenance	6%	12%	9%
Cost Increase due to Improved Remuneration	34%	33%	34%

A small but critical component of the overall system strengthening envisaged by the MTS process is the development of an efficient and effective patient transport system. This serves two key objectives: to improve patient access to referral services, by reducing cost barriers, and to improve efficient hospital operation, by facilitating discharge planning and outpatient scheduling. The cost in 2014 of running an integrated non-emergency patient transport system from regional hospital to tertiary hospital level is shown in Table 22.

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Table 22: Patient transport costs, 2014 (Millions of Rands, Constant 2005 prices)

Regional	Tertiary	National Referral	Combined Total
18,602,631	15,272,966	4,954,898	38,830,495

These transport costs are based on using contracted bus services, taking non-acute patients from one hospital to its “parent” referral centre and back again. Acutely ill patients would require ambulance transport, the costs of which are captured in parallel work on Emergency Medical Services. These costs are clearly miniscule when viewed in the context of overall running costs, yet would make a significant impact on improving access and efficient scheduling, admission and discharge planning for referral services.

The combined operating costs of hospitals plus patient transport would therefore be as follows in 2014.

Table 23: Total operating costs, 2014 (Millions of Rands, Constant 2005 prices)

Regional	Tertiary	National Referral	Central Referral	All Tertiary	Combined Total
12,619	8,970	4,760	384	14,114	26,733

Clearly, the required funding levels involve very large increases relative to current expenditure. To achieve the target levels of provision and quality improvement by 2009 would require annual average real funding increases of 8.5% between now and the end of the decade (see Table 21). However, over the period to 2014, sustained real annual average growth of 6% would be sufficient to yield these targets. These rates of growth are substantial – yet a 6% annual real growth target is in the same league as the current rate of increase being given to the United Kingdom National Health Service to make good past under-funding – a highly analogous situation.

Table 24: Real annual average funding growth required, 2004 to 2010

	To 2009	To 2014
Regional	9.5%	6.6%
Tertiary	7.7%	5.5%
Combined	8.5%	6.0%

The scale of these increases is rather less daunting if they are viewed in terms of their share of Gross Domestic Product. The GDP for the year 2005/06 was R 1,108 billion¹¹. Baseline expenditure on regional and tertiary and regional hospitals is therefore currently some 1.4% of GDP. If relatively modest real GDP growth rates are assumed over the

¹¹ National Treasury. “Budget Review 2004”

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next ten years (4% and 6%), the plan's funding requirement would represent only 1.4 to 1.5% of GDP in 2009, and 1.5% to 1.6% in 2014. Extensive international evidence indicating that national health expenditure displays an unambiguously positive income elasticity both across countries and over time¹². These analyses consistently indicate two important long-term trends in the evolution of health expenditure:

- In all developed countries, the share of total economic output (Gross Domestic Product, or GDP) devoted to health has consistently risen as GDP rises – i.e. as a country gets richer, it spends relatively more on health.
- That this relationship between health spending and GDP over time (and across countries at the same point in time) is, in fact, the most accurate long-term predictor of health expenditure – with or without adjustment for the specific influences described above.

Estimates have been constructed of the magnitude of this long-term relationship between GDP and health expenditure (the "income elasticity of demand" of health care expenditure – summarised in Getzen, 2000). Two studies of the United States have indicated that, in the long run, every 1% increase in US GDP leads to a 1.6% increase in health expenditure. Eight international studies, examining data for different periods from 1961 to 1987, indicated that, in other countries, a 1% long-term increase in GDP was associated with increases in health expenditure ranging between 1.2% and 1.4%.

Individual countries can make policy choices, which limit the operation of this relationship between GDP and health expenditure for a period of time. Most notably, the United Kingdom has consistently suppressed the rate of growth of health expenditure over two decades, so that it now spends a substantially lower proportion of GDP on health than its European neighbours with similar levels of economic development. However, a massive programme of reinvestment and increased funding for the NHS has just commenced, with the explicit aim of pumping public health expenditure up from 6.5% of GDP today to between 9.4 and 11% of GDP in twenty year time. Set against this context, aiming to increase the share of South African public hospital expenditure from 1.1% of GDP to 1.5% of GDP over ten years seems rather less challenging.

¹² Getzen T.E. Health care is an individual necessity and a national luxury: applying multilevel decision models to the analysis of health care expenditures. *Journal of Health Economics* 2000; 19:259-270.

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Schieber G.J. Health expenditures in major industrialized countries, 1960-87. *Health Care Financing Review* 1990; 11:159-168.

16. Capital Costs

A substantial capital investment programme would be required to ensure that the hospital infrastructure is modernised. This would involve investment in health facilities themselves (both the building of new facilities or units, upgrading works, and closure and demolition of old and sub-standard buildings); in clinical equipment in general; in a major programme of procurement of modern and efficient diagnostic radiology equipment; and the development of patient hotels and dedicated diagnostic day surgery units at tertiary and regional hospitals. Table 24 shows the overall capital costs of strengthening regional hospitals by 2014 (including identified newbuild projects).

Table 24: Regional hospitals capital upgrading costs (Millions of Rands)

Buildings	3,082
Equipment	399
Diagnostic Radiology	238
Patient Hotel	202
Day Surgery Units	1,450
Total	5,371

Table 25: Regional hospitals capital upgrading costs by province (Millions of Rands)

Province	By 2014
Eastern Cape	430
Free State	234
Gauteng	910
KwaZulu Natal	1,930
Limpopo	224
Mpumalanga	188
Northern Cape	204
North West	350
Western Cape	899
South Africa	5,371

Capital expenditure requirements for tertiary hospitals are significantly greater than those of regional hospitals, reflecting the more capital-intensive infrastructure of higher level hospitals, and the additional costs of essential initiatives such as dedicated day surgery units and patient hotels.

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Table 26: Tertiary hospitals capital costs to 2010 (Millions of Rands)

Expenditure Area:	
New Build Hospitals	4,381
General Facilities	3,018
Patient Hotels	1,293
Day Surgery Units	1,275
Equipment Refit	1,008
Diagnostic Radiology	424
Radiotherapy	900
Total	12,298

Table 27: Tertiary hospitals capital costs to 2014 (Millions of Rands)

Province	Concentrated
Eastern Cape	1,455
Free State	358
Gauteng	3,296
KwaZulu Natal	1,994
Limpopo	1,264
Mpumalanga	1,084
Northern Cape	954
North West	310
Western Cape	1,583
South Africa	12,298

Overall, total capital expenditure requirements by province are summarised in Table 28.

Table 28: Combined capital costs to 2014 (Millions of Rands)

Province	Concentrated
Eastern Cape	1,885
Free State	592
Gauteng	4,206
KwaZulu Natal	3,923
Limpopo	1,488
Mpumalanga	1,272
Northern Cape	1,159
North West	660
Western Cape	2,482
South Africa	17,669

17. Impact on Patient Access and Equity

A key benefit of the service improvements proposed in this plan lies in bringing tertiary and regional hospital services closer to the population, thus improving access and reducing inequity. The TRA model is able to calculate the proportion of the population who live within a given drive time of a hospital. This analysis has been conducted for the current situation and for the situation once the plan has been implemented. As can be seen from Table 29, the improvement in accessibility would be very substantial. This is due to the fact that the plan would place large populations in Mpumalanga and KwaZulu because the plan would place two new hospitals within reach of large populations in Mpumalanga and KwaZulu Natal whose current access to tertiary care is very poor. This access improvement would have significant positive impacts on the outcomes of complex trauma cases, on the ability to provide cheap and effective follow up, on scheduling and discharge planning, and on the costs of specialists providing outreach support to lower level facilities.

Table 29: Proportion of population living within 2 hours' drive of tertiary hospital

Province	Current Baseline	Plan Outcome
Eastern Cape	84.7%	84.7%
Free State	80.1%	80.1%
Gauteng	100.0%	100.0%
KwaZulu Natal	73.1%	84.1%
Limpopo	77.5%	87.6%
Mpumalanga	53.8%	91.4%
Northern Cape	46.7%	46.7%
North West	83.4%	83.4%
Western Cape	86.2%	86.2%
South Africa	81.3%	87.5%

Improvements in regional hospital access are summarised in Table 29. While the overall impact on access appears small, the upgrading of Upington, De Aar and Vryburg Hospitals dramatically improves access in Northern Cape and North West respectively, and two upgraded hospitals in KwaZulu Natal also improve the position in that province.

Table 30: Proportion of population living within 1 hour's drive of regional hospital

Province	Current Baseline	Plan Outcome
Eastern Cape	60.5%	60.5%
Free State	86.3%	86.3%
Gauteng	100.0%	100.0%
KwaZulu Natal	77.5%	83.8%
Limpopo	72.3%	72.3%
Mpumalanga	80.1%	80.1%
Northern Cape	34.6%	69.0%
North West	74.6%	85.6%
Western Cape	89.2%	89.2%
South Africa	79.8%	82.6%

It should be noted that solutions to the poor level of regional hospital access in the Eastern Cape are actively being sought. The province was not able to designate a suitable site for a new regional hospital, as there are complex challenges regarding staffing in the areas of greatest need.

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The plan will not only improve equity by allowing better physical access, but also by increasing utilisation rates in under-served regions of the country. Tables 30 to 32 show how the overall disparity between the highest and the lowest hospital admission rates will be reduced by half by 2014 – in other words, the degree of inequity in referral hospital utilisation will be half that seen today.

Table 31: Regional Hospital Inpatient Separations per 1000 Catchment Population

Province	Baseline	2009	2014
Eastern Cape	10.0	23.3	27.7
Free State	19.0	42.8	50.8
Gauteng	42.3	55.7	61.2
KwaZulu Natal	53.2	45.4	53.5
Limpopo	18.2	25.6	32.0
Mpumalanga	24.8	22.6	28.0
Northern Cape		16.3	20.7
North West	9.0	29.7	37.3
Western Cape	33.6	51.5	57.1
South Africa	31.1	39.1	45.4
Max:Min Ratio	5.9	3.4	3.0

Table 32: Tertiary 1 Inpatient Separations per 1000 Catchment Population

Province	Baseline	2009	2014
Eastern Cape	16.8	15.2	21.3
Free State	46.4	8.4	11.1
Gauteng	30.5	17.0	17.7
KwaZulu Natal	15.2	10.4	16.8
Limpopo	6.0	10.8	18.1
Mpumalanga		11.0	19.8
Northern Cape	67.4	25.4	35.2
North West	35.5	27.4	30.3
Western Cape	39.8	16.3	18.8
South Africa	25.1	14.7	19.2
Max:Min Ratio	11.3	3.2	3.2

Table 33: Regional & All Tertiary Inpatient Separations per 1000 Population

Province	Baseline	2009	2014
Eastern Cape	26.8	38.5	49.0
Free State	67.1	53.9	64.5
Gauteng	74.9	74.9	81.0
KwaZulu Natal	69.9	58.0	72.4
Limpopo	24.1	38.6	52.2
Mpumalanga	24.8	33.6	47.8
Northern Cape	67.4	41.7	55.9
North West	44.6	57.2	67.6
Western Cape	82.1	73.0	81.1
South Africa	59.2	56.3	67.0
Max:Min Ratio	3.4	2.2	1.7

18. Implementation Processes and Planning

Implementation of the plan would involve the following key components, which will be led by the MTS Project Manager. The MTS Project Team has recently been established with funding for three years' implementation activities, comprising a Project Manager and Administrator.

