

Planning oral health human resources for the province of KwaZulu-Natal

by

PRATIMA KISSOON-SINGH

BDS (Mysore, India), Dip Odont (Pretoria, RSA)

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Study leader: Prof P J Van Wyk

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To my husband Kapil Satyapal,
daughter Vedika and son Pravir,
and my parents...
for their love, support and encouragement.

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DECLARATION

I, Pratima Kissoon-Singh, declare that the dissertation I am herewith submitting for the degree MSc.Odont. (Community Dentistry) at the University of Pretoria, is my own work and has not previously been submitted for any other degree at any other university.

P. Kissoon-Singh

May 2001

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LIST OF ABBREVIATIONS:

KZN	KwaZulu-Natal
WHO	World Health Organization
FDI	Federation Dentaire Internationale
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immuno-Deficiency Syndrome
DHS	District Health System
PHC	Primary Health Care
NOHS	National Oral Health Survey
PmBurg	Pietermaritzburg
PShepstone	Port Shepstone
mins.	minutes

SUMMARY

Planning oral health human resources for the province of KwaZulu-Natal

by: Pratima Kissoon-Singh
Department of Community Dentistry
Faculty of Dentistry
University of Pretoria
Republic of South Africa

Supervisor: Professor P J van Wyk
BSc, BChD, MChD, Dip Pub Admin, PhD (Pret)
Chief Specialist and Associate Professor
Head: Department of Community Dentistry
School of Dentistry
University of Pretoria

Degree: *MSc (Odontology)*

The South African health system has failed in the provision of oral health care to all its citizens. There is a maldistribution of oral health personnel between the public and private sectors, and a shortage and inequitable distribution within the public service. Dental facilities and infrastructure are rudimentary in many areas. To address this problem, the national health ministry has proposed a basic oral health care package for all its state-dependent citizens.

The aim of this study is to plan human resources for oral health care for KwaZulu-Natal using the basic primary oral health care package. This would

ensure an equitable distribution and optimal utilization of personnel in meeting the oral health needs of this province.

KwaZulu-Natal is one of the poorest provinces in South Africa, with the largest population. It is plagued by many notifiable diseases, and has the highest prevalence of HIV/Aids. It has escalating levels of crime and violence, and the largest number of disabled individuals. The oral health status appears to be stable, with some of the WHO goals being achieved. However, due to historical circumstances, there is a large backlog in dental care.

The computerized oral health personnel planning model of the WHO was used to calculate optimal numbers of human resources required for the provision of this package. These results show that there is a gross shortage of personnel.

A human resource plan was formulated for the short and long terms, for 2000 and 2010 respectively. Emergency care for the relief of pain and sepsis would be provided to the entire state-dependent population to ensure, at least, a minimal level of care.

The short term plan would address immediate problems by redistributing existing personnel equitably among regions. Fillings would be provided to the 0-14 year cohort only. Oral hygienists would provide preventive care, collaborating intersectorally with other government departments. All oral health personnel had to become proficient in the diagnosis of oral manifestations of HIV/Aids and infection control measures. The implementation of water fluoridation should become a priority.

The long term plan considered the changing epidemiological priorities of this province. Target groups identified were the 0-14 year age group, the disabled, handicapped, and Aids patients and orphans. The 0-14 year cohort would receive preventive care, fillings and scaling of teeth. Fissure sealants would be

provided on a referral basis. The other target groups would receive special group care aimed at alleviating oral health problems. Aids would be peaking by 2008, and therefore scaling would also be provided to the 15-29 year cohort, due to this group being considered as high-risk.

Due to the implementation of water fluoridation, a drop in caries levels is anticipated. This would result in a decreased demand for restorative care. Therefore, to decrease the backlog in dental care, fillings would be provided on demand to all state-dependent patients in the long term plan.

Recommendations were made for the three components involved in human resource development i.e. tertiary institutions, service organizations and health planners. This would include ways of increasing the pool, and decreasing the requirements, for human resources. With the support of the provincial ministry of health, this study can play a significant role in the provision of a more equitable oral health service for the special needs of KwaZulu-Natal.



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CHAPTER 1 - INTRODUCTION

1.1 INTRODUCTION

The vision of the Department of Health of this province is:

“to achieve optimal health status for all persons of KwaZulu-Natal”

(Department of Health: KwaZulu-Natal 2000b: 3).

One of the major failures of the oral health care system in South Africa in general, and in KwaZulu-Natal in particular, has been its inability to provide basic types of care needed by the total population. While certain segments of the population are relatively well served, the majority receives little or no oral health care. Major contributing factors to the above state of affairs, are the inadequate numbers and inequitable distribution of oral health personnel in the province. In order to address the issue, the National Department of Health has proposed a basic primary oral health care package.

This package consists of promotive and preventive services, as well as curative procedures and makes provision for the rendering of these services to all state-dependent residents of South Africa. However, due to a shortage of human and financial resources within the public sector, the authorities should initially, at the very minimum, provide an emergency oral health service to all state-dependent people. In addition, existing personnel should focus on target groups, with emphasis on prevention and promotion. As resources become available, the type and quantity of curative care can be increased.

This study plans to determine how human resources within the public sector can provide the basic package of oral health services to the state-dependent population of KwaZulu-Natal.

1.2 PROBLEM STATEMENT

For almost three centuries, the health services of South Africa have been dominated by the principles of segregation and inequality (Van Rensburg and Harrison 1995:53). Different racial groups had unequal provision for, and access to health care, with an accompanying disproportionate distribution of health personnel. This gave rise to significant race-related patterns of disease. An example of this is seen in the DMFT of the population of South Africa (Department of Health 1994). The African population has a significant *decayed* component, which shows the lack of oral health service provision in this group. In the White population, the *filled* component predominates, showing the availability of oral health services to this group.

To overcome these problems, the South African government has proposed a minimum package of health care for the state-dependent population. A basic package for oral health care was also formulated (Department of Health 1997).

The Department of Health: KwaZulu-Natal formulated its mission statement which aims: *"to develop a sustainable, coordinated, integrated and comprehensive health system at all levels, based on the primary health care approach through the district health system"* (Department of Health: KwaZulu-Natal 2000b:3).

However, KwaZulu-Natal is a province beset by poverty, disease disability and trauma. Human and financial resources are limited in the public sector. There is a gross mal-distribution of oral health personnel between the public and private service. There is also an inequitable distribution of human resources within the public sector of this province.

Oral health was given a low priority in the health care plans of this country. Resources were devoted to other aspects of health that seemed more important to policy-makers. This was because oral diseases are not perceived to be life-threatening. But the most common dental diseases can be prevented by simple and low cost means. In addition, there is a large backlog in oral health care that needs to be addressed.

1.3 AIMS, GOALS AND PREMISE

1.3.1 AIM

The aim of this study is to plan human resources for oral health care for KwaZulu-Natal, using the basic primary oral health care package, in order to ensure an equitable distribution and efficient utilization of such personnel in meeting the oral health needs of the province.

1.3.2 GOALS

- The goals of this study are to formulate a comprehensive situation analysis of Kwazulu-Natal, with special reference to oral health care,
- Review national and provincial policy documents with reference to the situation analysis,
- Critically evaluate the various methods of human resource planning, and select appropriate ones for this study,
- Make proposals on how to optimally utilize the different categories of oral health personnel in the public sector to deliver the basic oral health care package to the state-dependent citizens of kwazulu-Natal.

1.3.3 PREMISE

The premise of this study is that if, at the very minimum, parts of the package are made available to all state-dependent people of the province, there should be a decrease in the need for oral health care that currently exists. If human resource capacity increases, or oral health status improves, other components of the package can be implemented. This will help to achieve the highest possible goals for oral health, within existing or attainable levels of personnel, for a large sector of the population. It will also increase the awareness in oral health care, and decrease the backlog in dental treatment within KwaZulu-Natal.

1.4 DELIMITATIONS AND LIMITATIONS

1.4.1 DELIMITATIONS

- The categories of oral health personnel studied are according to recommendations of the policy documents (Department of Health 1999:10) for the public sector only.
- Calculations were only done for those procedures included in the basic oral health care package (Department of Health 1997:144).
- Oral health status was studied for the age cohorts recommended by the computerized oral health personnel planning model (World Health Organization/ Federation Dentaire Internationale 1989:44) used in this study.
- The approaches to human resource planning used in this study are a combination of the needs-based, service targets and demand-based approaches.

1.4.2 LIMITATIONS

- Regions used in this study may change due to re-demarcation of local government boundaries of this province.
- The district health system has not been implemented fully in KZN.
- There is a frequent loss of oral health personnel from the public sector.
- Compulsory community service will provide a *fluctuating* supply of oral health personnel.

1.5 DEFINITIONS

Human Resources - "all the individuals available for, and undergoing training in, the different health occupations; their demographic characteristics; their social characteristics in terms of education, experience and values; and the changes of personnel required, both in numbers and qualifications, to provide the health services needed or demanded by a population" (Mejia & Fulop 1978:16).

Planning – "it is the administrative instrument that provides a rational basis for decision-making" (Mejia & Fulop 1978:16).

National health planning – "is the process of defining community health problems, identifying needs and resources, establishing realistic and feasible priority goals, and setting out the administrative action required to reach these goals" (Mejia & Fulop 1978:16).

1.6 FRAMEWORK OF DISSERTATION

Chapter 2 presents a literature review, which outlines oral health policy documents, and the South African health services, in the context of the primary health care approach and the district health system. The approaches used in human resource planning were examined, and international and South African studies were appraised.

Chapter 3 provides a comprehensive situation analysis of KwaZulu-Natal. It includes socio-demographic patterns, oral health status and needs, human resources and dental facilities available, and the service provision data of this province.

Chapter 4 discusses the materials and methods used in this study. This includes the selection of appropriate planning methods, and the methodology used in the calculation of human resources needed to perform the basic package.