Preparatory Phase (2004 to 2005):

- Negotiation of increased recurrent funding for regional and tertiary hospitals to improve quality and sustainability of services, and to place health system on funding trajectory required to achieve MTS plan objectives (commencing 2004/05 adjustment budget)
- Audit of location of specialists and other specialised staff (e.g. specialised nursing staff, professions allied to medicine etc.) by discipline by hospital; gap analysis of baseline relative to estimated future needs; development of recruitment, training, retention and remuneration policies to secure skilled personnel where required
- Development, phasing and packaging of capital projects, and integration into the Hospital Revitalisation programme
- Development of referral networks, agreements and protocols, accompanied by incremental development of national patient transport system for inter-hospital transport of non-acute referred patients
- Negotiation with Health Sciences faculties to provide academic, teaching and research links at all "developing tertiary" hospitals, with a progressive plan to expand academic presence and career paths at each tertiary hospital

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- Negotiation of implementation plans and targets with each province, and development of project milestones, indicators and performance management frameworks for ongoing programme review
- Consideration of revisions to the programme budget structure for “provincial hospitals” and “central hospitals”, to ensure that tertiary hospitals can be identified as such within the programme structure
- Finalisation of any required changes to National Tertiary Services Grant conditions, grant framework and monitoring systems

Phase 1 (2005 to 2009):

- Front-loaded investment in specialised personnel, infrastructure and equipment at existing main tertiary hospitals in Gauteng, KwaZulu Natal, Free State and Western Cape to act as capacity expanders for other provinces (commencing 2005/06)
- National coordination of equipment procurement to exploit bulk purchasing power
- Investment at all tertiary hospitals in dedicated diagnostic and day surgery units, patient hotels
- Staged investment in and expansion of Frere, Port Elizabeth, Umtata, Kimberley, Klerksdorp, Ngwelezana, Polokwane and Rob Ferreira hospitals to provide the basket of “developing tertiary” hospital services by 2009 (commencing 2005/06, but main effort falling between 2007/08 and 2009/10)
- Progressive development of national referral services at Polokwane
- Recruitment of additional specialists to regional hospitals to achieve the goal of employing at least one specialist per discipline per regional hospital by 2009 (commencing immediately)
- Major review of implementation progress in 2008/09, with powers to determine whether or not hospitals and provinces have achieved their objectives, and to redirect resources if necessary
- Ongoing productivity improvements to achieve length of stay and day case rate targets by 2009

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Phase 2 (2010/11 to 2014/15)

- Second wave of recruitment of specialists to regional hospitals (objective to double number of specialists at this level between 2009 and 2014)
- Continued investment in “developing tertiary” hospitals to provide the full basket of “Fully Developed” tertiary hospital services by 2014/15, accompanied by winding down of outreach support from Phase 1 “parent” hospitals
- Continue productivity improvements to achieve 2014 targets
- Preparation for next ten year plan to commence by 2012/13

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Appendix A

Services to be Provided by Level of Hospital

Regional Hospital Services	
Specialist Service Available On-Site	Specific Components Explicitly Included:
Anaesthetics	
Diagnostic Radiology	XRay, CT Scan, Ultrasound, Fluoroscopy, Interventional radiology (basic interventions e.g. image guided aspirations)
General Medicine Service	Echocardiography, Stress ECG Specialist Immunology Nurse Regional ICU Service Diabetes / Endocrine clinic GIT incl. endoscopy, proctoscopy, sigmoidoscopy, colonoscopy (with Gen Surg) Geriatric Care Genetic Nurse & Counselling Oncology palliation and basic care Neurology basic care Spirometry & oximetry Basic Rheumatology Basic Infectious Diseases Pathology Services Infection Control Proctoscopy, Sigmoidoscopy
General Surgery Service	Regional Burns Service 24 hour Level II Trauma Service, Accident & Emergency
Mental Health Services (Psychiatry & Psychology)	Acute Inpatient & Outpatient Child & Adolescent Psychiatry ECT Liaison Psychiatry Community Mental Health Services
Neonatology Obstetrics & Gynaecology Service	Neonatal Low & High Care, Neonatal Intensive care Emergency Obs & Gynae Ultrasound, prenatal diagnosis Kangaroo Care Basic urogynaecology Mid trimester abortions and adequate pain relief systems Basic oncology, menopause and screening programmes Preliminary infertility investigations
Orthopaedic Surgery	General Orthopaedic Surgery 24 hour Level II Trauma Service, Accident & Emergency
Paediatrics Service	General Paediatric Medicine Service General Paediatric Surgery (General Surgeon?)
Rehabilitation Centre	Physiotherapy, OT, Orthotics & Prosthetics, Speech Therapy, Dietetics, Podiatry Acute Rehabilitation Team

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“Developing” Tertiary Hospital Services	n.b. Hospital in process of expanding to provide “Full” tertiary services (see next page)
Specialist Service Available On-Site	Specific Components Explicitly Included:
Anaesthetics Burns Unit	Specialised Burns ICU & Theatre
Critical Care & ICU	Full ICU Service
Diagnostic Radiology	XRay, Mistle CT Scan, Ultrasound, Fluoroscopy, Mammography, Colour Doppler US, Interventional Radiology, Angiography
General Medicine Service	Angiography AT Scan Coronary Care Echocardiography, Stress ECG Endoscopy, proctoscopy, sigmoidoscopy, colonoscopy (with Gen Surg) Genetic Nurse & Counselling Oncology palliation and basic care
General Surgery Service Mental Health Services (Psychiatry & Psychology)	Complex & High Acuity Care Child and adolescent psychiatry; Old-age psychiatry; Forensic psychiatry; Substance abuse; Liaison psychiatry; Eating disorders; Inpatient psychotherapy; Social psychiatry; Acute psychotic (complicated); Acute non-psychotic (complicated) Neonatal Intensive Care Unit
Neonatology	Acute renal failure / clinical nephrological problems / dialysis complication
Nephrology	AS Regional plus: Fetal/ Maternal Medicine Sub-Specialty Orthopaedics
Obstetrics & Gynaecology Service	AS Regional plus: Fetal/ Maternal Medicine Sub-Specialty Orthopaedics
Orthopaedic Surgery	AS Regional plus: Fetal/ Maternal Medicine Sub-Specialty Orthopaedics
Outreach Ambulatory Specialist Services (Specialists travel out from parent National Referral Hospital – during capacity expansion phase and until local specialists become available)	Dermatology, ENT Surgery, Gastroenterology, Infectious Diseases, Plastic & Reconstructive Surgery, Respiratory Medicine, Urology, Vascular Surgery (n.b. unless already available locally)
Paediatric Medicine	Specialist General Paediatricians with special interest
Paediatric Surgery	Specialist Paediatric Surgery Service
Paediatric ICU	Full Paediatric ICU Service
Rehabilitation Centre	Physiotherapy, OT, Orthotics & Prosthetics, Speech Therapy, Dietetics, Podiatry, Audiology Acute Rehabilitation Team incl. Spinal beds Stroke Unit
Trauma	Tertiary Major Trauma Centre

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Fully Developed	n.b. This service list represents the destination point for "developing" tertiary hospitals
Tertiary Hospital Services	
Specialist Service Available On-Site	Specific Components Explicitly Included:
Anaesthetics Burns Unit	Specialised Burns ICU & Theatre
Clinical Pharmacology Specialist	
Critical Care & ICU	Full ICU Service
Dermatology Specialist Service	Inpatient & ambulatory
Diagnostic Radiology	XRay, Mri slice CT Scan, Ultrasound, Fluoroscopy, Mammography, Colour Doppler US, Interventional Radiology, Angiography
ENT Surgery Specialised Service	General ENT Surgery
Gastroenterology	Tertiary GIT Service
General Medicine Service	Angiography AT Scan Coronary Care Echocardiography, Stress ECG Endoscopy, proctoscopy, sigmoidoscopy, colonoscopy (with Gen Surg) Genetic Nurse & Counselling Oncology palliation and basic care
General Surgery Service	Complex & High Acuity Care
Infectious Diseases	Tertiary Infectious Diseases Service, Pathology Services, Infection Control, Dietitian, Counselling Services, Social Worker
Mental Health Services (Psychiatry & Psychology)	Child and adolescent psychiatry; Old-age psychiatry; Forensic psychiatry; Substance abuse; Liaison psychiatry; Eating disorders; Inpatient psychotherapy; Social psychiatry; Acute psychotic (complicated); Acute non-psychotic (complicated) Neonatal Intensive Care Unit
Neonatology	
Nephrology	Acute renal failure / clinical nephrological problems / dialysis complication
Obstetrics & Gynaecology Service	As Regional plus: Fetal/ Maternal Medicine General Ophthalmology Service
Ophthalmology	
Orthopaedic Surgery	Sub-Specialty Orthopaedics
Paediatric Medicine	Specialist General Paediatricians with special interest
Paediatric Surgery	Specialist Paediatric Surgery Service
Paediatric ICU	Full Paediatric ICU Service
Plastic & Reconstructive Surgery Specialist Service	General Plastic & Reconstructive Surgery
Rehabilitation Centre	Physiotherapy, OT, Orthotics & Prosthetics, Speech Therapy, Dietetics, Podiatry, Audiology Acute Rehabilitation Team incl. Spin albeds Stroke Unit
Respiratory Medicine	Comprehensive Pulmonology Service
Trauma	Tertiary Major Trauma Centre
Urology Specialist Service	General Urology Service
Vascular Surgery Specialist Service	General Vascular Surgery Service

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National Referral Hospital Services	n.b. Offered only at certain designated tertiary hospitals
(" Adds on" to a Tertiary Hospital)	
Specialist Service Available On-Site	Specific Components Explicitly Included:
Cardiology	Echocardiography, Ultrasound, Electrocardiography, Stress Testing, ECG Holter Pacer follow-up, Cath Lab, Electrophysiology Ablation
Cardiothoracic Surgery	Full Cardiothoracic Service
Clinical Immunology	Tertiary Clinical Immunology
Craniofacial Surgery	
Critical Care & ICU	Additional ICU Capacity
Diagnostic Radiology	MRI Interventional Neuroradiology
ENT Surgery	Specialised ENT Service
Endocrinology	Tertiary Endocrinology Service
Geriatrics	Specialised Geriatric Service
Haematology	Tertiary Haematology Service
Human Genetics	Tertiary Genetics Service
Infectious Diseases	Clinical Research Capacity
Medical & Radiation Oncology	Tertiary Oncology Centre
Neurosurgery	Tertiary Specialist Neurosurgery Service
Nuclear Medicine	Tertiary Nuclear Medicine Centre
Obstetrics & Gynaecology Service	Oncology Urogynaecology Reproductive Medicine
Ophthalmology	Specialised Ophthalmology Service
Orthopaedic Surgery	Orthopaedic Oncology
Plastic & Reconstructive Surgery	Tertiary Plastic & Reconstructive Surgery
Renal Transplant	Renal Transplant Unit
Rheumatology	Tertiary Rheumatology Service
Urology	Tertiary Urology Service
Vascular Surgery	Tertiary Vascular Surgery Service
Paediatric Cardiology	
Paediatric ICU	Additional Paediatric ICU Capacity
Paediatric Endocrinology	
Paediatric Gastroenterology	
Paediatric Haematology & Oncology	
Paediatric Infectious Diseases	
Paediatric Nephrology	Dialysis & Renal Transplant
Paediatric Neurology	
Paediatric Respiratory Medicine & Allergology	

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Central Referral Units	
("Add on" to a National Referral Hospital)	n.b. offered only at Johannesburg and Groote Schuur / Red Cross
Specialist Service Available On-Site	Specific Components Explicitly Included:
{ Cardiology	Cardioverter Defibrillator & LV Assist Devices Unit
{ Cardiothoracic Surgery	Heart & Lung Transplant Unit
{ Respiratory Medicine	National Pulmonology Referral Centre: Lung volume reduction, Lung Transplant
Maxillofacial Surgery	National Referral Centre
{ Diagnostic Radiology	National PET Scan Interventional Neuroradiology Cardiac Imaging
{ Nuclear Medicine	PET or gamma-PET
{ Medical & Radiation Oncology	National Oncology Referral Centre: Bone Marrow Transplant, IMRT, Intraoperative Radiation, Stereotactic Radiation, PET Scan planning; laminar flow, cryopreservation, stem cell harvesting, T- cell depletion facilities
{ Haematology	Bone Marrow Transplantation Unit
{ Hepatology	Specialist Liver Unit
{ Liver Transplant	Liver Transplant Unit
{ General Surgery	National Surgical Referral Centre: Liver and major pancreatic resections, TME
{ Nephrology	National Nephrology Centre: Pancreas-kidney / Liver-kidney Transplant
Clinical Immunology	National Referral Centre
Clinical Pharmacology	National Policy Support Unit
Dermatology	National Referral Centre
Endocrinology	National Endocrinology Referral Centre
ENT	Cochlear Implant Skull Base Surgery
Human Genetics	National Genetics Centre
Ophthalmology	Super-Specialist Ophthalmology Service
Infectious Diseases	National Institute for Communicable Diseases
<i>National Paediatric Referral Centre:</i>	
{ Paediatric Medicine & Surgery	Organ transplantation, epilepsy surgery, craniofacial surgery; certain high-cost / complexity medical interventions
{ Paediatric Gastroenterology	Transplant Surgery, Metabolic Laboratory
{ Paediatric Haematology & Oncology	Bone Marrow Transplant
{ Paediatric Neurology	Complex epileptic surgery, complex neuromuscular patients, neurodegenerative and metabolic patients, Video telemetry, intracranial mapping, neuro-metabolic lab.
{ Paediatric Rheumatology	Specialised Paediatric Rheumatology including Bone Marrow Transplant, DEXA scans, Interleukin levels, joint replacement

Appendix B

MTS Model: Assumptions & Sources

Variable	Description / Notes	Source
Admission and OPD Visit Rates	<p>Model generates admissions and OPD visits in 2010/11 for each catchment area based upon:</p> <p>The higher of current local admission and OPD visit rates per 1000 population for that hospital or national median rate for regional hospital catchments, 33rd percentile national rate for tertiary catchments) x estimated population in 2010/11 or 2014/15. Note that certain specialties targeted for strengthening (geriatrics, human genetics) are assigned higher rates to reflect development of services.</p> <p>The model therefore generates estimates of future workload based upon an equitable admission and OPD rate, based on good current achievement levels, and accounting for future population growth. It therefore seeks directly to deal with current under-provision in poorer regions without undermining better-served areas.</p>	<p>National Tertiary Services Grant monitoring returns, 2002/03</p> <p>Hospital Minimum Data Set returns, 2001</p> <p>DoH/Africon Travel & Referral Analysis Model, September 2003</p>
Average Length of Stay	<p>User definable, based on achievable current average length of stay per specialty in South African public hospitals. See Minimum Data Set Data Dictionary for technical definition. Scenarios set as follows:</p> <p>Regional Hospitals: All achieve ALOS currently achieved by top 25%</p> <p>Tertiary Hospitals: All achieve ALOS currently achieved by top 20%</p>	<p>National Tertiary Services Grant monitoring returns, 2002/03</p> <p>Hospital Minimum Data Set returns, 2001</p> <p>For conceptual discussion, see:</p> <p>Hensher M. "Financing health systems through efficiency gains". World Health Organisation / Commission on Macroeconomics and Health 2001.</p>

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<p>Bed Occupancy</p>	<p>User definable. Default values based on international best practice:</p> <p>Regional - 80%</p> <p>Tertiary 1 – 80%</p> <p>Tertiary 2 – 85%</p> <p>Tertiary 3 – 90%</p>	<p>Baghurst A, Place M, Posnett J. “Dynamics of bed use in accommodating emergency admissions: stochastic simulation model.” <i>British Medical Journal</i> 1999; 319 :155-158 .</p> <p>Bamum H, Kutzin J. “Public hospitals in developing countries: resource use, cost, financing.” Washington, The World Bank 1993 .</p> <p>Hensher M. “Financing health systems through efficiency gains”. World Health Organisation / Commission on Macroeconomics and Health 2001 .</p>
<p>Buildings and Capital Expenditure</p>	<p>Upgrading costs of additional capacity:</p> <p>Tertiary Hospital @ R 1,060,410 per bed</p> <p>Regional Hospital @ R 545,567 per bed</p> <p>Downgrading costs of bed closures (12.5% of new build cost):</p> <p>Tertiary Hospital @ R 132,551 per bed</p> <p>Regional Hospital @ R 68,196 per bed</p> <p>1 x Dedicated day surgery unit per tertiary hospital @ R 75 million each</p> <p>1 x patient hotel per tertiary hospital @ R 100,000 per bed (1 patient hotel bed per 10 inpatient beds)</p>	<p>National Department of Health, National Strategic Health Facilities Transformation Funding Model, 2003</p>
<p>Catchment Populations</p>	<p>Catchment population per hospital calculated for each level of hospital (Regional, Tertiary 1, Tertiary 2, Tertiary 3) on basis of population per census Enumerator Area falling within concentric drive time polygons; population outside drive time polygons assigned to Thiessen polygons.</p> <p>Census 2001 population data, uplifted by Stats SA population growth formula</p>	<p>DoH/Africon Travel & Referral Analysis Model, September 2003</p>

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<p>Cost per Day Case</p>	<p>Increasing DC rate requires estimation of cost per day case. Basis for calculation: Variable costs per admission for relevant specialty, plus 50% of fixed cost of one bed day for relevant specialty</p>	<p>National Department of Health, Costing of Regional & Tertiary Hospitals, 2003</p>
<p>Day Case Rate</p>	<p>User definable, based on achievable current day case rates per specialty in South African public hospitals. Day Case Rate = $\text{Day Cases} \div (\text{Inpatient Separations} + \text{Day Cases})$ Scenarios set as follows: Regional Hospitals: All achieve ALOS currently achieved by top 75% Tertiary Hospitals: All achieve ALOS currently achieved by top 80%</p>	<p>National Tertiary Services Grant monitoring returns, 2002/03 Hospital Minimum Data Set returns, 2001 For conceptual discussion, see: Hensher M. "Financing health systems through efficiency gains". World Health Organisation / Commission on Macroeconomics and Health 2001. Hensher M, Edwards N. Hospital provision, activity and productivity in England since the 1980s. <i>British Medical Journal</i> 1999; 319:911-914.</p>
<p>Discount Rate</p>	<p>Discount rates of 8% and 10% have been used in Net Present Value calculations, reflecting rates typically used in SA project appraisals</p>	<p>Gautra in project appraisal SA National Roads Agency</p>
<p>Drug Expenditure</p>	<p>Specialty groups were asked to identify specific new drugs (currently unavailable in the public sector) which will need to be accommodated over the next few years. Only a minority of groups identified any such drugs. These were then assigned a cost factor as a multiple of current average drug expenditure per admission (10% of the cost per admission), based on estimated additional cost of the drugs and scale of demand. See last page of this appendix for details.</p>	<p>Specialty Group Reports</p>

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<p>Economies of Scale</p>	<p>Hospitals smaller than 200 beds show increasing returns to scale; hospitals over 600 beds in size show diseconomies of scale; implying optimal hospital size typically lies between 200 and 600 beds. It is therefore assumed that new hospitals or major re-provision projects should bear this optimal size range in mind</p>	<p>Centre for Reviews and Dissemination. Effective Health Care Bulletin: Hospital volume and health care outcomes, costs and patient access. Nuffield Institute for Health, University of Leeds, and NHS Centre for Reviews and Dissemination, University of York 1996.</p> <p>Zere E, McIntyre D, Addison T. Technical efficiency and productivity of public sector hospitals in three South African provinces. Paper submitted to <i>South African Journal of Economics</i>.</p>
<p>Efficiency Savings</p>	<p>Length of Stay reductions:</p> <p>Reduced length of stay does not yield a one-for-one reduction in costs as a) variable costs per admission are largely insensitive to ALOS, b) as ALOS reduces, the average acuity and care needs of remaining inpatient days increase. ALOS impact on costs modeled as follows:</p> <p>30% ALOS reduction yields 11% reduction in cost per admission 40% ALOS reduction yields 14% reduction in cost per admission</p> <p>Increasing Day Case rate:</p> <p>Switching inpatient separations to day cases will achieve cost savings equivalent to (Cost per Admission minus Cost per Day Case)</p>	<p>Bamum H, Kutzin J. "Public hospitals in developing countries: resource use, cost, financing." Washington, The World Bank 1993.</p> <p>National Department of Health, Costing of Regional & Tertiary Hospitals, 2003</p>
<p>Equipment – General</p>	<p>Model incorporates following allowances for general equipment:</p> <p>New tertiary beds @ R477,664 per bed New regional beds @ R 92,298 per bed</p> <p>General equipment upgrade and refit @ R 100,000 per tertiary bed and R 25,000 per regional bed</p>	<p>National Department of Health, Costing of Regional & Tertiary Hospitals, 2003</p>

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<p>Equipment - Radiology</p>	<p>Specific additional capacity in Diagnostic Radiology has been costed as follows:</p> <p>Regional Hospital– Single-slice CT @ R2.1 million plus Digital Fluoroscopy @ R 2 million Tertiary 1 Hospital– 6 slice CT @ R 4.5 million, Digital Fluoroscopy @ R 2 million, Angiography suite @ R 6 million Tertiary 2 Hospital– MRI 1T short bore magnet @ R 7.5 million Tertiary 3 Hospital– PET & cyclotron @ R 50 million, additional MRI @ R 7.5 million plus 16 slice CT @ R 8.5 million</p>	<p>Diagnostic Radiology Specialty Group Report</p> <p>Siemens Ltd, Medical Engineering Division</p>
<p>Hospital Activity Data: Regional hospitals</p>	<p>Hospital Minimum Data Set returns, 2001</p>	<p>National Department of Health</p>
<p>Hospital Activity Data: Tertiary hospitals</p>	<p>National Tertiary Services Grant monitoring returns, 2002/03.</p> <p>Hospital Minimum Data Set returns, 2001.</p> <p>All services in Tertiary hospitals were incorporated to ensure that the full spectrum was accommodated and to ensure that “spill-over” effects are accounted for.</p> <p>Non-NTSG services data residuals were estimated as follows: General Medicine = MDS “Medicine” minus all other NTSG medical General Surgery = MDS “Surgery” minus all other NTSG surgical Obs & Gynae = MDS Maternity plus MDS Gynaecology Orthopaedics = MDS Orthopaedics minus NTSG Spinal Injury Mental Health = MDS Psychiatry Paediatric Medicine = MDS Paediatrics minus NTSG Paediatric Surgery and NTSG Neonatology Trauma = MDS Surgery x 12.5% Urology = MDS Surgery x 7.5%</p>	<p>National Department of Health</p> <p>(Based on observed proportions in tertiary hospital costing study)</p>

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Hospital Cost Data	Costing of selected regional and tertiary hospitals using data for FY 2002/03	Directorate: Health Financing & Economics National Department of Health
Medical Scheme Membership	Total registered members and dependants of medical schemes, 2002: 6,962,914 Distributed per province using average provincial membership proportions as recorded in 1995 to 1999 October Household Surveys	Council for Medical Schemes “Annual Report of the Registrar of Medical Schemes, 2002-3”, 2003. Statistics South Africa (Central Statistical Service) “October Household Survey 1995”, 1997 and subsequent years.
Patient Transport Cost	The TRA model costs a round trip by bus from the referring hospital to the destination hospital and back, at a cost of R 0.30c per patient / km.	DoH/Africon Travel & Referral Analysis Model, September 2003
Period of Analysis	Base data: 2001/02 and 2002/03 New configuration achieved in: 2010/11 and 2014/15 All prices presented in constant 2003/04 prices Where necessary, prices inflated / deflated using CPI: 2001/02 to 2002/03: 10% 2002/03 to 2003/04: 7.7%	National Treasury, “Budget Review 2003”
Population	Base population, 2001: 44,819,778 Estimated mid-year population, 2003: 46,429,823	Statistics South Africa “Census 2001: Census in Brief”, 2003.
Population growth	Thereafter extrapolation of inter-censal growth rate <i>r</i> from Census 2001 total population to 2010.	Statistics South Africa “Statistical Release P0302: Mid-year estimates 2003”, July 2003.
Proportion of Level 2 work load in Tertiary	When a Tertiary hospital is downgraded to regional status, the following work load is deemed to be regional (Level 2): General Medicine, General Surgery, Casualty, OPD: 75% Orthopaedics, Obs & Gynae, Paediatric: 50%	Vallabhjee K, Jinabhai C, Gouws E, Bradshaw D, Naidoo K. “Levels of health care at academic and regional hospitals in KwaZulu-Natal”. <i>South African Medical Journal</i> 1997;

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Hospitals	All remaining workload is assumed to be shifted to other Tertiary hospitals (as Tertiary 1)	87:1355-1359. Financial and Fiscal Commission. “Submission – Medium Term Expenditure Framework 2004-2007: towards a review of the intergovernmental fiscal relations system”. April 2003.
Referral Rates from level to level	Regional to T1: 20% of Separations / OPD Visits at referring hospital T1 to T2: 20% of Separations / OPD Visits at referring hospital T2 to T3: 20% of Separations / OPD Visits at referring hospital	Centre for Health Systems Research & Development / Health Care Management Programme. “Assessment of current health care referral systems in the RSA: a study of the current referral patterns, including the views and experiences of users and providers of health services”. University of the Free State, September 2000.
Staff in Post Staffing Requirements by Specialty	Health Professionals in post as of March 2003 by hospital (pay point). Regional Hospitals – Draft Regional Hospitals Package and MTS specialty group outputs Tertiary Hospitals – MTS Specialty Group outputs These represent minimum requirements; larger hospitals would be in position to employ additional personnel as required. Base calculations attempt to identify the minimum key personnel required to make the reconfigured system work effectively, as a guide for HR planning and training.	PERSAL – National Department of Health National Department of Health. “Discussion document: strategic framework for the modernisation of tertiary hospital services.” May 2003. National Department of Health. “A regional hospital service package for South Africa: a draft proposal.” July 2002.