Chapter 5 presents the human resource plan for KwaZulu-Natal, taking into account information obtained in the situation analysis. The plan was drawn up for the short and long terms. Suggestions were made on methods that could be used to implement this plan.

Chapter 6 provides an overall discussion of this study from which conclusions were derived. Recommendations were made for the equitable provision of human resources for oral health care for the state-dependent population of KZN using the basic oral health care package.

1.7 REFERENCE TECHNIQUE

The Harvard method, described in the Manual for Research and Post-Graduate Studies (University of Pretoria, 2000) is used in this dissertation.

1.8 SUMMARY

This chapter provides the background for this study, and gives an introduction to the many problems experienced in oral health care in KZN today. The provincial health department has formulated a mission statement that is committed to the equitable provision of health care to the population of this province. However the universal phenomenon of the "gap" that exists between *needs and desires*, and *available resources*, makes this statement very difficult to fulfil. Therefore this study will propose short and long-term plans to attempt to alleviate the many problems in the provision of oral health care in KwaZulu-Natal.

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CHAPTER 2 - LITERATURE REVIEW

2.1 INTRODUCTION

The health care system of a country is responsible for the provision of health care to all its citizens and human resources are one of the vehicles through which it is achieved. Human resources are a very important component of this system because they consume a very significant portion of health expenditure, and have many special features that have to be taken into consideration during planning (Mejia and Fulop 1978:12).

The human resource system for health is composed of three main parts. They are planning, production and management. Mejia (1978:54) describes the Health Services and Manpower Development (HSMD) model (Fig. 2.1), which recommends the *integrated* development of health services.

Each of these components should work closely together from national, provincial, local and district levels so that the optimal numbers of correctly skilled personnel are produced. This will provide the best possible health care for all sectors of the population.

The government of South Africa has formulated policy documents for oral health based on the primary health care approach within the district health system. This chapter will provide a brief overview of policy documents and health services with respect to the provision of oral health care in South Africa. The methods used in human resource planning will then be critically evaluated to select the most appropriate ones for this study.

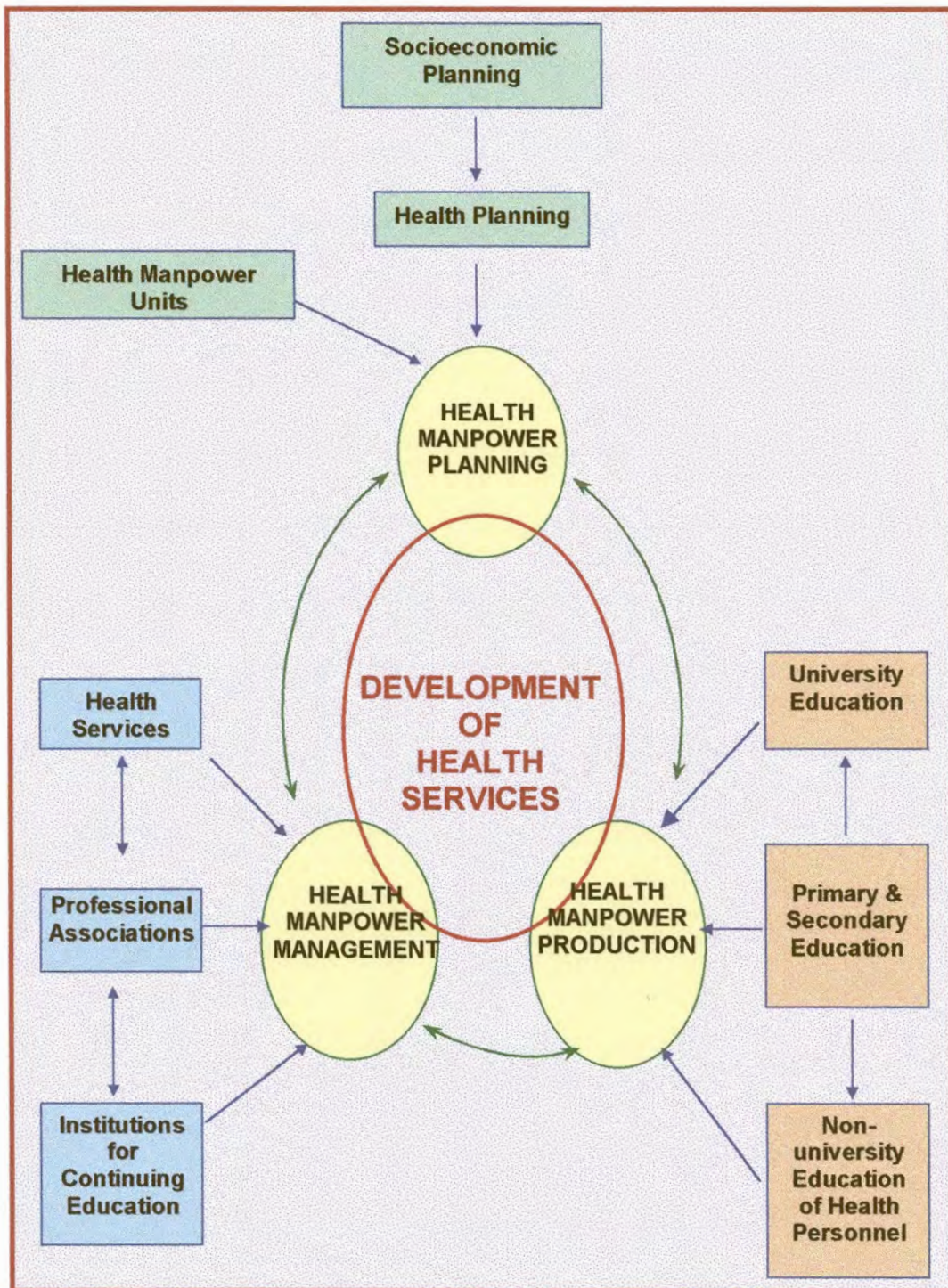


FIG 2.1 – Health Services Manpower Development Model (Mejia 1978:54)

2.2 POLICY DOCUMENTS

2.2.1 WHITE PAPER FOR THE TRANSFORMATION OF THE HEALTH SYSTEM IN SOUTH AFRICA (Department of Health 1997:143)

This document recommends that a basic primary oral health care package should be provided at all primary health care facilities (Department of Health 1997:143). Priority groups identified by this document are mothers, children, pregnant women, the physically and mentally disabled and the elderly. Oral health services should be integrated with other health services at all levels of care. The focus of oral health care should change towards prevention and promotion, with emphasis on water fluoridation.

- **Water Fluoridation:**

Water fluoridation is the *"upward adjustment of fluoride concentration in public water supplies to an optimum amount of between 0,7 and 1,2 parts per million"* (Gilbert and Chikte 1993:321). In 1997, the National Minister of Health announced approval for the implementation of water fluoridation in South Africa. In 2000, this initiative was legislated (Republic of South Africa 2000).

Many scientific studies (Renson, Crielaers, Ibikunle, Pinto, Ross, Sardo-Infiri, Takazoe and Tala 1985:238; Murray, Breckon, Reynolds and Nunn 1991:319; and Du Plessis, van Rooyen, Naude and van der Merwe 1995:545) have concluded that water fluoridation is the safest and most cost-effective community-based method of preventing dental caries. Therefore, this initiative should greatly improve the oral health status of the population of South Africa in the long term.

- **Oral Health Promotion and Education:**

There is evidence to show that ongoing programmes of oral health promotion and education can play a significant role in improving the knowledge of people (Department of Health 2001). This document also indicates that mass-media programmes have not been so effective.

- **Curative Oral Health Services:**

The following curative procedures have been recommended in the basic oral health care package (Department of Health 1997:144):

- an annual examination
- bite-wing radiographs
- cleaning of teeth
- simple (1-3 surface) fillings
- fissure sealants
- emergency relief of pain and infection control.

According to the World Bank (1994:4) packages of health services have been used cost-effectively in many countries to deal with the most common health problems. It aims at providing better health at lower cost. The package has to be relevant to the demographic, socio-economic and epidemiological profiles of its recipients; and should be limited and flexible. As population profiles change from low to high levels of health, so too can the package that is being offered.

They also recommend that this basic package should be supplemented by 'supporting services' (World Bank 1994:5). This will improve the value of contacts between health care providers and patients. These services include oral health information, communication and education. In addition, the basic package and supporting services should be augmented by

'intersectoral interventions'. An example of this in oral health care is the implementation of water fluoridation by the Department of Water Affairs and Forestry.

2.2.2 DRAFT NATIONAL ORAL HEALTH POLICY FOR SOUTH AFRICA (Department of Health 1999)

The draft National Oral Health Policy for South Africa document was used during the course of this study, as it was the only other policy document available at this time. Subsequently, at the termination of this study, a new policy document (Department of Health 2001) has been proposed, and will be discussed in the next section.

This document (Department of Health 1999) was drawn up to provide a framework for the provision of oral health care for national, provincial and district levels based on the primary health care approach. Some of the recommendations are:

□ **National goals and objectives for the provision of oral health:**

National goals and objectives for the provision of oral health care in South Africa were formulated for the years 2005 (Table 2.1) and 2010 (Table 2.2).

TABLE 2.1 - National goals for oral health for 2005

Goal	Objective
1	To increase primary health care facilities delivering oral health care services by ensuring that these services are being made available in the following priority: <ul style="list-style-type: none">• District Hospitals,• Community Health Centres• Clinics
2	To ensure that at least 50% of primary schools are exposed to organized school preventive programmes.
3	To ensure that 40% of the population with piped water systems receives optimally fluoridated water.
4	To reduce the average national restoration: extraction ratio of 1:12 to 1:8.
5	To decrease the shortfall in facilities and personnel in rural areas from 70% to 60%.