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<p>Sustainability Improvements - Maintenance</p>	<p>Cost model includes additional funding for maintenance and replacement of buildings and equipment to achieve long-term sustainability of investments</p> <p>Model assumes that current maintenance expenditures are only 50% of required levels (3% of current replacement value p.a. for buildings, 10% for equipment). Additional maintenance funds are incorporated as follows:</p> <p>Regional hospital – buildings R34 per bed day, equipment R 11 per bed day Tertiary hospital – buildings R 100 per bed day, equipment R96.50 per bed day</p>	<p>National Department of Health, National Strategic Health Facilities Transformation Funding Model, 2003</p>
<p>Sustainability Improvements - Replacement</p>	<p>Routine replacement and upgrading of buildings and equipment is incorporated as follows:</p> <p>Buildings – current replacement cost of hospital annualized over 50 year life span Equipment – current replacement cost of hospital inventory annualized over 7.5 year life span</p>	<p>National Department of Health, Costing of Regional & Tertiary Hospitals, 2003</p>
<p>Sustainability Improvements - Personnel</p>	<p>Model allows incorporation of real increases in staff salaries and packages, reflecting a) acknowledged need for improvements in pay and conditions of service to promote recruitment and retention of scarce skills and b) current policy developments in this area. Default values:</p> <p>By 2010 - health professionals 25% real increase in salaries, other staff 10% real increase in salaries (relative to 2003/04 baseline)</p> <p>By 2015 - health professionals 30% real increase in salaries, other staff 10% real increase in salaries (relative to 2003/04 baseline)</p>	

Additional Drug / Therapy Costs

Specialty	Cost Factor	Comment
Burns	2	Transcyte & Integra
Cardiology	4	Statins, ace inhibitors, drug eluting stents, streptokinase
Cardiothoracic	2	Newer immunosuppressants, improved availability of valves etc.
Clinical Immunology	1	No Major New Drugs Proposed
Craniofacial Surgery	1	No Major New Drugs Proposed
Critical Care & ICU	3	Xigris for specific patients
Dermatology	2	Retinoids (Roacutane and Neotigason), topical Vitamin D analogues (Calcipotriol) and Dovonex.
Diagnostic Radiology	1	No Major New Drugs Proposed
Ear Nose & Throat	1	No Major New Drugs Proposed
Endocrinology	1	No Major New Drugs Proposed
Gastroenterology	1.5	Infliximab for Crohn's Disease
General Medicine	1	No Major New Drugs Proposed
General Surgery	1	No Major New Drugs Proposed
Geriatrics	1	No Major New Drugs Proposed
Haematology	2	Gleevec, factor VII
Hepatology	1	No Major New Drugs Proposed
Human Genetics	2	Herciptin treatment of breast cancer and Gleevec for treatment of CML.
Infectious Diseases	1	No Major New Drugs, n.b. ART costed separately to MTS
Liver Transplant	1.5	Newer immunosuppressants
Maxillofacial Surgery	1	No Major New Drugs Proposed
Medical & Radiation Oncology	1.5	Improved access to current drugs
Mental Health	1	No Major New Drugs Proposed
Neonatology	1	No Major New Drugs Proposed
Nephrology	2	ACE-inhibitors, erythropoietin, intravenous iron should be standard treatment for dialysis patients, newer immunosuppressive agents, hepatitis B vaccination
Neurology	1	No Major New Drugs Proposed
Neurosurgery	1	No Major New Drugs Proposed
Nuclear Medicine	1.5	Improved access to isotopes
Obstetrics & Gynaecology	1	No Major New Drugs Proposed
Ophthalmology	1	No Major New Drugs Proposed
Orthopaedics	1.5	Implants
Paediatric Surgery	1	No Major New Drugs Proposed
Paediatrics	2	Growth hormone, GnRH analogues and aromatase inhibitors, Bisphosphonates, statins, insulin analogues, Phosphate preparations, Vitamin D analogues
Paediatric ICU	1	No Major New Drugs Proposed
Plastic Surgery	1	No Major New Drugs Proposed
Rehabilitation Centre	1	No Major New Drugs Proposed
Renal Transplant	1	No Major New Drugs Proposed
Respiratory Medicine	1.5	Newer pneumococcal vaccines
Rheumatology	2	Biological agents for rheumatoid arthritis and bisphosphonates, selective oestrogen receptor modulators and calcitonin for osteoporosis. TNF alpha antagonists and interleukin-1 receptor antagonists.
Surgery	1	No Major New Drugs Proposed
Trauma	1	No Major New Drugs Proposed
Urology	1	No Major New Drugs Proposed
Vascular Surgery	1	No Major New Drugs Proposed

Appendix C

Efficiency and Sustainability Assumptions

Cost per Admission - Regional		Subtract	Add	Subtract	Add
	Start %	ALOS	Drug Share	Admin Cost	Staff Real Income
Direct Costs	72%				
Fixed	76%	5%			18%
Variable	24%		6%		
Overhead	28%	2%		0%	3%
Total		7%	6%	0%	21%

Length of Stay Reduction	20%
Hotel & Facilities % Total	9%
Assumed reduction in admin costs	0%
Assumed real income increase - professionals	34%
Assumed real income increase - others	22%

Cost per Bed Day - Regional	Add		
	Sustainable Maintenance		
	Buildings	Equipment	Total
Additional Cost per Bed Day	3400%	1100%	4500%
Assumed adequacy of current spending	50%		

Cost per OP Visit - Regional	Add	Subtract	Add
	Drug Share	Admin Cost	Staff Real Income
Adjusted Cost per OP Visit	6%	0%	21%

Efficiency and Sustainability Assumptions

	Add	Add	Add	Subtract	Add	Add
Cost per Day Case	Admission	Drug Share	Bed Day	Admin Cost	Staff Real Income	Equipment
Variable Cost Component of Admission	24%	12%	38%	0%	21%	300%

Cost per Admission - Tertiary	Start %	Subtract	Add	Subtract	Add
		ALOS	Drug Share	Admin Cost	Staff Real Income
Direct Costs	78%				
Fixed	76%	6%			16%
Variable	24%		6%		
Overhead	22%	1%		0%	2%
Total		7%	6%	0%	18%

Length of Stay Reduction	20%
Hotel & Facilities % Total	6%
Assumed reduction in admin costs	0%
Assumed real income increase - professionals	34%
Assumed real income increase - others	22%

Cost per Bed Day - Tertiary	Add		
	Sustainable Maintenance		
	Buildings	Equipment	Total
Additional Cost per Bed Day	10000%	9650%	19650%
Assumed adequacy of current spending	50%		

Cost per OP Visit - Tertiary	Add	Subtract	Add
	Drug Share	Admin Cost	Staff Real Income
Adjusted Cost per OP Visit	6%	0%	18%

	Add	Add	Add	Subtract	Add	Add
Cost per Day Case - Tertiary	Admission	Drug Share	Bed Day	Admin Cost	Staff Real Income	Equipment Maintenance
Variable Cost Component of Admission	24%	10%	38%	0%	18%	1800%

APPENDIX D

Results of Validation of MTS Cost Model

General

As described in the main report, the MTS Cost Model is based upon the results of a step-down cost analysis of eight hospitals conducted by the Directorate: Health Financing & Economics during 2003; these results are then adjusted in line with assumptions described in detail in the main report and in Appendix B.

In order to ensure that the MTS Cost Model is a valid and appropriate basis for estimating the future costs of hospital provision, a detailed validation exercise was undertaken to assess the model's accuracy in predicting current levels of expenditure on regional and tertiary hospitals.

Approach

The most complete dataset of actual expenditure data per hospital currently available to the MTS team relates to financial year 2001/02, and was extracted from FMS records. The cost model operates in current (i.e. 2003/04) prices. FMS expenditures per hospital typically do not include capital expenditures on replacement and upgrading of buildings and equipment, while the cost model does incorporate the annualized costs of capital and equipment replacement. In order to make cost model consistent with actual FMS data, two adjustments were made to the cost model outputs:

- They were deflated to 2001/02 prices (deflator 2002/03 7.7%, 2001/02 10%)
- They were reduced by the average value of the capital and equipment replacement costs (a factor of -14% for tertiary hospitals and -7.8% for regional hospitals)

These adjustments then allowed a direct comparison of aggregate cost model outputs with aggregate actual expenditures, and a statistical analysis of the relationship between model predicted expenditure and actual expenditure for each hospital.

Aggregate Outputs

The model outputs achieved a very close aggregate match with total actual expenditure, as summarized in Table C1 below:

Table C1 – Actual vs. Predicted Aggregate Expenditure

Rands (000s)	Actual Expenditure	Model Estimate	Variance
Regional Hospitals	4,080,886	4,266,834	+ 4.6%
Tertiary Hospitals	7,207,707	7,238,638	+ 0.4%
Regional and Tertiary	11,288,592	11,505,472	+ 1.9%

Statistical Measures of Predictive Ability

Statistical analysis of the relationship between actual and model-predicted expenditure at individual hospital level also indicated a very robust and strong relationship. Table C2 below summarizes these outputs.

Table C2 – Statistical Measures

	Correlation Coefficient	R Squared
Regional Hospitals	0.83	0.70
Tertiary Hospitals	0.91	0.84
Regional and Tertiary	0.94	0.88

Conclusions

As can be seen from both tables, the cost model is slightly less accurate in its ability to correctly predict regional hospital expenditure than it is in predicting tertiary hospital expenditure. However, the team is confident that the predictive power of the cost model is very high - better than 95% accuracy in predicting regional hospital expenditure, and better than 99% accuracy in predicting tertiary hospital expenditure. In both cases, the model is more likely to marginally overestimate costs than to yield an underestimate, which is clearly desirable to ensure stability of budgeting. As such, the team concluded that the cost model can be used with a high degree of confidence in the context of the overall MTS Planning Model.

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Cost Model – Current Unit Costs 2003/2004

Current costs of study hospitals, before application of efficiency and sustainability assumptions

REGIONAL / LEVEL II HOSPITAL SERVICES

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Medicine	3,525	482		850
Tuberculosis	3,525	482		850
Surgery	6,353	720		1,458
Orthopaedics	5,695	738		1,353
Psychiatry	6,634	894		1,594
Maternity	2,199	644		702
Gynaecology	3,632	1,976		1,616
Paediatrics	3,061	429		743
Total			373	
Casualty			373	

TERTIARY 1 ("TERTIARY HOSPITAL SERVICES")

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Burns	26,582	1,068	5,644	5,127
Clinical Pharmacology	1,000,000			
Critical Care & ICU	19,871	3,013		4,940
Dermatology	19,279	1,783	396	4,223
Diagnostic Radiology			743	0
Ear Nose & Throat	6,170	1,932	493	2,032
Gastroenterology	17,277	2,541	995	4,256
General Medicine	3,348	457	403	807
General Surgery	6,033	684	403	1,385
Infectious Diseases	36,510	1,478	859	7,048
Mental Health	9,113	1,044	473	2,097
Neonatology	27,285	237		4,834
Nephrology	8,869	1,735	1,252	2,400
Obstetrics & Gynaecology	3,449	1,877	403	1,534
Ophthalmology	5,609	1,757	450	1,848
Orthopaedics	5,409	701	403	1,285
Paediatric Medicine	2,907	407	380	706
Paediatric Surgery	11,661	3,236	340	3,633
Paediatric ICU	25,441	3,878	0	6,335
Plastic & Reconstructive Surgery	14,901	5,982	1,294	5,566
Rehabilitation Centre	176,031	0	620	30,418
Respiratory Medicine	17,420	1,781	1,039	3,901
Trauma	6,033	684	403	1,385
Urology	6,033	684	403	1,385
Vascular Surgery	16,364	1,562	617	3,609
Remaining OPD Visits			373	

APPENDIX D – FINAL DOCUMENT

TERTIARY 2 (NATIONAL REFERRAL HOSPITAL SERVICES)