(Department of Health 1999:7)

TABLE 2.2 – National goals for oral health for 2010

Goal	Objectives
1	Age 5-6: 70% caries-free
2	Age 12: less than 1,5 DMFT (Score of 0 means sound teeth)
3	Age 15: at least 5 healthy sextants, the remainder scoring CPITN 1 or 2 (Score of 0 means health gums)
4	Age 18: to ensure that 60% or more of those in this age group will retain all their teeth (excluding third molars)
5	Age 35 - 44: no more than 5% edentulous; 80% with a minimum of 20 functional teeth. No more than 0,1 sextants scoring CPITN 4
6	Age 65 - 74: no more than 15% edentulous; 60% with a minimum of 20 functional teeth. No more than 0,5 sextants scoring CPITN 4
7	The Age Standardized Incidence Rate (ASIR) of the combined figures for mouth, tongue, lip and gingival cancer be 6,9 per 100 000. The national mean was 6,9 per 100 000 in 1989.

(Department of Health 1999:7)

This was compared to the WHO Global Goals for Oral Health (Table 2.3) for the year 2000 (Federation Dentaire Internationale 1982: 74).

TABLE 2.3 - WHO Goals for oral health for 2000

Goal	Objective
1	50% of 5-6 year-olds will be caries-free.
2	The global average will be no more than 3 DMF teeth at 12 years old.
3	85% of the population should retain all their teeth at 18 years.
4	A 50% reduction in present levels of edentulousness at age 35-44 will be achieved.
5	A 25% reduction in present levels of edentulousness at age 65 years and over will be achieved.
6	A data-based system for monitoring changes in oral health will be established.

(Federation Dentaire Internationale 1982:74)

The WHO subsequently reviewed the DMFT values in 184 of 204 countries in the WHO Oral Health Country/ Area Profile Programme (Bratthall 2000:378). It was found that 68% of these countries had already achieved 3 DMFT or less. However, a significant proportion of individuals in each population had higher DMFT levels.

This gave rise to the formulation of the Significant Caries Index, which aims to draw attention to the one third of each population with the highest dental caries levels. In twelve-year old Black children in South Africa, the mean DMFT score is 1,71, while the Significant Caries Index is 4,30.

Therefore the new WHO global goal for oral health is: *'that the Significant Caries Index should be less than 3 DMFT in 12 year olds, and should be reached by 2015'*. This index is of particular importance when new national surveys are performed.

□ **Guidelines for levels of oral health care delivery:**

Guidelines for the different levels of oral health care delivery are proposed according to the district health system (Table 2.4). Emphasis is placed on prevention and promotion at all levels, while curative care should be based on a referral system (Department of Health 1999:10).

TABLE 2.4 – Guidelines for levels of oral health care delivery

Level	Institution	Services to be provided
Primary	Clinic	-health promotion -school oral health programmes -preventive services e.g. fluoride rinses -basic emergency oral health services -referral to health center
	Community Health Centre	-health promotion - school oral health programmes -preventive services including fissure sealants -basic curative services -referral to district hospital
Primary	District Hospital	-referral center -all procedures that can be carried out by a dentist -referral to regional hospitals
Secondary	Regional Hospital	-all the above -dental laboratory services -specialist services according to the need of the particular province -referral to AOHSC
Tertiary	Academic Oral Health	-all the above
	Services Complex	-all specialist services

(Department of Health 1999:10)

❑ **Guidelines for oral health personnel:**

The draft policy document (Department of Health 1999:10) recommends that dentists, dental therapists, oral hygienists, dental assistants and health promoters are required to provide oral health care within the district health system. A referral system should be established for specialized services. It also provides recommended human resource: population ratios based on the need for services determined by epidemiological surveys. The ratios recommended for oral health services are shown in Table 2.5.

TABLE 2.5 – Recommended ratios for oral health personnel

Human Resource	Ratio
Specialist: Population	1:1 000 000
Dentist: Population	1:60 000
Oral Hygienist: Population	1:50 000
Dental Therapist: Population	1:12 000
Dentist: Dental Therapist	1:5
Dentist: Oral Hygienist	1:1,2
Dental Therapist: Oral Hygienist	5:1
Clinician: Dental Assistant	1:1,5
Dentist: Dental Technician / Technologist	6:1

(Department of Health 1999:11)

❑ **Oral health budget:**

In 1994, the oral health budget for services and training was 1,5% of the total health budget of South Africa (Department of Health 1999:13). The total amount spent in 1994 in South Africa, on curative and restorative procedures to treat oral diseases, was more than one billion rand (Department of Health 1999:3). However only 20% of this amount was contributed by the State, while 80% was by private individuals and third party providers.

Information obtained from the Department of Health: KZN (1999a) reveals that oral health services are no longer run as a vertical programme. It has been devolved to regions, with no separate budget for oral health.

❑ **Priorities regarding users:**

This document (Department of Health 1999:15) also formulated priorities regarding users. They included:

- Pregnant women, children and the disabled
- Patients in government institutions and hospitals
- Adult patients requiring emergency services

2.2.3 REVISED DRAFT – SOUTH AFRICAN ORAL HEALTH POLICY 2001 (Department of Health 2001)

A further revision of the Draft National Oral Health Policy (1999) was prepared, which is currently being circulated to stake-holders for comment. However, an overview of this document is essential for further developments in the planning process. This document provides guidelines at varying levels.

❑ **National programmes in oral health**

Certain programmes are required to be implemented and managed at national level to ensure equity among provinces. Some of these programmes include:

- The oral health policy process
- The national water fluoridation programme
- The national oral health data set
- Dissemination of a best-practice database

- Assessment and advice to the Cluster Manager: Human Resource Management on policy issues such as oral personnel training.

□ Population-based initiatives to promote oral health

This involves the implementation of oral health prevention and promotion initiatives at national, provincial and local levels. These include:

- increasing the awareness of the population of oral disease risk, and the potential for appropriate self-care.
- intersectoral collaboration with other health promotion initiatives e.g. tobacco, sugar, alcohol, violence and accidents.
- integration of oral health policies and programmes into all other initiatives that impact on community health e.g. women's health and HIV/ AIDS.

□ Locally effective oral health strategies or services

This document recommends that it is inappropriate to develop a uniform programme due to the diverse population in South Africa. Therefore programmes should be devised for specific needs, determinants and circumstances for each community.

□ Monitoring and evaluation

Health authorities should provide the National Department of Health information on all activities prepared and executed.

□ Policy review

National oral health policy documents should be reviewed annually, and recommendations made accordingly.



2.3 HEALTH SERVICES:

2.3.1 HISTORY

The South African health care system has had many problems that were inherited through history. According to Van Rensburg and Harrison (1995:58), some of the problems included fragmentation of health services into fourteen departments of health, each operating independently of each other. It was run as a highly centralized planning system, with emphasis on curative hospital-based care. There was inequity in the delivery of health services, with urban areas favoured over rural ones. Health prevention and promotion was relegated to local authorities, while provincial administration was responsible for curative care. There was a large private sector that accounted for almost three-fifths of the total health care expenditure, and was used by 23% of the population on a regular basis.

2.3.2 DISTRICT HEALTH SYSTEM

The Department of Health introduced the District Health System to redress inequities in health care, and to achieve equitable, efficient and effective health services for all South Africans (Clarke 1998:5). The author states that the principle of the District Health System is to make each region an independently functioning unit, which is responsible for addressing the health needs of its own population.

The components of a district are community health workers, a community health centre, fixed and mobile clinics and a district hospital; all of which make up the first referral centre. If patients require more specialized care, they are referred to secondary or tertiary hospitals. Though many provinces have already demarcated health districts, the district health system has not yet been fully established in KwaZulu-Natal.

2.3.3 PRIMARY HEALTH CARE APPROACH

The World Health Organization (1996:34) considered the Primary Health Care Approach to be “*essential health care made universally acceptable to individuals and families in the community by means acceptable to them, through their full participation and at a cost that the community and country can afford. It forms an integral part both of the country's health system of which it is the nucleus and of the overall social and economic development of the community*”.

South Africa has adopted the primary health care approach in formulating its health policy. This will ensure that the government incorporates and strengthens primary health care at all levels of the District Health System, as well as with other sectors that contribute to the development strategy of the country.

According to the World Health Organization (1996:34) the basic tenets of this approach are:

- Health services must be geographically, financially, culturally and functionally *accessible* to all sectors of the population.
- Health care should focus towards district-based *prevention and promotion*; and away from hospital-based curative care.
- *Community participation*, where individuals take responsibility for the health and welfare of their own community. They develop capacity to make decisions on issues that affect their health, and to ensure social awareness and self-reliance.
- *Appropriate health technology* refers to methods, techniques and equipment used, to contribute towards solving a health problem within the local situation. It should be acceptable to the community and service providers, cost-effective and available locally.
- *Multisectoral collaboration* in a coordinated manner is essential for all sectors involved in the socio-economic development of a community.

2.3.4 DUALISTIC HEALTH CARE SYSTEM

South Africa has a dualistic health care system that is composed of two parallel macro-models (Van Rensburg and Harrison 1995:66). They are the public and private health sectors.

□ **Public Health Sector:**

The public health sector provides services to the large majority of the population, and is governed by the principles of primary health care (Department of Health 1997:142). Services are financed from a central state budget, i.e. general tax revenue (McIntyre 1995:89). The contribution by the individual at public health care facilities is only a fraction of the cost at which the service is actually rendered. Planning for service provision in the public sector is very difficult as budgetary allocations are subject to political decision-making, and the availability of resources at that time (McIntyre 1995:89). This sector has to provide curative care to the majority of the population, and also takes responsibility for prevention and promotion.

□ **Private Health Sector:**

It is made up of the majority of oral health personnel, but serves the affluent and/or employed minority of the population (McIntyre 1995:92). People who use this sector pay either directly or indirectly to the provider. Therefore health care is only sought to relieve specific symptoms. It is based on the Medical Model of Health (Abbatt and McMahon 1991:4) where services are mainly curative, neglecting the preventive and socio-economic factors affecting health.

Reasons for attendance between these sectors vary considerably. In the public sector, patients attend mainly for emergencies for the relief of pain,

while in the private sector patients attend due to advice given by their service provider. The rapid increase in costs in the private sector has resulted in fewer people being able to afford private health care (McIntyre 1995:96).

2.3.5 DISTRIBUTION OF PERSONNEL

There is an inequitable distribution of dental personnel within the oral health services in South Africa. According to Rossouw (1995:248), about 78% of all oral health personnel work in the private sector, but serve only a small minority of the population. Public sector dentists, who make up only 13 percent of the total number in the country, are required to serve 65 - 80% of the total population.

Van Wyk, Kroon and Cleaton-Jones (1994:457) give a clear picture of the imbalance in the geographic distribution of dental operators in South Africa, with urban areas having an overwhelming number. The operator: population ratios vary from 1:1880 in Durban to 1:458 529 in Ntuzuma (Table 2.6).

TABLE 2.6 – Operator: population ratios for cities/ towns in KwaZulu-Natal

City/ Town	Ratio	City/ Town	Ratio	City/ Town	Ratio
Ntuzuma	458 529	Durban	1 880	Umlazi	149 638
Nongoma	69 153	Pietermaritzburg	3 571	Hlabisa	56 573
Mount Currie	13 855	Port Shepstone	3 362	Lower Tugela	7 438
Glencoe	17 265	Eshowe	6 678	Ixopo	22 626

(Van Wyk, et al. 1994:457)

2.4 APPROACHES TO HUMAN RESOURCE PLANNING

2.4.1 INTRODUCTION

Human Resource Planning has been defined as: “a process whereby a determination is made regarding the appropriate numbers, types, and distribution of individuals capable of providing health services to achieve a desired goal or health outcome” (Goodman and Weyant 1990:48).

According to Hall (1978:62), the four main approaches used in health human resource planning are the:

- Health Needs Approach
- Service Targets Approach
- Health (or Economic) Demands Approach
- Human Resource: Population Ratio Approach

The choice of approach for a particular region or country is based on various factors. They include the government’s attitude to planning, availability of data to support the model, political values of the planner, current utilization rates, personnel supply, and the use of other categories of personnel such as dental auxiliaries.

No method appears to be ideal at this stage, and the choice of approach is dependent on the requirements of that country. A combination of approaches may be required, so that the end result provides a more comprehensive view of the human resource situation than could be obtained from one method alone.

This section will discuss the four main approaches to human resource planning; including a description of the method, the advantages and disadvantages of each one, and their possible applications.

2.4.2 HEALTH NEEDS APPROACH

Introduction:

This approach determines the health services that people require, in order to achieve and maintain optimum health (Hall 1978:63). It is *normative* in orientation, and is based on the principle that the provision of health care should have a sound scientific foundation. It is perceived that health professionals are best able to determine the health needs of the population because of the training they have undergone.

Need is not affected by changes in price; and is not reliant upon a price-related valuation of supply and demand. It is therefore necessary to differentiate between health needs and health wants. According to Hall (1978:63) they can be defined as:

- *Health needs* - "health services required, as determined by experts, whose ideas are based on scientific knowledge".
- *Health wants* - "health services desired by the consuming public, whose ideas are based on social, cultural, economic, educational, psychological and other beliefs".

Method:

- i. The first step in this method is to establish the disease-specific mortality and morbidity rates of the region or country (Hall 1978:64).
- ii. Standards that affect the number, kind, frequency and quality of services to be provided to persons suffering from each disease category are drawn up.



- iii. Staffing norms are prepared to convert the various services into the amount of time necessary for each category of health worker to provide them.
- iv. The total personnel hours needed in the target year for the projected population are determined. This is based on disease-specific morbidity rates, services required per sick person, and the amount per personnel time needed to perform each service.
- v. Divide the total personnel hours required, by the average number of hours worked annually per person, to determine the total supply of personnel required.

Advantages:

- i. This method is easy to understand since it is based on scientific knowledge, and appears logical and workable to decision-makers.
- ii. It looks ethical to the consumer since it provides health services to the entire population according to their needs.
- iii. It assists in the study of productivity, utilization and staffing ratios. This is because the emphasis is on the production of services and not on human resources.
- iv. It is especially useful in communities who have high morbidity rates since resources are allocated to areas where they are needed most, and where they will have the greatest effect. Specific goals can be formulated for target populations, and personnel levels can be determined to achieve these goals.

- v. It makes cost estimation easy, and encourages quality of care.
- vi. Its value increases with the health sectors capability to measure health needs and to respond to it. It is especially useful in specific health programmes such as prevention, where the health problems and health services are easy to delineate.
- vii. It is useful in the design of educational programmes. It is important to understand the needs of the community if successful programmes are to be devised to improve health states.

Disadvantages:

- i. The estimation of need may be insignificant in countries that do not have sufficient means to produce all health services determined by the planner. This demonstrates the wide gap between the need for health care as perceived by the experts, and the ability of the service providers to satisfy them.
- ii. There may be differences between the projected needs and what the consumer will use. There are cultural, economic and other barriers that will prevent the need from being converted to demand.
- iii. It is a complicated and costly method, and often requires detailed data that may not be available in that country. It may favour very extensive, and often unrealistic planning.
- iv. Setting of standards may be problematic due to a lack of agreement on what optimum levels of health care should be. This results in difficulties in the evaluation and management of many disease conditions. In the article by Goodman and Weyant (1990:48),

Nuttal and Elderton concluded that while dentists show a strong predilection for restorative care, even in the absence of caries, there is a high level of disagreement of what constitutes *appropriate* treatment for a given diagnosis.

- v. This approach gives little attention to the assessing of alternatives, especially if this method fails to address all the health problems of that country.
- vi. These projections may draw attention away from more important issues affecting the allocation and use of resources.
- vii. This method is often based on the Medical Model where services are mainly curative. The determinants of health are often overlooked.

Indications:

- i. This method is relevant in countries that have sophisticated data systems, survey skills and planning expertise.
- ii. The country must have an active government policy and an adequate service delivery system.
- iii. It is mainly applicable where there is a dominant public sector with firm control over personnel and the delivery of services.
- iv. The country should have an elevated awareness of public health and knowledge of health matters.

-
- v. The country should have well-established technology based on health prevention and promotion, and specific health programmes.

Examples of countries where this method has been used are:

- i. Latin-America - by the Centre for Development Studies (CENDES) and the Pan-American Health Organization (PAHO). The preparation of human resource and other standards for the provision and production of services to combat each disease category is an essential part of the CENDES-PAHO planning effort (Hall 1978:65).
- ii. Sri Lanka - The National Health Manpower Study based a substantial part of its comprehensive health plan on a careful assessment of the human resource requirements for coping with major disease conditions (Hall 1978:66).

2.4.3 SERVICE TARGETS APPROACH

Introduction:

In this approach, targets are set for the production and delivery of specified health services. These targets are then converted into human resource requirements by means of staffing and productivity standards (Hall 1978:67).

Targets are established by health experts, and are based on inputs such as health needs, economic demands, consumer wants and human resource ratios. This method is normative in orientation, and is usually undertaken in countries where health authorities play an active part in the progressive growth of the health system. It tries to strike a balance between the needs and wants of the population, the available medical technology, and what can actually be delivered at a given point in time.

A special feature of this approach is that it can be described as *micro-analytical*, which means that it does not have to deal with the health system as a whole. It regards each component activity of the health sector separately (Hall 1978:67). An example of this method may be in the formulation of an oral health plan for the country, where preventive programmes may be based on the needs method, curative services on the demands method, and educational programmes on the target method.

According to Cowell and Sheiham (1981:84), this method seeks to establish goals to be achieved within a specified period of time. Specific epidemiological indices are used to assess the status of all patients and the objectives are stated in measurable terms.

Method:

- i. In this method, targets are set for the production and delivery of specified health services.
- ii. A description of the kind of service to be rendered is planned.
- iii. The total sum of services of each kind is determined.
- iv. The different types and mix of personnel needed to do these services are established.
- v. Productivity of human resources is also considered.

Advantages:

- i. The various components of demand are first separated. Then the most suitable method can be chosen for each component.
- ii. It facilitates the study of productivity, utilization and staffing ratios since importance is placed on production of services and *not* human resources.
- iii. It is usually simple to explain the results of the findings to people involved in the decision-making process.
- iv. It makes the estimation of costs simpler.
- v. It can easily be applied with other planning methods.
- vi. It facilitates planning for the total health team.

- vii. It requires modest data and planning capabilities since the programmes are specific and restricted to smaller areas.

Disadvantages:

- i. The setting of norms and standards may be based more on what people perceive or hope the health system should be, rather than on reality.
- ii. The planner may make errors due to oversights and inaccuracies about the delivery and distribution of specified mix of services.
- iii. This method assumes the desire of the public to actually utilize the service.
- iv. The application of this method is restricted where there is poor government regulation and control of health services.
- v. It may encourage detailed planning, especially for components of demand not subject to much control.

Indications:

- i. This method is appropriate mainly to countries that have a dominant public sector with relatively strong control over human resources and the delivery of services.
- ii. This method has a better prognosis in countries where the government plays an active role in the planning of health services.

- iii. It can be used in both preventive and curative services, but is more useful in prevention.

An example of a country where this method has been used is:

The United States Division of Indian Health used this method to elevate the oral health status of American Indians and Alaskan natives to the highest possible level of health care (Cowell and Sheiham 1981:85). The focus was on target groups in order to address the most prevalent oral health problems and thereby reducing pain, disfigurement and dysfunction.

2.4.4 HEALTH DEMANDS APPROACH

Introduction:

This approach is based on measurement and projection of the health services that the users are willing to buy or ask for, regardless of their objective need for these services (Bui Dang Ha Doan 1981:74).