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Cardiology	13,159	2,467	698	3,507
Cardiothoracic Surgery	14,769	1,981	563	3,543
Clinical Immunology	15,466	2,138	1,950	3,742
Craniofacial Surgery	1,330	0	110	230
Critical Care & ICU	19,871	3,013	0	4,940
Diagnostic Radiology			743	0
Ear Nose & Throat	6,170	1,932	493	2,032
Endocrinology	19,203	2,302	912	4,469
Geriatrics	66,409	4,890	801	13,921
Haematology	28,578	2,459	1,392	6,168
Human Genetics	14,055	0	751	2,429
Infectious Diseases	36,510	1,478	859	7,048
Medical & Radiation Oncology	25,004	2,926	576	5,784
Neurosurgery	38,219	4,110	2,944	8,659
Nuclear Medicine	3,162	0	3,162	546
Neurology	15,517	1,918	444	3,640
Ophthalmology	5,609	1,757	450	1,848
Orthopaedics	19,001	1,998	620	4,283
Plastic & Reconstructive	14,901	5,982	1,294	5,566
Renal Transplant	17,277	2,541	995	4,256
Rheumatology	9,325	1,766	753	2,494
Urology	10,212	2,146	1,276	2,838
Vascular Surgery	16,364	1,562	617	3,609
T2 Paediatrics	17,751	1,745	1,452	3,940

APPENDIX D – FINAL DOCUMENT

TERTIARY 3 (CENTRAL REFERRAL UNITS)

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Group 1 - Chest				
Cardiology	13,159	2,467	698	3,507
Cardiothoracic	14,769	1,981	563	3,543
Respiratory Medicine	17,420	1,781	1,039	3,901
Group 2 - Radiology				
Radiology			743	0
Nuclear Medicine	3,162	0	3,162	546
Medical & Radiation Oncology	25,004	2,926	576	5,784
Haematology	28,578	2,459	1,392	6,168
Group 3 - Liver & Pancreas				
Hepatology	17,277	2,541	995	4,256
Liver Transplant	17,277	2,541	995	4,256
Surgery	11,327	1,771	899	2,843
Nephrology	8,869	1,735	1,252	2,400
National Referral Centres:				
Clinical Immunology	15,466	2,138	1,950	3,742
Clinical Pharmacology	3,000,000			
Dermatology	19,279	1,783	396	4,223
Endocrinology	19,203	2,302	912	4,469
ENT	6,170	1,932	493	2,032
Human Genetics	14,055	0	751	2,429
Ophthalmology	5,609	1,757	450	1,848
Infectious Diseases	36,510	1,478	859	7,048
Maxillofacial Surgery	3,495	2,983	924	2,095
Paediatrics	17,751	1,745	1,452	3,940

APPENDIX E – FINAL DOCUMENT

Cost Model – Model Costs 2009

Appendix E

REGIONAL / LEVEL II HOSPITAL SERVICES

	Inpatient Separations	Sustainable Maintenance	Outpatient Visits	Day Cases
Medicine	4449	45		895
Tuberculosis	4449	45		895
Surgery	8018	45		1526
Orthopaedics	7188	45		1423
Psychiatry	8373	45		1678
Maternity	2775	45		763
Gynaecology	4584	45		1802
Paediatrics	3864	45		784
Total			456	
Casualty			456	

TERTIARY 1 ("TERTIARY HOSPITAL SERVICES")

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Burns	34256	197	6998	8250
Clinical Pharmacology	1000000			87218
Critical Care & ICU	26801	197		9399
Dermatology	24845	197	491	6553
Diagnostic Radiology			877	18
Ear Nose & Throat	7581	197	582	2255
Gastroenterology	21747	197	1204	5539
General Medicine	4114	197	476	901
General Surgery	7413	197	476	1530
Infectious Diseases	44860	197	1014	7680
Mental Health	11198	197	558	2309
Neonatology	33526	197		5259
Nephrology	11430	197	1552	3537
Obstetrics & Gynaecology	4238	197	476	1715
Ophthalmology	6893	197	530	2052
Orthopaedics	6808	197	488	1694
Paediatric Medicine	3572	197	448	790
Paediatric Surgery	14328	197	402	4013
Paediatric ICU	31260	197		6952
Plastic & Reconstructive Surgery	18310	197	1527	6157
Rehabilitation Centre	216295	197	732	
Respiratory Medicine	21927	197	1257	5147
Trauma	7413	197	476	1530
Urology	7413	197	476	1530
Vascular Surgery	20107	197	728	3956
Total Tertiary 1 services				
Remaining OPD Visits			418	

APPENDIX E – FINAL DOCUMENT

Cost Model – Model Costs 2009

TERTIARY 2 (NATIONAL REFERRAL HOSPITAL SERVICES)

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Cardiology	18537	197	950	7810
Cardiothoracic Surgery	19034	197	698	5369
Clinical Immunology	19004	197	2301	4111
Craniofacial Surgery	1634	197	130	267
Critical Care & ICU	26801	197	0	9399
Diagnostic Radiology			877	18
Ear Nose & Throat	7581	197	582	2255
Endocrinology	23595	197	1077	4902
Geriatrics	81598	197	945	15188
Haematology	36830	197	1726	9603
Human Genetics	18114	197	931	4055
Infectious Diseases	44860	197	1014	7680
Medical & Radiation Oncology	31473	197	697	7588
Neurosurgery	46960	197	3473	9474
Nuclear Medicine	3981	197	3827	768
Neurology	19066	197	524	3997
Ophthalmology	6893	197	530	2052
Orthopaedics	23347	197	732	4694
Plastic & Reconstructive	18310	197	1527	6157
Renal Transplant	21228	197	1174	4675
Rheumatology	12017	197	934	3685
Urology	12547	197	1505	3132
Vascular Surgery	20107	197	728	3956
T2 Paediatrics	22876	197	1801	6093

Appendix E

TERTIARY 3 (CENTRAL REFERRAL UNITS)

	Inpatient Separations	Inpatient Days	Outpatient Visits	Day Cases
Group 1 - Chest				
Cardiology	16958	197	950	7810
Cardiothoracic	17261	197	698	5369
Respiratory Medicine	19837	197	1257	5147
Group 2 - Radiology				
Radiology			877	18
Nuclear Medicine	3601	197	3827	768
Medical & Radiation Oncology	28473	197	697	7588
Haematology	33400	197	1726	9603
Group 3 - Liver & Pancreas				
Hepatology	19155	197	1174	4675
Liver Transplant Surgery	19674	197	1204	5539
Nephrology	12559	197	1061	3130
Nephrology	10365	197	1552	3537
National Referral Centres:				
Clinical Immunology	17148	197	2301	4111
Clinical Pharmacology	3000000			
Dermatology	21375	197	467	4625
Endocrinology	21291	197	1077	4902
ENT	6841	197	582	2255
Human Genetics	16427	197	931	4055
Ophthalmology	6219	197	530	2052
Infectious Diseases	40479	197	1014	7680
Maxillofacial Surgery	3875	197	1090	2343
Paediatrics	20746	197	1801	6093

Appendix F

Length of Stay and Day Case Rates

The tables below provide descriptive statistics on current day case rates and lengths of stay. The columns marked in **bold** denote the target values used in the model.

Regional Hospitals: Day Case Rate

	Mean	Median	75 percentile	80 percentile	90 percentile
Medicine	13.7%	6.6%	17.2%	24.5%	30.1%
Tuberculosis	14.7%	14.7%	20.0%	21.1%	23.2%
Surgery	7.8%	5.2%	10.9%	11.3%	13.8%
Orthopaedics	19.0%	19.0%	26.2%	27.6%	30.5%
Psychiatry	33.3%	33.3%	33.3%	33.3%	33.3%
Maternity	7.0%	5.2%	9.9%	11.0%	14.9%
Gynaecology	25.6%	25.6%	35.9%	37.9%	42.0%
Paediatrics	8.0%	4.5%	11.4%	12.6%	18.2%
Total	6.9%	5.5%	8.4%	9.7%	15.1%

Tertiary Hospital Services: Day Case Rate

	Mean	Median	75 percentile	80 percentile	90 percentile
Burns	29.9%	23.0%	52.1%	56.3%	64.5%
Critical Care & ICU	4.3%	4.9%	6.7%	6.7%	7.5%
Dermatology	34.7%	11.5%	67.0%	82.9%	91.5%
Ear Nose & Throat	12.2%	15.1%	15.4%	16.6%	18.9%
Gastroenterology	15.0%	15.0%	15.0%	15.0%	15.0%
General Medicine	15.5%	3.6%	15.5%	26.0%	49.7%
General Surgery	23.5%	13.9%	39.1%	41.3%	49.7%
Infectious Diseases	15.8%	1.5%	15.9%	24.5%	41.7%
Mental Health	4.1%	2.0%	5.5%	6.2%	7.6%
Neonatology	5.0%	5.1%	6.7%	8.0%	10.5%
Nephrology	65.3%	78.4%	94.0%	96.4%	99.6%
Obstetrics & Gynaecology	8.8%	6.8%	13.7%	14.0%	15.6%
Ophthalmology	34.3%	29.8%	56.3%	57.3%	64.8%
Orthopaedics	7.4%	5.0%	7.7%	8.2%	15.0%
Paediatric Medicine	10.1%	5.7%	9.5%	12.3%	23.0%
Paediatric Surgery	14.9%	14.2%	17.5%	20.1%	29.5%

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Plastic & Reconstructive Surgery	17.9%	24.5%	27.1%	27.5%	32.3%
Rehabilitation Centre	1.3%	1.3%	1.3%	1.3%	1.3%
Respiratory Medicine	18.6%	20.6%	28.6%	31.4%	34.6%
Trauma	0.0%	0.0%	0.0%	0.0%	0.0%
Urology	16.1%	10.5%	21.7%	30.0%	34.4%
Vascular Surgery	11.8%	2.4%	5.4%	6.3%	32.1%
Total Tertiary I services	13.8%	9.5%	17.0%	19.7%	23.2%

National Referral Hospital Services: Day Case Rate

	Mean	Median	75 percentile	80 percentile	90 percentile
Cardiology	17%	4%	34%	37%	45%
Cardiothoracic Surgery	12%	4%	16%	20%	29%
Clinical Immunology	54%	52%	87%	90%	95%
Craniofacial Surgery	9%	6%	12%	15%	19%
Endocrinology	9%	5%	11%	12%	21%
Haematology	35%	5%	76%	79%	86%
Human Genetics	33%	33%	43%	45%	50%
Medical & Radiation Oncology	8%	6%	11%	14%	18%
Neurology	26%	7%	43%	57%	77%
Neurosurgery	3%	2%	5%	5%	8%
Nuclear Medicine	100%	100%	100%	100%	100%
Renal Transplant	22%	22%	33%	35%	40%
Rheumatology	15%	2%	22%	27%	35%
Total T2 services	16%	19%	21%	23%	25%

Central Referral Services: Day Case Rate

Group 3 - Liver & Pancreas	Mean	Median	75 percentile	80 percentile	90 percentile
Hepatology	0.15	0.15		0.15	
Liver Transplant	0.06	0.06		0.06	
Surgery	0.27	0.03	0.29	0.44	0.72

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Regional Hospitals : Average Length of Stay

	Mean	Median	25 percentile	20 percentile	10 percentile
Medicine	4.89	4.59	3.84	3.46	3.00
Tuberculosis	16.67	15.91	5.07	4.06	2.32
Surgery	4.89	4.56	3.58	3.43	2.59
Orthopaedics	8.51	10.51	8.07	6.66	3.85
Psychiatry	12.00	11.78	9.73	9.32	8.50
Maternity	2.60	2.44	1.84	1.68	1.48
Gynaecology	4.12	2.77	2.35	2.15	1.75
Paediatrics	5.26	4.78	4.05	3.72	2.95
Total	4.28	4.14	3.32	3.13	2.84

Tertiary Hospital Services: Average Length of Stay

	Mean	Median	25 percentile	20 percentile	10 percentile
Burns	19.52	20.94	10.34	9.86	6.85
Critical Care & ICU	6.98	4.61	3.62	3.40	2.97
Dermatology	7.94	7.22	5.20	4.13	1.91
Ear Nose & Throat	6.11	4.32	3.60	3.29	3.15
Gastroenterology	6.61	5.11	4.70	4.61	4.44
General Medicine	14.75	7.79	4.53	4.12	3.26
General Surgery	9.54	8.57	6.61	5.96	5.39
Infectious Diseases	7.25	6.58	6.23	6.08	4.39
Mental Health	18.21	15.43	7.59	7.03	5.58
Neonatology	10.00	9.17	3.69	2.99	2.46
Nephrology **	4.44	2.79	0.76	0.45	0.33
Obstetrics & Gynaecology	3.85	3.48	2.82	2.62	1.93
Ophthalmology	3.71	2.94	2.11	1.88	1.62
Orthopaedics *	-	10.84	7.81	7.71	7.55
Paediatric Medicine	10.54	7.75	5.63	5.46	4.81
Paediatric Surgery	6.34	5.73	3.76	3.33	2.58
Plastic & Reconstructive Surgery	6.02	4.99	4.66	4.59	4.26
Rehabilitation Centre	43.36	40.26	26.08	25.08	23.07
Respiratory Medicine *	-	5.36	4.45	4.16	3.98
Trauma	9.13	7.75	6.85	6.27	5.58
Urology	8.42	7.37	6.11	5.83	5.48
Vascular Surgery	7.39	7.77	5.86	5.74	4.85
Total Tertiary I services	7.63	6.85	5.49	5.30	4.58