Definitions of important concepts of demand are:

- Effective/ Met Demand - "this is what people will pay for; and is decided by economics. Current health service utilization rates are a good measure of met demand" (Hall 1978:68).
- Unmet Demand - "are health services that people desire, but are unable to use due to cost or accessibility" (Hall 1978:68).

It is predictive in orientation based on detailed analyses of the past and present correlates of demand. The estimates are based on present levels of utilization of services and current patterns of behavior of consumers within the dental health marketplace.

This approach compares the amount of care sought with variables such as income, costs, access, education, age, sex and residence. It excludes needs or wants of the population that the health services may not have the means to fulfil. Professionally determined need and quality of services are of secondary importance.

According to Goodman and Weyant (1990:48), this method is largely relevant to private sector planning and fee-for-service health care systems. It is applicable to countries where government policies are more concerned with actively shaping future sectoral development, and in which there are no large inequities in health.

There are many factors that affect demand for dental care, which include technological changes (e.g. water fluoridation), or alterations in financing mechanisms. As need varies within population subgroups, so does demand for dental care. It is believed that individuals that have the greatest need for health services may demand it the least.

Method:

- i. This method can be done by observation and quantification of present demand. Choose the measurement unit e.g. patient visits, working time.
- ii. Project the demand for health services to a target year in the future. The analyst determines what the demand will be at the target year, on the basis of the most probable development of each factor of the demand. The analyst may make an alternative projection in order to see what the demand will be at the target year if changes occur, e.g. if insurance coverage is generalized to the entire population.
- iii. Demand for *services* is changed into demand for *personnel* based on the mixture of personnel and human resource productivity. Therefore, the analyst tries to see what professions will participate in producing those services and what the output per worker in each profession will be. By the examination of these factors, the required number of workers in each profession can be calculated.

Advantages:

- i. This method allows for easy understanding of the dynamics and influences of demand.

- ii. It allows for the separation of the various components of demand.
- iii. It is conducive to producing economically realistic projections.
- iv. It results in a good estimate of the minimum growth in demand likely to occur, and ensures that the level of future satisfaction at least equals that of the present.
- v. It provides useful information for comparing the economic returns from training in health occupations with those of other fields.
- vi. It identifies and quantifies market forces that affect consumers and suppliers.
- vii. It is applicable in the fee-for-service health care systems in which it supports the role of supply and demand as the basis for the provision of services.

Disadvantages:

- i. Some variants may need more complicated data, and may be very complex and expensive to perform.
- ii. Societal and political reasons for upgrading health services may be disregarded. However demand may be lowest among those who have the highest need.
- iii. The quality of services or its applicability to existing health problems may not be accounted for.
- iv. This method may enhance or continue the inequalities in access to health services. It projects utilization as *all* visits made; but does

not highlight the differences between emergency visits and routine six-monthly visits. It must be noted that what is often calculated as demand is based on what is suggested by the service provider, known as provider-induced demand (Goodman and Weyant 1990:49).

- v. Methods to improve productivity are often overlooked as they do not consider the amount or type of treatment provided. It does not measure the time spent by personnel on each treatment.
- vi. This method requires complex computer programmes, and may be difficult to interpret the results to health authorities and the community.
- vii. It is often arduous to obtain reliable data from the private sector. According to Goodman and Weyant (1990:49) no adequate system exists to collect and interpret required data for this model.
- viii. Certain changes within the health services, e.g. implementation of a national health insurance system, or changes in medical aid coverage, could alter projections of demand.
- ix. This model cannot assess changes in the health status of a population. It is therefore incapable of estimating the type of personnel needed to address existing disease levels.

Indications:

- i. This method is mainly applicable to countries with a dominant private sector.

- ii. It should be done where government plays a passive role in the health care delivery system of the country.
- iii. It is appropriate in countries where the health care system provides equally for all sectors of the population.
- iv. It promotes health team planning which is very important in the allocation of human resources for oral health care.

An example of a country where this method has been used is:

In a study of medical personnel in Canada (Cowell and Sheiham 1981:82), indices were developed to measure demand. Four estimates of future requirements were developed. This constituted a projection based on the physician: population ratio of 1961. An assumption was made that this ratio would increase at the same rate as it did between 1951 and 1961, using an annual per capita number of visits by patients by 1961. It was assumed that the average number of visits would increase annually approximately by twenty-five percent.

2.4.5 HUMAN RESOURCE: POPULATION RATIO METHOD

Introduction

This approach has been the method of choice in many countries, both for estimating demand for health human resources, and for characterizing supply. It is a very simple, low cost and easy to interpret by all those concerned with human resource policies.

There are only two essential data inputs required for this method. These are population projection, and desired human resource: population ratio. Once these have been developed, the ratio is used to calculate the corresponding human resource requirements.

Method:

- i. The population of the region being studied must be determined. This can be obtained from demographic projections, census data, and other such sources.
- ii. The number of human resources present in the given population must be counted. This can be obtained from Professional Councils, Boards, or Organizations.
- iii. A desired ratio must be obtained from expert judgment, international comparisons, or from the planner himself.
- iv. It can then be determined whether a shortage or over-supply of health workers exists.

v. This method can be either normative or predictive. The population to be served is converted directly into manpower requirements by means of desired, empirical, or normative ratios, based on various criteria (Hall 1978:74). This method may be used as a primary technique, or as a by-product of calculations carried out in relation to one of the other methods. This method is based on the principle of supply-to-demand; where supply is the number of health workers, and demand is the total population served.

vi. According to Bui Dang Ha Doan (1981:75), the formula for estimating health human resource requirements is:

$$N = P \times r,$$

where **N** is the *total number* of workers required in a specified profession,

P is *total population*, obtained from demographic projections, census figures, etc,

r is the *desirable ratio*, and is the basis of the estimation and can be obtained from expert judgment, international comparisons, or the judgment of the analyst himself.

Advantages:

- i. This method is simple to use and to explain to others, and requires modest data.
- ii. If the existing health situation is fairly adequate, it can be justified to sustain the current status of the health system.
- iii. It is beneficial for supplying baseline projections of the various kinds of human resources that may be necessary to sustain the present situation.

- iv. When the ratio is obtained as a conclusion of the application of another more exact method, it can be a convenient curtailment for short- and medium-range planning.

Disadvantages:

- i. It is easy to select ratios that may be totally unrealistic for the current situation in the region or country because the overall situation has not been assessed.
- ii. This method is usually used in single occupational classes, which may neglect the evaluation of human resource mixes. The shifting of some services to other categories of personnel is not detected by this approach.
- iii. Cost estimation may be hard to obtain because changes in financing mechanisms may alter the demand for service. It does not address the problem of equitable distribution of human resources. When planning is done, the human resource: population ratio may appear satisfactory. But it does not address the imbalances in the distribution of personnel.
- iv. It may overlook the ability for improving utilization and relevance of services (Hall 1978:74).
- v. It does not address differences in productivity between human resources. There is little evidence concerning the production characteristics of individual providers (Goodman and Weyant 1990:49).

- vi. This approach fails to take into consideration the accessibility of health services to the population. Some health services may be close to the community, but takes a few hours to reach it due to terrain, transport and other problems.
- vii. Adequate human resource: population ratios do not automatically provide good health. Other components of the health system, like logistical support, may also be deficient.

Indications:

- i. It is applicable to countries with a fairly satisfactory health status, adequate health delivery systems or with an established efficient health sector.
- ii. This method can be carried out with restricted planning resources.
- iii. The ratio method can be used where either the private or public sector exist.
- iv. It can be done where there is either an active or passive approach towards the delivery of health services.
- v. It is applicable where there are fairly similar international models on which to base their health care system.

An example of a country where this method has been used is:

It has been used extensively in the United States of America for many years to lobby for different initiatives (Goodman and Weyant 1990:48).

- In the 1960's where student loans were offered if dentists practised in "shortage areas" as determined by this method.
- In the 1970's, where an oversupply of dentists was being perceived, the decision to close several dental schools was arrived at from, among other factors, dentist: population ratios.

2.4.6 SUMMARY OF HUMAN RESOURCE APPROACHES

The first three approaches (health-needs, service targets and health demands) convert *people* into the *health services* that they desire, which are then converted into *human resources* required to produce the services. The human resource: population ratio method converts *people* directly into *human resources* (Hall 1978:62).

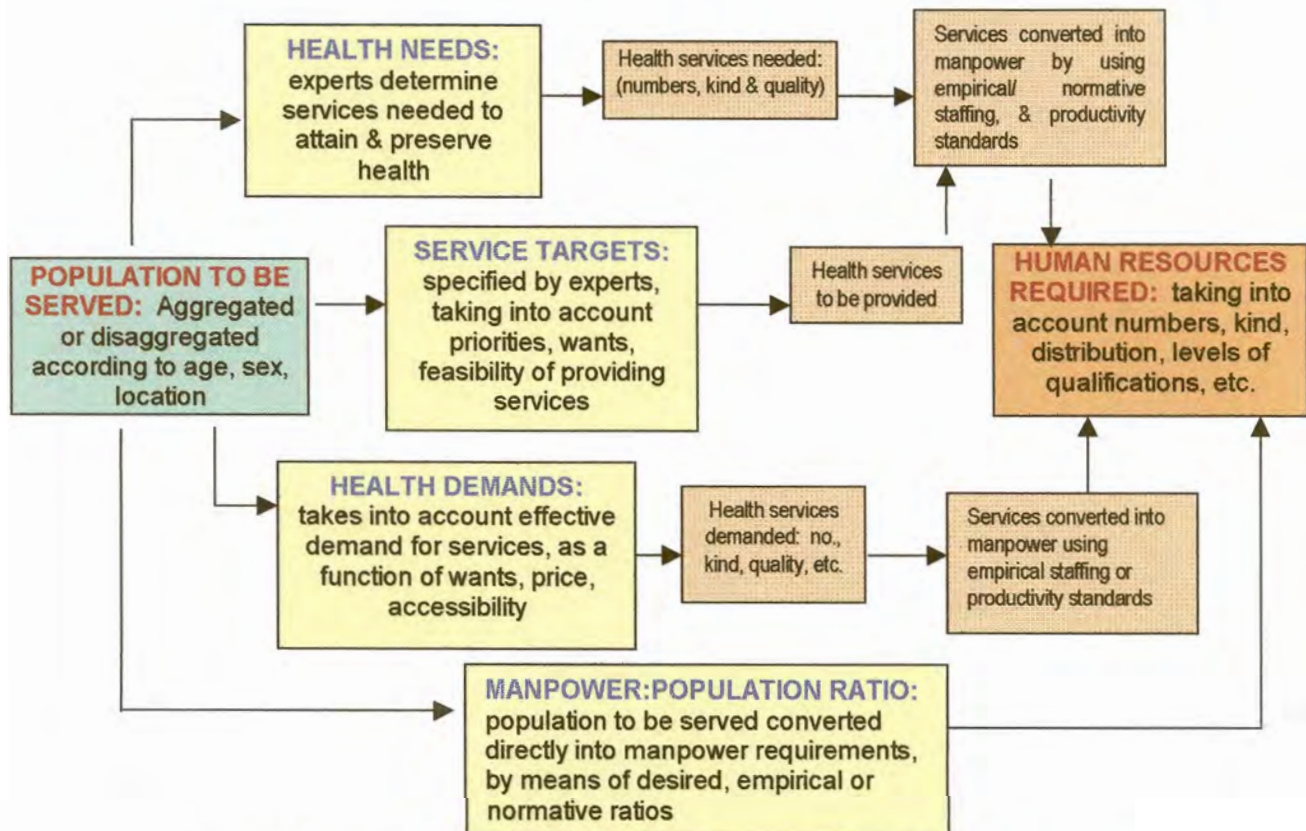


Fig. 2.2 Schematic representation of the four methods of estimating human resource requirements (Hall 1978:62)

2.5 SOUTH AFRICAN STUDIES:

2.5.1 VAN WYK (1996)

This study used the demand-based, determinant modified model for oral health personnel planning in South Africa. It is based on the principle of supply (volume of services that can be produced) and demand (volume of services that is required). This study made recommendations on the optimal number of personnel needed for 2011 (Table 2.7), which aimed at reducing the needs, and therefore the demand for oral health services.

TABLE 2.7 – Optimal number of oral health personnel for 2011 determined by the demand-based approach

Oral Health Personnel	Number
Dentists	3 337
Dental Therapists	2 515
Oral Hygienists	1040-1267
Dental Technicians	1001
Dental Assistants (public sector)	4982

(Van Wyk 1996)

2.5.2 BOOYENS, ROSSOUW AND SNYMAN (1996:293)

The authors used a modified version of the World Health Organization/ Federation Dentaire Internationale (1989) computerized oral health personnel planning model for the first time in South Africa in 1994. It used the needs-based, demand-modified approach to determine optimal numbers of oral health personnel for South Africa. This study found that South Africa required 6 700 to 7 262 oral health operators. The greatest need for oral health was among the Black group. Table 2.8 shows the optimal number of each category of oral health personnel as determined by this study.

TABLE 2.8 – Optimal number of oral health personnel for South Africa determined by the needs-based approach

Oral Health Personnel	Percentage
Dentists	21 – 24
Dental Therapists	22 – 27
Oral Hygienists	42 – 49
Specialists	6 – 8

(Booyens et al. 1996:293)

2.5.3 DREYER, ROSSOUW AND CHIKTE (1997:583)

This document was drawn up at the request of the Committee of Dental Deans of South Africa. They identified the three categories of oral health care workers providing clinical care as dentists/ specialists, dental therapists and oral hygienists. They found that in 1996, there were 4236 dentists/ specialists, 891 oral hygienists and 236 dental therapists on the registers of the Interim National Medical and Dental Council of South Africa. The fifteen year annual growth up to the end of 1996 was 160 oral health care workers per year. This comprised of 104 dentists, 42 hygienists and 14 therapists.

The study projected that the total clinically available oral health care workforce for 2010 would be 5 828 (Table 2.9).

TABLE 2.9 – Projections for clinically available oral health personnel for South Africa for 2010

Oral Health Personnel	Number
Dentists	4000
Dental Therapists	556
Oral Hygienists	927
Specialists	300

(Dreyer et al 1997:583)

This study discussed the capacity of training institutions, and recommended that the present training facilities be expanded to deliver a larger output of dental therapists and oral hygienists.

2.5.4 THE PICK REPORT (Pick, Nevhutal, Cornwall & Masuku 2000)

This report was drawn up to provide a national strategy for Human Resources for Health (HRH), as an outcome of a special workshop of the Provincial Health Restructuring Committee and the Heads of Human Resources for Health in the nine provinces. Some of the recommendations of this report are:

- A single category of dental auxiliary should be created to replace the dental therapist and oral hygienist,
- Dental assistants should be used in underserved areas to provide simple dental procedures, such as the Atraumatic Restorative Technique (ART), and they should undergo training for one year by dentists.
- The scope of the dental therapist should be expanded to include the:
 - placement and removal of sutures,
 - placement and removal of removable orthodontic appliances,
 - care of wounds.

The projected requirements for 2029 for South Africa are 6413 dentists, and 435 oral hygienists.

2.5.5 COMPULSORY COMMUNITY SERVICE AUDIT FOR DENTISTS IN SOUTH AFRICA (Gugushe, 1999)

This report was done as an audit of dental personnel and facilities for the implementation of compulsory community service. It concludes that there are deficiencies in the structure and management of oral health services in

most provinces. Dental services are essentially palliative and demand-driven. Dentists are the main category of clinical oral health personnel providing services, with the quality of services ranging from fair to poor. Most provinces do not have a dedicated oral health budget.

Recommendations of this study include:

- A national operational task team, comprising of all stakeholders associated with oral health care, will implement compulsory community service. Consultation with provinces should be encouraged.
- It is estimated that an additional amount of approximately R100 million is required for 1999/2000 for the successful implementation of compulsory community service.

One of the problems identified by Gugushe (1999) is the lack of provincial oral health policies that could serve as a standardized functional model for oral health in the nine provinces.

2.6 COMPUTERIZED ORAL HEALTH PERSONNEL PLANNING MODEL (WHO / FDI 1989:44)

This model was prepared by a joint working group of the World Health Organization and the Federation Dentaire Internationale (WHO/FDI 1989:44). A computer programme was prepared to supplement the manual *Health Through Oral Health: Guidelines for Planning and Monitoring for Oral Health Care* (WHO/ FDI 1989:44). It was used to calculate the future needs for dental personnel of a country.

It quantifies two main sets of information:

- the need for oral care in communities
- that which a 'unit' of oral care personnel can be expected to achieve.

The need is translated into full-time equivalents (FTE) of oral health personnel required to provide the calculated level of care. Thereafter factors modifying the planning process should be considered. From the information obtained, the various options can be appraised, and the best ones selected. A human resource plan is then drawn up.

Recommendations for time estimates for the various procedures for each age cohort are provided according to the prevailing conditions of the country e.g. developing or highly industrialized. The working year can be calculated for a 1500, 1750 or 2000 hour year, depending on the working conditions in the country. The replacement period for restorations can be for five, ten or fifteen years. Therefore the programme has many variables that can be altered to suit the situation of that particular country. Selection criteria and limitations of this model will be discussed in Chapter 4: Materials and Methods.

2.7 SUMMARY

This chapter discussed the gross inequities in the health care system of South Africa, and the government's policies to try and overcome them. Human resource planning methods were reviewed in order to select the most appropriate one for this study. International and South African studies were appraised, and calculations for optimal numbers of oral health personnel for South Africa were noted. These findings would serve as a starting point for this study.

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CHAPTER 3 - SITUATION ANALYSIS

3.1 INTRODUCTION

In 1978, the World Health Assembly unanimously accepted the Declaration of Alma Ata of "Health for All by the year 2000" (WHO 1996:17). It emphasized that health services differ from country to country according to local circumstances and levels of development, and should be based on the results of *social, biomedical and health service research*.

A situation analysis is necessary to obtain this information. It allows the planner to select priority areas of concern, and acts as a common reference point for the rest of the planning process (Green 1994:31). KwaZulu-Natal, like the rest of South Africa, has large differences in oral health status within it's population due to variations in culture, diet, socio-economic conditions, and financial and human resources.

3.2 DEMOGRAPHIC PATTERNS

3.2.1 GEOGRAPHIC LOCATION

KwaZulu-Natal is one of the nine provinces within the Republic of South Africa. It is made up of the former province of Natal and 'self-governing territory' of KwaZulu (Hirschowitz and Orkin 1995:150). It lies along the eastern seaboard, extending from Ingwavuma in the north to Port Edward in the south; and inland as far as Newcastle, Bergville and Matatiele in the west. It covers an area of 92 100 square kilometers, which is equivalent to 7,6% of the total land area of South Africa (Statistics South Africa 1998:2). As represented in Figure 3.1, it is divided into eight regions and twenty-five health districts (Department of Health: KwaZulu-Natal 2000a:1).