* Orthopaedics and Respiratory Medicine arithmetic means skewed by outliers

** Nephrology values reflect fact that day case activity is preponderant in this speciality

APPENDIX F – FINAL DOCUMENT

National Referral Hospital Services: Average Length of Stay

	Mean	Median	25 percentile	20 percentile	10 percentile
Cardiology	6.90	4.73	3.87	3.56	3.07
Cardiothoracic Surgery	7.72	7.84	6.63	6.52	5.85
Clinical Immunology	7.29	6.76	5.66	5.44	5.00
Craniofacial Surgery	6.62	7.07	4.40	4.10	3.28
Endocrinology	7.29	6.98	4.59	3.96	3.63
Geriatrics	0.00	0.00	0.00	0.00	0.00
Haematology	10.46	4.74	3.85	3.43	2.55
Human Genetics	4.77	4.40	3.01	2.81	2.71
Medical & Radiation Oncology	8.70	7.93	6.29	6.25	2.92
Neurology	8.67	7.78	6.58	6.10	4.11
Neurosurgery	11.39	8.34	7.18	7.11	6.77
Nuclear Medicine	4.67	4.02	3.22	3.05	2.73
Renal Transplant *	11.48	12.67	7.15	5.86	4.93
Rheumatology	6.97	5.07	4.41	4.09	3.42
Total T2 services	7.04	6.15	5.09	4.76	4.66

* Renal transplant ALOS refers to all admissions of prospective and past recipients, not simply to immediate post-transplant stay

Central Referral Services: Average Length of Stay

	Mean	Median	75 percentile	80 percentile	90 percentile
Group 3 - Liver & Pancreas					
Hepatology	0.15	0.15		0.15	
Liver Transplant	0.06	0.06		0.06	
Surgery	0.27	0.03	0.29	0.44	0.72

APPENDIX G – FINAL DOCUMENT

Appendix G

REGIONAL / LEVEL II HOSPITAL SERVICES

	FTEs	Minimum Unit Size	Expansion Threshold (PDEs)	PDEs per Specialist
Medicine		1	55000	55000
General Surgery		1	35000	35000
Orthopaedics		1	35000	35000
Psychiatry		1	6000	6000
Obstetrics		0.5	21000	42000
Gynaecology		0.5	21000	42000
Paediatrics		1	31000	31000
Anaesthetics		1	160000	160000
Diagnostic Radiology		1	160000	160000

TERTIARY 1 ("TERTIARY HOSPITAL SERVICES")

	FTEs	Minimum Unit Size	Expansion Threshold (PDEs)	PDEs per Specialist
Anaesthetics		5	50000	10000
Burns		1	3500	3501
Clinical Pharmacology		1	n/a	n/a
Critical Care & ICU		2	2000	1000
Dermatology		2	2000	1000
Diagnostic Radiology		2	700	350
Ear Nose & Throat		3	2400	800
Gastroenterology		3	10000	3333
General Medicine		3	7500	2500
General Surgery		3	10000	3333
Infectious Diseases & HIV/AIDS		3	7500	2500
Mental Health		3	6000	2000
Neonatology		2	5000	2500
Nephrology		2	750	375
Obstetrics & Gynaecology		5	5000	1000
Ophthalmology		2	3500	1750
Orthopaedics		3	4000	1333
Paediatric Medicine		3	4000	1333
Paediatric Surgery		3	4000	1333
Paediatric ICU		2		
Plastic & Reconstructive Surgery		2	3500	1750
Rehabilitation Centre incl Spinal		1	4000	4000
Respiratory Medicine		1	7500	7500
Trauma		5	8000	1600
Urology		3	5000	1667
Vascular Surgery		2	3500	1750
Other Services		3		

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TERTIARY 2 (NATIONAL REFERRAL HOSPITAL SERVICES)

	FTEs Minimum Unit Size	Expansion Threshold (PDEs)	PDEs per Specialist
Anaesthetics	4	5000	1250
Cardiology	3	2000	667
Cardiothoracic Surgery	3	3500	1167
Clinical Immunology	1	7500	7500
Craniofacial Surgery	3	3500	1167
Critical Care & ICU	1	2000	2000
Diagnostic Radiology	2	700	350
Ear Nose & Throat	1	2400	2400
Endocrinology	2	7500	3750
Geriatrics	3	7500	2500
Haematology	3	7500	2500
Human Genetics	4	7500	1875
Infectious Diseases	1	7500	7500
Medical & Radiation Oncology	10	1500	150
Neurology	4	2000	500
Neurosurgery	5	2000	400
Nuclear Medicine	3	1500	500
Obstetrics & Gynaecology	3	5000	1667
Ophthalmology	2	3500	1750
Other Services	3		
Plastic & Reconstructive	1	3500	3500
Renal Transplant	3	3500	1167
Rheumatology	3	7500	2500
Urology	1	5000	5000
Vascular Surgery	1	3500	3500
T2 Paediatric Sub-Specialties	15	4000	267
Rehabilitation (incl. Spinal Injury)	1	4000	4000

APPENDIX G – FINAL DOCUMENT

TERTIARY 3 (CENTRAL REFERRAL UNITS)

	FTEs Minimum Unit Size	Expansion Threshold (PDEs)	PDEs per Specialist
Group 1 - Chest			
Cardiology	1	n/a	n/a
Cardiothoracic	1	n/a	n/a
Respiratory Medicine	1	n/a	n/a
Group 2 - Radiology			
Radiology	1	n/a	n/a
Nuclear Medicine	1	n/a	n/a
Medical & Radiation Oncology	1	n/a	n/a
Haematology	1	n/a	n/a
Group 3 - Liver & Pancreas			
Hepatology	2	n/a	n/a
Liver Transplant	2	n/a	n/a
Surgery	1	n/a	n/a
Nephrology	1	n/a	n/a
National Referral Centres:			
Clinical Immunology	1	n/a	n/a
Clinical Pharmacology	3	n/a	n/a
Dermatology	2	n/a	n/a
Endocrinology	2	n/a	n/a
ENT	2	n/a	n/a
Human Genetics	2	n/a	n/a
Ophthalmology	2	n/a	n/a
Infectious Diseases	2	n/a	n/a
Maxillofacial Surgery	3	n/a	n/a
Paediatrics	10	n/a	n/a

Appendix H

Specialist Requirement for Tertiary and Regional Hospitals 2014

	Specialists
Anaesthetics	242
Burns	26
Cardiology	37
Cardiothoracic Surgery	21
Clinical Immunology	8
Clinical Pharmacology	6
Craniofacial Surgery	18
Critical Care & ICU	40
Dermatology	39
Diagnostic Radiology	248
Ear Nose & Throat	52
Endocrinology	16
Gastroenterology	39
General Medicine	218
Other Services	0
General Surgery	219
Geriatrics	18
Haematology	20
Hepatology	4
Human Genetics	28
Infectious Diseases & HIV/AIDS	43
Liver Transplant	4
Maxillofacial Surgery	6
Medical & Radiation Oncology	89
Mental Health	167
Neonatology	27
Nephrology	49
Neurology	24
Neurosurgery	39
Nuclear Medicine	25
Obstetrics & Gynaecology	246
Ophthalmology	76
Orthopaedics	227
Paediatric Medicine & Surgery	465
Paediatric ICU	0
Plastic & Reconstructive Surgery	34
Rehabilitation (incl. Spinal Injury)	23
Renal Transplant	18
Respiratory Medicine	18
Rheumatology	18
Trauma	65
Urology	54
Vascular Surgery	32
Total Requirement	3,052

Appendix I

Total Separations (Inpatient plus Day Cases) Regional Hospitals

Current rates per 1000 Populations

	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Offset Downgraded T1	Rate in Use
Medicine	7.58	8.89	11.86	19.18	21.51	23.48	11.86	0.47	12.33
Tuberculosis	0.32	0.36	0.43	1.16	1.31	1.40	0.43		0.43
Surgery	6.69	8.27	11.05	15.22	17.35	19.45	11.05	0.43	11.48
Orthopaedics	0.23	0.03	0.25	0.26	0.41	0.51	0.25	0.03	0.27
Psychiatry	0.09	0.08	0.18	0.26	1.30	1.92	0.18		0.18
Maternity	7.66	8.27	10.36	13.42	16.58	16.97	10.36	0.28	10.63
Gynaecology	0.44	0.13	0.67	0.88	1.47	1.82	0.67		0.67
Paediatrics	3.90	5.20	5.19	7.66	9.24	10.34	5.19	0.11	5.30
Total	29.19	30.93	40.61	50.23	60.61	68.28	40.61		40.61

Appendix I

**Total Separations (Inpatient plus Day Cases)
Current rates per 1000 Populations**

Tertiary Hospitals	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Downgraded T1 Activity	Rate in Use
Burns	0.03	0.10	0.14	0.24	0.25	0.26	0.14	0.00	0.14
Clinical Pharmacology		0.00					0.00	0.00	0.00
Critical Care & ICU	0.24	0.78	0.47	0.69	0.80	0.89	0.47	0.00	0.47
Dermatology	0.02	0.25	0.04	0.07	0.12	0.16	0.04	0.00	0.04
Diagnostic Radiology		0.00					0.00	0.00	0.00
Ear Nose & Throat	0.13	0.37	0.41	0.65	0.69	0.69	0.41	0.00	0.41
Gastroenterology	0.04	0.03	0.06	0.12	0.15	0.18	0.06	0.00	0.06
General Medicine	2.64	4.38	3.76	4.08	5.39	5.88	3.76	0.47	3.29
General Surgery	1.60	4.08	2.32	3.48	5.06	5.24	2.32	0.43	1.89
Infectious Diseases	0.09	0.14	0.23	0.38	0.41	0.43	0.23	0.00	0.23
Mental Health	0.18	0.27	0.19	0.31	0.35	0.44	0.19	0.00	0.19
Neonatology	0.18	0.49	0.24	0.61	0.75	0.85	0.24	0.00	0.24
Nephrology	0.16	0.83	0.34	0.54	0.89	1.24	0.34	0.00	0.34
Obstetrics & Gynaecology	3.24	6.56	6.03	6.84	8.93	8.95	6.03	0.28	5.75
Ophthalmology	0.31	1.24	0.74	1.57	2.01	2.05	0.74	0.00	0.74
Orthopaedics	0.67	1.23	0.97	1.30	1.73	1.88	0.97	0.03	0.94
Paediatric Medicine	0.93	2.22	1.07	1.93	2.51	2.79	1.07	0.11	0.96
Paediatric Surgery	0.32	0.77	0.77	0.96	1.12	1.13	0.77	0.00	0.77
Paediatric ICU		0.00					0.00	0.00	0.00
Plastic & Reconstructive Surgery	0.16	0.25	0.29	0.40	0.46	0.57	0.29	0.00	0.29
Rehabilitation Centre	0.05	0.04	0.06	0.07	0.08	0.09	0.06	0.00	0.06
Respiratory Medicine	0.19	0.31	0.27	0.44	0.63	0.74	0.27	0.00	0.27
Trauma	0.53	0.87	0.59	0.89	1.02	1.30	0.59	0.00	0.59
Urology	0.34	0.56	0.35	0.49	0.58	0.68	0.35	0.00	0.35
Vascular Surgery	0.07	0.19	0.16	0.26	0.31	0.33	0.16	0.00	0.16
Total Tertiary 1 services	12.34	25.97	18.96	27.38	33.06	34.60	18.96	0.00	18.96

Appendix I

APPENDIX I – FINAL DOCUMENT

**Total Separations (Inpatient plus Day Cases)
Current rates per 1000 Populations**

National Referral Services	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Downgraded T1 Activity	Rate in Use
							0.00		
Cardiology	0.33	0.66	0.40	0.42	0.43	0.45	0.40		0.40
Cardiothoracic Surgery	0.12	0.26	0.14	0.15	0.16	0.25	0.14		0.14
Clinical Immunology	0.01	0.05	0.01	0.02	0.02	0.03	0.01		0.01
Craniofacial Surgery	0.03	0.06	0.03	0.06	0.07	0.08	0.03		0.03
Critical Care & ICU		0.00					0.05		0.05
Diagnostic Radiology		0.00					0.00		0.00
Ear Nose & Throat		0.00					0.00		0.00
Endocrinology	0.06	0.14	0.07	0.07	0.07	0.08	0.07		0.07
Geriatrics		0.00					0.10	Assumption	0.10
Haematology	0.13	0.19	0.17	0.45	0.61	0.69	0.17		0.17
Human Genetics	0.01	0.05	0.01	0.01	0.01	0.01	0.01	80%ile	0.01
Infectious Diseases		0.00					0.00		0.00
Medical & Radiation Oncology	0.28	0.59	0.36	0.62	0.77	0.84	0.36		0.36
Neurology		0.23	0.00	0.00	0.00	0.00	0.23		0.23
Neurosurgery	0.14	0.33	0.14	0.18	0.20	0.28	0.14		0.14
Nuclear Medicine	0.05	0.10	0.06	0.17	0.24	0.27	0.06		0.06
Obstetrics & Gynaecology		0.00					0.00		0.00
Ophthalmology		0.00					0.00		0.00
Orthopaedics		0.00					0.00		0.00
Plastic & Reconstructive		0.00					0.00		0.00
Renal Transplant	0.00	0.02	0.00	0.03	0.05	0.06	0.02		0.02
Rheumatology	0.06	0.05	0.08	0.10	0.11	0.11	0.08		0.08
Urology		0.00					0.00		0.00
Vascular Surgery		0.00					0.00		0.00
T2 Paediatrics		0.00					0.20	Assumption	0.20
Total T2 services	1.23	2.72	1.44	1.65	1.77	2.50	1.44		1.44

Total Outpatient Visits**Current Rates per 1000 Populations**

Regional Hospitals	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Offset Downgraded T1	Rate in Use
Medicine		0.00							
Tuberculosis		0.00							
Surgery		0.00							
Orthopaedics		0.00							
Psychiatry		0.00							
Maternity		0.00							
Gynaecology		0.00							
Paediatrics		0.00							
Total	71.70	87.56	99.41	134.88	169.53	231.23	99.41	13.79	113.19
Casualty	26.37	34.66	49.69	75.91	94.97	113.70	49.69		49.69

APPENDIX I – FINAL DOCUMENT

Total Outpatient Visits

Current Rates per 1000 Populations

Tertiary hospitals	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Offset Downgraded T1	Rate in Use
Burns	0.11	0.13	0.18	0.23	0.29	0.35	0.18	0.00	0.18
Clinical Pharmacology		0.00					0.00	0.00	0.00
Critical Care & ICU	0.41	0.29	0.45	0.66	0.77	1.19	0.45	0.00	0.45
Dermatology	1.09	4.03	2.19	3.54	4.72	5.89	2.19	0.00	2.19
Diagnostic Radiology	1.34	3.35	2.26	2.46	3.20	5.27	2.26	0.00	2.26
Ear Nose & Throat	1.86	1.87	2.76	2.84	4.85	5.53	2.76	0.00	2.76
Gastroenterology	0.62	0.13	0.92	0.96	0.99	1.00	0.92	0.00	0.92
General Medicine		0.00					0.00	0.00	0.00
General Surgery		0.00					0.00	0.00	0.00
Infectious Diseases	0.40	0.55	1.02	1.72	2.12	2.80	1.02	0.00	1.02
Mental Health		0.00					0.00	0.00	0.00
Neonatology	0.06	0.11	0.11	0.25	0.38	0.45	0.11	0.00	0.11
Nephrology	0.99	2.49	1.49	4.12	6.21	6.70	1.49	0.00	1.49
Obstetrics & Gynaecology	1.76	6.65	2.97	13.14	14.29	14.76	2.97	0.06	2.90
Ophthalmology	2.71	6.22	5.31	11.02	13.05	13.74	5.31	0.00	5.31
Orthopaedics	3.16	6.08	5.56	9.92	12.58	12.72	5.56	0.00	5.55
Paediatric Medicine		0.00					0.00	0.00	0.00
Paediatric Surgery	0.33	0.72	0.47	0.80	1.13	1.25	0.47	0.00	0.47
Paediatric ICU		0.00					0.00	0.00	0.00
Plastic & Reconstructive Surgery	0.71	0.87	1.47	2.17	2.28	2.32	1.47	0.00	1.47
Rehabilitation Centre	0.29	0.10	0.34	0.46	0.52	0.56	0.34	0.00	0.34
Respiratory Medicine	1.14	1.58	1.20	3.24	3.62	3.82	1.20	0.00	1.20
Trauma	17.82	29.69	25.32	30.58	34.55	35.92	25.32	0.00	25.32
Urology		0.00					0.00	0.00	0.00
Vascular Surgery	0.15	0.36	0.45	0.79	1.27	1.34	0.45	0.00	0.45
Total Tertiary Services	30.49	65.24	42.33	76.13	94.53	120.52	42.33	0.06	42.27
Remaining OPD Visits	33.22	111.77	58.80	123.97	152.90	163.46	58.80	13.73	45.08
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.79	-13.79

APPENDIX I – FINAL DOCUMENT

Total Outpatient Visits
Current Rates per 1000 Populations

National Referral Services	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Offset Downgraded T1	Rate in Use
							0.00		
Cardiology	1.32	3.46	1.33	1.33	1.34	1.76	1.33		1.33
Cardiothoracic Surgery	0.12	0.45	0.15	0.36	0.48	0.52	0.15		0.15
Clinical Immunology	0.11	1.64	0.15	0.32	0.41	0.46	0.15		0.15
Craniofacial Surgery	0.94	0.45	0.99	1.04	1.07	1.09	0.99		0.99
Critical Care & ICU		0.00					0.00		0.00
Diagnostic Radiology		0.00					0.20	Assumption	0.20
Ear Nose & Throat		0.00					0.20	Assumption	0.20
Endocrinology	0.53	1.40	0.55	1.14	1.47	2.07	0.55		0.55
Geriatrics		0.00					0.20	Assumption	0.20
Haematology	0.17	0.65	0.34	0.70	0.89	1.24	0.34		0.34
Human Genetics	0.08	0.11	0.09	0.22	0.29	0.33	0.09	80%ile	0.09
Infectious Diseases		0.00					0.15		0.15
Medical & Radiation Oncology	3.09	5.84	4.93	7.82	9.45	10.10	4.93		4.93
Neurology	0.44	2.60	0.50	0.50	0.50	0.64	0.50		0.50
Neurosurgery	0.70	0.84	1.11	1.53	1.76	3.24	1.11		1.11
Nuclear Medicine		1.82					1.82		1.82
Obstetrics & Gynaecology		0.00					0.50		0.50
Ophthalmology		0.00					0.60		0.60
Orthopaedics		0.00					0.90		0.90
Plastic & Reconstructive	0.52	0.00	0.74	0.92	1.03	1.08	0.74		0.74
Renal Transplant	0.44	0.32	0.54	0.63	0.98	1.18	0.54		0.54
Rheumatology		0.67					0.20		0.20
Urology		0.00					0.20		0.20
Vascular Surgery		0.00					0.04		0.04
T2 Paediatrics	10.32	0.00	14.40	14.46	14.49	20.16	14.40		14.40
Total T2 services		0.00					30.84		30.84

APPENDIX I – FINAL DOCUMENT

Central Referral Units	33 percentile	Mean	Median	66 percentile	75 percentile	80 percentile	Median	Offset Downgraded T1	Rate in Use
Group 1 - Chest									
Cardiology		0.00					0.20		0.20
Cardiothoracic		0.00					0.20		0.20
Respiratory Medicine		0.00					0.20		0.20
Group 2 - Radiology									
Radiology		0.00					0.20		0.20
Nuclear Medicine		0.00					0.20		0.20
Medical & Radiation Oncology		0.00					0.20		0.20
Haematology		0.00					0.20		0.20
Group 3 - Liver & Pancreas									
Hepatology		0.02					0.00		0.00
Liver Transplant	0.07	0.15	0.07	0.07	0.07	0.07	0.07		0.07
Surgery	0.02	0.00	0.02	0.02	0.02	0.02	0.20		0.20
Nephrology		0.00					0.00		0.00
National Referral Centres :									
Clinical Immunology		0.00					0.20		0.20
Clinical Pharmacology		0.00					0.20		0.20
Dermatology		0.00					0.20		0.20
Endocrinology		0.00					0.20		0.20
ENT		0.00					0.20		0.20
Human Genetics		0.00					0.20		0.20
Ophthalmology		0.00					0.20		0.20
Infectious Diseases		0.00					0.20		0.20
Maxillofacial Surgery		0.00					0.20		0.20
Paediatrics		0.17					0.20		0.20
Total T3 services	0.09	0.00	0.09	0.09	0.09	0.09	3.67		3.67

Appendix J

Beds Baseline

Province	Regional	Tertiary	Total
Eastern Cape	1,431	2,637	4,068
Free State	767	1,613	2,380
Gauteng	5,020	6,128	11,148
KwaZulu Natal	6,361	3,038	9,399
Limpopo	913	500	1,413
Mpumalanga	1,331	308	1,639
Northern Cape	0	0	0
North West	381	1,447	1,828
Western Cape	1,509	1,179	2,688
South Africa	17,713	16,850	34,563

Medical Specialists

Province	Total
Eastern Cape	58
Free State	148
Gauteng	641
KwaZulu Natal	227
Limpopo	26
Mpumalanga	8
Northern Cape	13
North West	14
Western Cape	448
South Africa	1,583

Source: Persal
 All medical specialists (excl. dental)
 Includes those working outside regional and tertiary hospitals

APPENDIX J - FINAL DOCUMENT

Total Patient Separations (Inpatients plus Day Cases)

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	74,053	125,536	35,023	8,160	168,719	242,772
Free State	40,691	78,458	2,860	0	81,318	122,009
Gauteng	368,986	46,478	247,261	18,106	311,845	680,831
KwaZulu Natal	363,764	87,183	27,258	1,810	116,251	480,015
Limpopo	75,474	28,194	8,259	0	36,453	111,927
Mpumalanga	61,907	31,815	0	0	31,815	93,722
Northern Cape	0	29,833	17,951	1,830	49,614	49,614
North West	14,980	79,275	8,884	0	88,159	103,139
Western Cape	133,811	135,346	81,369	18,796	235,511	369,322
South Africa	1,133,666	642,118	428,865	48,702	1,119,685	2,253,351

Outpatient Visits

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	221,129	360,759	208,982	50,429	620,170	841,299
Free State	186,354	295,905	409	3,748	300,062	486,416
Gauteng	1,674,322	1,004,309	822,267	119,228	1,945,804	3,620,126
KwaZulu Natal	1,778,799	708,252	122,420	4,742	835,414	2,614,213
Limpopo	335,534	116,671	18,156	0	134,827	470,361
Mpumalanga	235,003	160,113	0	0	160,113	395,116
Northern Cape	0	22,396	39,737	1,325	63,458	63,458
North West	72,400	52,532	331,677	0	384,209	456,609
Western Cape	376,836	203,824	1,052,803	8,283	1,264,910	1,641,746
South Africa	4,880,377	2,924,761	2,596,451	187,755	5,708,967	10,589,344

APPENDIX J - FINAL DOCUMENT

Total Service Recurrent Costs (2004/05 prices)

Province	Regional	Tertiary	Total
Eastern Cape	651,877,243	586,880,618	1,238,757,861
Free State	657,269,654	511,513,214	1,168,782,868
Gauteng	1,667,360,455	3,533,662,739	5,201,023,194
KwaZulu Natal	1,850,723,323	1,242,283,748	3,093,007,070
Limpopo	323,063,682	275,761,547	598,825,229
Mpumalanga	609,393,366	0	609,393,366
Northern Cape	0	269,175,366	269,175,366
North West	260,658,731	219,503,399	480,162,130
Western Cape	632,075,483	1,596,138,993	2,228,214,476
South Africa	6,652,421,936	8,234,919,624	14,887,341,560