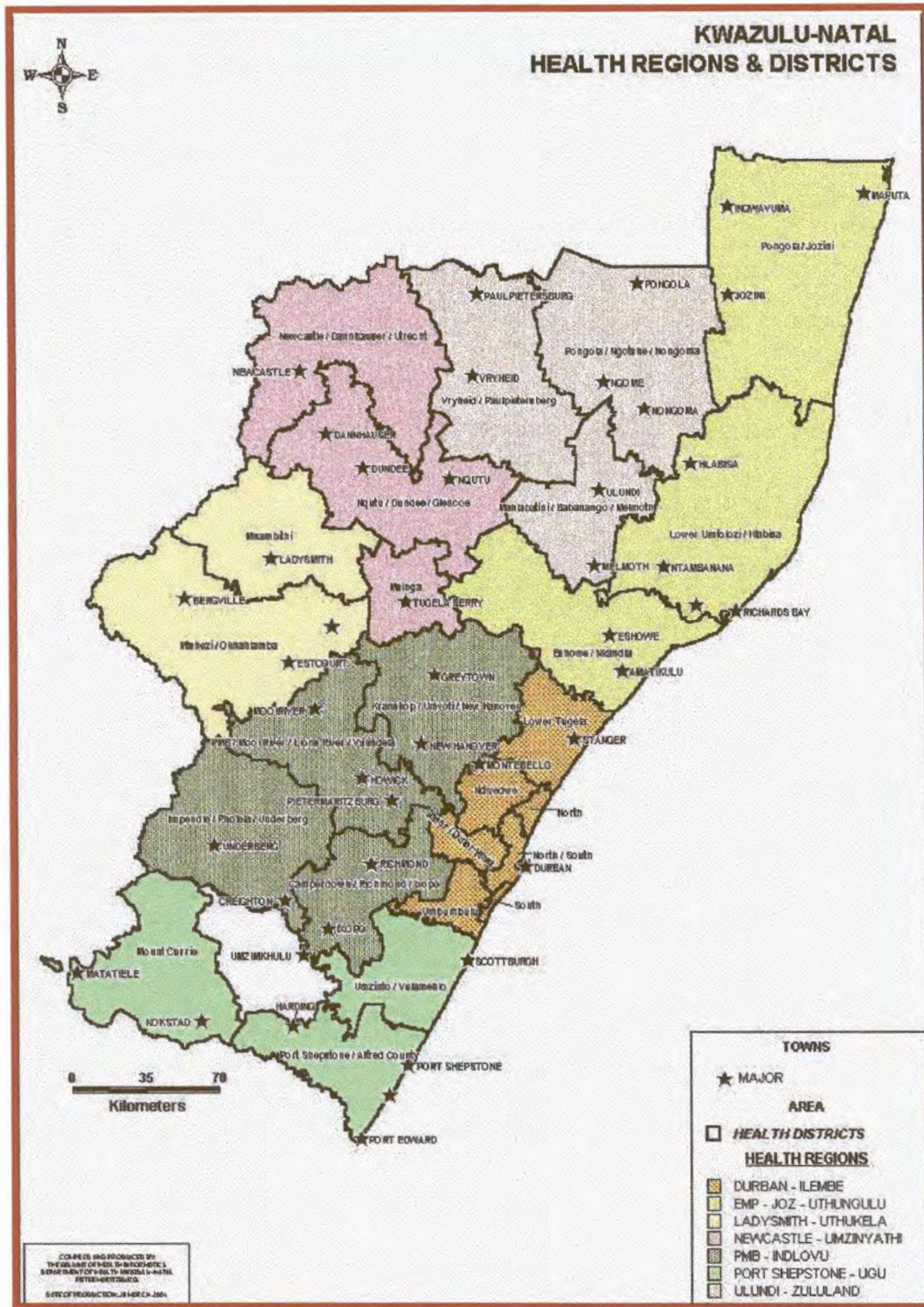


Fig. 3.1 - Map of KwaZulu-Natal showing health regions and districts
(Department of Health: KZN 2000a:1)

3.2.2 TOTAL POPULATION

KwaZulu-Natal has the highest population of all the provinces of South Africa. The total population is 8 726 300 (Department of Health: KwaZulu-Natal 2000a:1). This accounts for 20,7% of the total population of 40 583 573 of South Africa (Statistics South Africa 1998:4). According to Van Rensburg and Van Rensburg (1999:214), 87% are state-dependent.

KwaZulu-Natal has the highest prevalence of HIV/AIDS in South Africa (Whiteside and Sunter 2000:78). Population projections were done for KwaZulu-Natal taking into account the effect of AIDS (Whiteside and Sunter 2000:73). These projections showed that the population should continue to grow up to 2008, after which it will register a small decrease in number.

Table 3.1 shows the projections for the population of KwaZulu-Natal, with and without AIDS. The percentage difference was also calculated. Since HIV/AIDS is a reality in this province, the projections that took into account AIDS were used in this study. A decrease in life expectancy from 60 to 40 years is also expected within the next decade (Adler and Qulo 1999:305).

TABLE 3.1 - Population projections for KZN with and without AIDS

Year	Without AIDS	With AIDS	% Difference
2000	9 076 000	8 870 000	2,3
2002	9 412 000	9 005 000	4,3
2004	9 759 000	9 076 000	7,0
2006	10 084 000	9 099 000	9,8
2008	10 409 000	9 099 000	12,6
2010	10 723 000	9 095 000	15,2

(Whiteside and Sunter 2000:73)

The state-dependent population (87%) was calculated from these figures for the years 2000 and 2010, as 7 716 900 and 7 912 650 respectively.

3.2.3 RACIAL DISTRIBUTION

The population of South Africa has been divided through history into four main racial groups. Although racial segregation is not practiced in South Africa today, the National Minister of Health Dr N. C. Dlamini-Zuma states that, the racial variable should still be used, in the foreseeable future, in epidemiological surveys, in order to eliminate the racial inequalities of the past (Department of Health 1997:IV).

Table 3.2 shows that the Black population of KZN makes up the large majority of 81,7%. The Indian, White, Coloured and other groups comprise 9,4, 6,6, 1,4 and 0,8% respectively (Statistics South Africa 1998:9).

TABLE 3.2 - Racial distribution of population groups in KwaZulu-Natal

Race	African	Indian	White	Coloured	Other
Percentage	81,7	9,4	6,6	1,4	0,8

(Statistics South Africa 1998:9)

3.2.4 URBAN-RURAL DISTRIBUTION

KZN is one of the provinces of South Africa which has a larger rural than urban population. The urban: rural distribution by percentage is 43,1: 56,9 percent (Statistics South Africa 1998:6). Due to deprived socio-economic conditions in rural areas (Hirschowitz and Orkin 1995:152), this province is undergoing urbanization into the industrial and commercial centers. Table 3.3 shows the increase in urbanization from 1994 to 1996 (Department of Health: KZN & Health Systems Trust 1996:12 ⁽¹⁾ and Statistics South Africa 1998:6 ⁽²⁾).

TABLE 3.3 - Degree of urbanization of KZN

Year	Urban	Rural
1994 (1)	38,0	62,0
1996 (2)	43,1	56,9

(Department of Health: KZN & Health Systems Trust 1996 [1]; Statistics South Africa 1998 [2])

Even within urban areas, there is a great demarcation between developed suburbia, and townships and informal settlements. The informal settlements are growing rapidly within the Durban Functional Region, and are becoming very densely populated areas (Department of Health: KwaZulu-Natal 2000a:3).

3.2.5 AGE DISTRIBUTION

The age distribution of the population of KwaZulu-Natal varies within population groups. The African group is typically representative of a developing nation, with about 40% of the population under the age of 15 years (Statistics South Africa 1998:32). The White population has the profile of a developed country, with a large ageing sector. The Coloured and Indian communities lie between these two groups (Statistics South Africa 1998:30).

The age cohorts 0-14, 15-29, 30-64 and 65+ years were used in this study. This is because *these* cohorts are recommended in the manual and computer programme from which human resource calculations were made (WHO/ FDI 1998:23). The age distribution with projections for 2000, 2005 and 2010 per age cohort are represented in Table 3.4 (Department of Health: KwaZulu-Natal 2000a:2).

TABLE 3.4 - Population projections for KwaZulu-Natal for age cohorts

Cohort	Percentage	1999	2000	2005	2010
0 – 14	35,8	3 124 016	3 175 460	3 254 936	3 256 010
15 – 29	29,4	2 565 533	2 607 780	2 673 048	2 673 930
30 – 64	29,9	2 609 164	2 652 130	2 718 508	2 719 405
65 +	4,9	427 587	434 630	445 508	445 655
Total	100	8726300	8870000	9092000	9095000

(Department of Health: KwaZulu-Natal 2000a:2)

Table 3.4 also shows that a large proportion of the population is in the 0-14 year age cohort. The economically active group (15-65 years) makes up almost sixty percent of the total population.

3.2.6 REGIONAL DISTRIBUTION, AREA AND DENSITY

Regions within the province differ greatly with regard to population number, area and density (Department of Health: KwaZulu-Natal 2000a:3). Table 3.5 shows an increase in population size and density from 1996 to 1998. Durban has the highest population size and density, within the smallest area.

TABLE 3.5 - Regional population distribution, area and density for 1996 and 1998 in KZN

Region	Population 1996	Population 1998	Percentage population	Area	Density 1996	Density 1998
Ilembe (Durban)	3 145 908	3 265 033	37,4	4 864	647	671
Uthungulu (Empangeni/Josini)	1 359 448	1 410 926	16,2	21 030	65	67
Zululand (Ulundi)	703 382	730 017	8,4	15 569	45	47
Umzinyathi (Newcastle)	766 347	795 366	9,2	13 227	58	60
Uthukela (Ladysmith)	553 897	574 871	6,5	10 950	51	52
Indlovu (Pietermaritzburg)	1 153 159	1 196 825	13,7	17 247	67	69
Ugu (Port Shepstone)	725 779	753 262	8,6	9 541	76	79
KWAZULU-NATAL	8 407 920	8 726 300	100	92 428	91	94

(Department of Health: KwaZulu-Natal 2000a:3)

3.3 SOCIO-ECONOMIC SITUATION

3.3.1 SOCIO-ECONOMIC STATUS

According to Schou and Blinkhorn (1993:72), social inequalities affect the person's current state of oral health, knowledge, beliefs, expectations and exposure to care. An individual of lower socio-economic status usually has less prior and current access to health-sustaining resources like food, shelter and basic education. They also believe that there is a positive correlation between income, education, occupation, and oral hygiene behaviours and dental utilization.