Scenario 20 09

Beds

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	1,711	1,231	0	0	1,231	2,942
Free State	1,128	165	231	0	397	1,524
Gauteng	5,416	2,421	405	116	2,942	8,358
KwaZulu Natal	5,130	1,047	414	0	1,460	6,590
Limpopo	1,557	587	190	0	777	2,334
Mpumalanga	826	286	0	0	286	1,112
Northern Cape	161	286	0	0	286	448
North West	974	543	0	0	543	1,517
Western Cape	2,421	870	324	56	1,251	3,671
South Africa	19,324	7,436	1,565	172	9,173	28,497

Specialists

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	42	88	0	0	88	130
Free State	60	49	96	0	146	206
Gauteng	175	335	172	37	544	719
KwaZulu Natal	149	169	116	0	285	434
Limpopo	43	48	84	0	132	175
Mpumalanga	25	30	0	0	30	55
Northern Cape	16	33	0	0	33	49
North West	32	42	0	0	42	75
Western Cape	96	148	100	37	285	381
South Africa	638	943	568	74	1,585	2,223

APPENDIX J - FINAL DOCUMENT

Total Patient Separations (Inpatients plus Day Cases)

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	138,750	97,286	0	0	97,286	236,036
Free State	90,753	12,153	14,787	0	26,940	117,693
Gauteng	466,382	186,012	26,522	8,811	221,345	687,727
KwaZulu Natal	413,661	81,696	27,341	0	109,037	522,698
Limpopo	127,232	46,080	12,572	0	58,652	185,884
Mpumalanga	67,180	23,127	0	0	23,127	90,306
Northern Cape	13,203	22,578	0	0	22,578	35,782
North West	79,999	54,041	0	0	54,041	134,040
Western Cape	195,077	57,698	20,126	5,138	82,962	278,039
South Africa	1,592,237	580,672	101,347	13,950	695,969	2,288,206

Outpatient Visits

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	348,912	558,578	0	0	558,578	907,491
Free State	226,990	274,092	195,050	0	469,142	696,132
Gauteng	812,781	1,379,028	378,733	102,538	1,860,299	2,673,080
KwaZulu Natal	800,618	481,806	384,133	0	865,939	1,666,557
Limpopo	394,577	274,031	176,634	0	450,665	845,242
Mpumalanga	207,877	147,146	0	0	147,146	355,023
Northern Cape	41,837	143,792	0	0	143,792	185,629
North West	246,866	149,374	0	0	149,374	396,240
Western Cape	559,038	619,297	298,317	47,241	964,855	1,523,894
South Africa	3,639,497	4,027,144	1,432,869	149,779	5,609,792	9,249,289

Scenario 2014

Beds

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	1,788	1,404	0	0	1,404	3,193
Free State	1,167	171	148	0	319	1,486
Gauteng	5,262	2,009	273	113	2,396	7,658
KwaZulu Natal	5,271	1,369	279	0	1,648	6,919
Limpopo	1,707	804	128	0	932	2,639
Mpumalanga	894	431	0	0	431	1,325
Northern Cape	180	423	0	0	423	603
North West	1,077	529	0	0	529	1,606
Western Cape	2,376	824	239	58	1,122	3,498
South Africa	19,722	7,964	1,067	171	9,203	28,925

Specialists

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	77	193	0	0	193	270
Free State	94	49	87	0	137	231
Gauteng	283	342	164	42	548	831
KwaZulu Natal	261	250	102	0	352	613
Limpopo	88	128	80	0	207	296
Mpumalanga	50	65	0	0	65	115
Northern Cape	16	87	0	0	87	103
North West	57	95	0	0	95	152
Western Cape	146	157	96	42	295	441
South Africa	1,072	1,367	529	84	1,980	3,052

Total Patient Separations (Inpatients plus Day Cases)

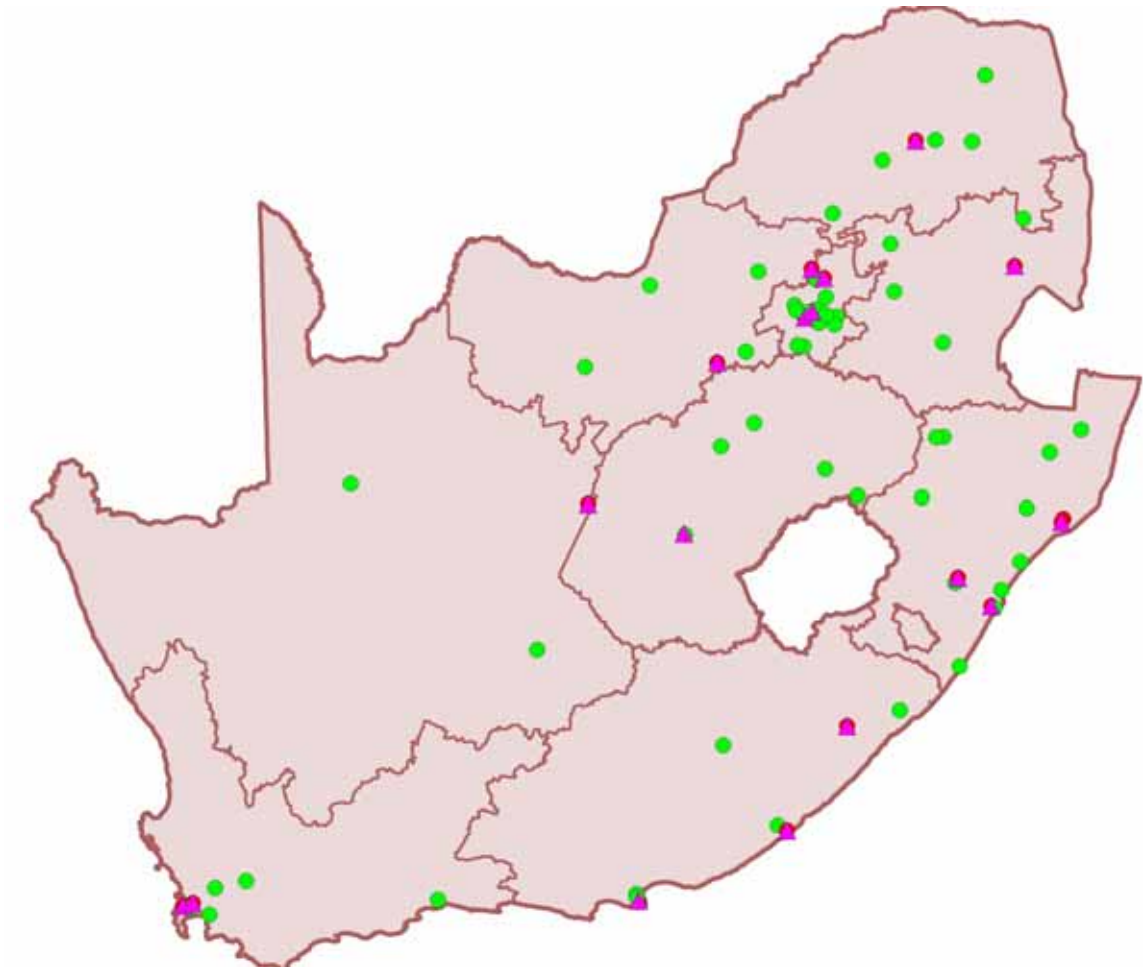
Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	172,157	143,189	0	0	143,189	315,347
Free State	112,619	16,566	14,932	0	31,499	144,118
Gauteng	533,862	200,145	26,558	8,616	235,320	769,182
KwaZulu Natal	509,680	139,899	27,392	0	167,291	676,971
Limpopo	165,706	82,326	12,595	0	94,921	260,628
Mpumalanga	86,659	44,607	0	0	44,607	131,265
Northern Cape	17,436	32,609	0	0	32,609	50,045
North West	104,622	62,285	0	0	62,285	166,907
Western Cape	226,372	69,737	20,655	5,086	95,478	321,850
South Africa	1,929,114	791,364	102,132	13,702	907,199	2,836,313

Outpatient Visits

Province	Regional	Tertiary 1	Tertiary 2	Tertiary 3	Total Tertiary	Combined Total
Eastern Cape	364,286	793,313	0	0	793,313	1,157,599
Free State	240,529	294,538	203,645	0	498,183	738,712
Gauteng	866,252	1,381,063	395,421	107,056	1,883,540	2,749,792
KwaZulu Natal	895,782	865,049	401,059	0	1,266,108	2,161,890
Limpopo	411,963	495,447	184,417	0	679,864	1,091,827
Mpumalanga	217,037	266,767	0	0	266,767	483,804
Northern Cape	43,681	159,801	0	0	159,801	203,482
North West	257,744	255,316	0	0	255,316	513,060
Western Cape	584,214	674,425	343,396	49,323	1,067,144	1,651,358
South Africa	3,881,487	5,185,719	1,527,938	156,379	6,870,036	10,751,524

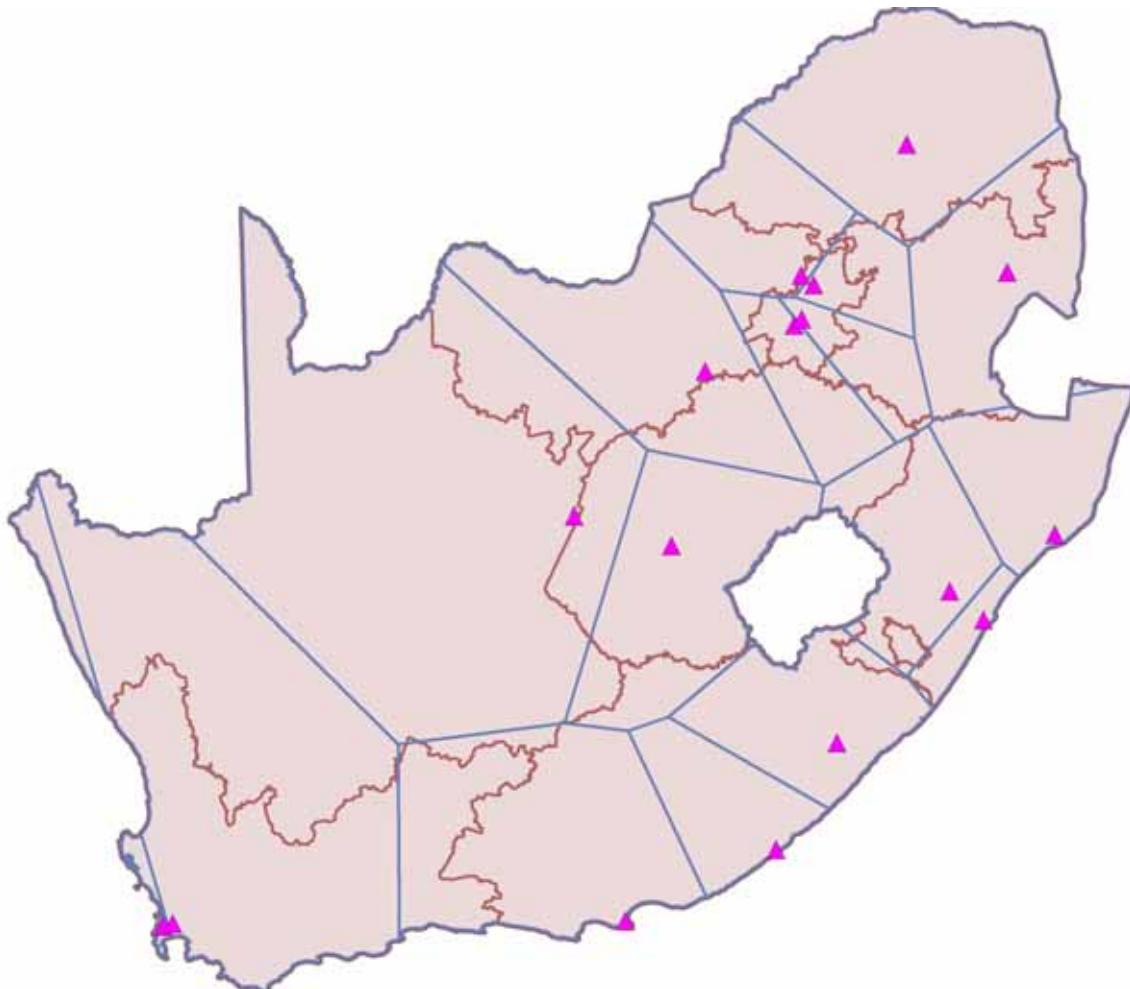
PREFERRED OPTION (2014)

REGIONAL AND TERTIARY HOSPITALS



PREFERRED OPTION (2014)

TERTIARY HOSPITALS



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