KwaZulu-Natal is the third poorest province in South Africa (Hirschowitz and Orkin 1995:152) in which exists a marked social stratification. The first sector is composed of a large rural, and predominantly African group, where six out of ten Africans live in rural areas (Hirschowitz and Orkin 1995:152). They live under poor socio-economic conditions, and often lack basic needs such as piped water, electricity, tarred roads and sanitation. Physical accessibility to essential services is a major problem due to a scattered population, difficult terrain and a limited transport and communication system. An example of this situation is in rural areas, where only twenty five percent of households had running water either inside their dwellings or on site, compared to eighty seven percent in urban areas (Statistics South Africa 1998:77).

These factors may result in a lack of demand for certain types of health care, like oral health, due to these people having other priorities in their lives. The rural health care system is often rudimentary due to the shortage of personnel, infrastructure and basic amenities. A large number of oral health facilities in these areas are inadequate; and access to basic health services is often difficult.

Due to the poor living conditions in the rural areas, many of these people are migrating into the larger cities (Table 3.3:50). They also live in poor socio-economic conditions; and their dwellings are usually shacks or informal settlements (Statistics South Africa 1998:66). Even though they live in urban areas that have large numbers of oral health personnel, this group is often unable to pay for oral health services provided by the private sector.

According to Hirschowitz and Orkin (1995:153), seventy-five percent of African households live below the Minimal Level of Living (MLL). This indicates households with a total monthly income below nine hundred rand. Only five percent of this group has access to medical aid.

The next group is made up of a small fully urbanized group, who live in first world socio-economic conditions (Statistics South Africa 1998:56). They have higher educational, employment and income levels; which leads to an increased awareness of oral health care, and access to an effective and efficient health care system (Gift 1993:77).

3.3.2 EDUCATIONAL LEVELS

Gift (1993:77) stated that the level of formal education appears to be one of the most powerful forces in oral health. Dental knowledge, regular use of services and continuity of care are highly correlated with formal education.

According to Statistics South Africa (1998:36), the educational levels in KwaZulu-Natal are relatively low compared to other provinces in South Africa. More than twenty percent of the population have had no formal schooling; while less than five percent were exposed to higher than Grade 12 education. The level of education for KwaZulu-Natal and South Africa,

amongst the age group twenty year and over, expressed as percentages are shown in Table 3.6.

TABLE 3.6 - Educational levels in KZN and South Africa, expressed as a percentage

Level of Education	KZN (%)	SA (%)
No schooling	22,9	19,3
Some schooling	17,9	16,7
Complete Primary School	6,7	7,5
Some Secondary School	31,8	33,9
Grade 12	15,9	16,4
Higher	4,8	6,2
Total	100	100

(Statistics South Africa 1998:36)

3.3.3 EMPLOYMENT RATES

Gift (1993:78) also relates employment to oral hygiene status and the use of services. Employment often represents a life-style and the availability of medical aid. Unemployment results in the inability to pay and lack of transportation.

There is a curvilinear relationship between unemployment rates and education, where people with lower education have higher unemployment rates (Statistics South Africa 1998:48). The social cost of unemployment is high as it leads to deviant behaviour, alcoholism, drug abuse and psychological harm. Hirschowitz and Orkin (1995) also showed that fifty four percent of unemployed Africans gave the inability to pay as the most important reason for not seeking health services.

According to Statistics South Africa (1998:47), 47% of the population of KwaZulu-Natal falls within the economically active age group (15 to 65

years). Only 1 570 573 of the population between the ages of 15-65 years are employed, which accounts for 39,1% of the economically active group.

The National Oral Health Survey of South Africa (Department of Health 1994:178) confirmed that in the African community, lack of finances and the availability of services were the most important barriers to the utilization of oral health services. In other population groups, it was mainly due to patient-related barriers.

3.3.4 WATER SUPPLY

The water supply source of KwaZulu-Natal was assessed by household (Statistics South Africa 1998:76). Table 3.7 reveals that presently, 66% of the population had access to piped water. Primary sources from the Department of Water Affairs and Forestry reveal that about 30% of the rural population has access to piped water.

TABLE 3.7 – Sources of water supply in KwaZulu-Natal

Piped Water Supply = 66%		Unpiped Water Supply = 34%	
In dwelling	650 677	Water Carrier	20 049
In yard/ on site	145 237	Bore-hole	110 755
Public tap	304 502	Dam, river	402 822
		Unspecified	26 882
Total	1 100 416	Total	560 508

(Statistics South Africa 1998:76)

Umgeni Water (2000:3) reveals that they are currently providing water to almost six million people in a geographic area of 24 000 square kilometers. Progress is underway to expand this area to 36 000 square kilometers.

During the year 1999/ 2000, water was supplied to over five million people in urban areas in KwaZulu-Natal. In addition, one million people in rural

and peri-urban areas were supplied with water through Umgeni Water's Rural Areas Water and Sanitation Programme (RAWSP). These figures infer that approximately 67,7% of the population of KwaZulu-Natal could have access to fluoridated water, if all water supplied by Umgeni Water is fluoridated.

Table 3.7 also reveals that a large part of the rural population obtains its water from boreholes. Experiments by Grobler, Janse van Rensburg, Rossouw and Holtshousen (1994:67) shows that bore-hole water has considerably higher levels of fluoride, and should be taken into consideration when water fluoridation is implemented.

3.3.5 NOTIFIABLE MEDICAL CONDITIONS

Cholera, malaria, tuberculosis and typhoid are the four major notifiable diseases occurring in this province (Department of Health 2000a:16). All of them are indicative of the prevailing poor socio-economic conditions. About 20 000 cases of these diseases were notified during the period April 1998 to March 1999. Fifty percent of the cases were for tuberculosis, and forty one percent was for malaria.

3.3.6 ACQUIRED IMMUNO-DEFICIENCY SYNDROME (AIDS)

The Department of Health: KwaZulu-Natal (2000a:24) believes that the incidence of this disease is *"increasing at an alarming rate and is the biggest health problem in the province"*.

According to Adler and Qulo (1999:301), it was estimated that more than 2,4 million South Africans were HIV positive at the end of 1996, and the number is likely to have increased substantially. The prevalence of HIV infection in antenatal attendees in South Africa has increased from 1% in

1990 to 23% in 1998. KwaZulu-Natal has the highest prevalence in South Africa, of 32,5% (Adler and Qulo 1999:301).

The projected impact of AIDS on the population over a period of time is an important factor to consider. Doyle (1993:108) indicates that the most profound effects will be seen in the fifteen to forty-nine, and zero to four year age groups. Adler and Qulo (1999:301) also believe that one in eight adults, in the 15 to 49 year age group, is infected with HIV. This is expected to change the age structure of the population, with a much smaller economically active population and many AIDS orphans.

A case study in KwaZulu-Natal (Whiteside and Sunter 2000:71) shows:

- the prevalence rate in the general population is expected to rise until 2006, when it will peak at twenty nine percent,
- an estimated 1 115 000 adults in KwaZulu-Natal are already infected,
- the projected AIDS deaths for 2005 and 2010 are 100 000 and 105 000 respectively, and
- projections for AIDS orphans for 2005 and 2010 are 270 000 and 475 000 respectively.

3.3.7 TRAUMA AND INJURY

Due to the poor socio-economic conditions that prevail in South Africa, there has been an increase in crime, drug- and taxi-related wars, gangsterism and fire-arm-related violence (Kassan, Lalloo and Karriem 2000:359). Peden and Butchart (1999:331) reveal that an estimated 70 000 South Africans are killed due to trauma each year. Three and a half million people seek health care as a result of such injury. There is a dearth of information on trauma statistics in KwaZulu-Natal, but the authors reveal that the mechanisms of homicide in this province are

firearms (58%), sharp objects (22%), blunt objects (18%) and other (2%). There is a ten percent prevalence of women abuse by their partner in this province (Department of Health: KwaZulu-Natal 2000a:57).

3.3.8 DISABILITY

KwaZulu-Natal has the highest level of disability in South Africa (Statistics South Africa 1998:33). There are 502 090 disabled people in this province, compared to 2 657 714 in South Africa. This statistic is important in this study since the disabled population is one of the target groups of the draft national policy document (Department of Health 1999:15).

3.4 ORAL HEALTH STATUS AND NEEDS:

3.4.1 NEED FOR ORAL HEALTH CARE

Oral diseases are not life-threatening or severely debilitating (WHO 1994:12). But oral dysfunction does have a detrimental effect on the quality of life of individuals. Examples of dysfunction are the pain and discomfort of dental caries, the edentulousness of periodontal disease resulting in eating difficulties, and psychological effects such as reduced self-confidence (McGrath, Bedi & Gilthorpe 2000:3).

The most common dental disorders are dental caries and periodontal disease, which are responsible for a large amount of pain and suffering. These diseases are almost preventable by simple and low cost means, which are often overlooked by health policy-makers. In KZN, current disease levels are likely to worsen as a result of urbanization and lifestyle changes. The HIV/AIDS epidemic and the escalating violence in this province may also lead to increased requirements for oral health care.

3.4.2 DENTAL CARIES

International Studies:

Over the past two decades, there has been a decrease in dental caries in industrialized countries (WHO 1990:9). A study by Renson et al. (1985:235) has revealed factors that are common to many of these countries. Some of them are the availability of fluoride through water fluoridation or toothpastes, increased dental consciousness coupled with greater utilization of services, accessibility of dental resources, the preventive approach adopted by practitioners, and a decrease in the consumption of added sugar.

Many of these factors reveal that the major contributors to the improvement of oral health are related to changes in *behaviour*, rather than on the direct health, of the population.

According to the WHO (1990:9), dental caries is increasing in developing countries. This increase is due to, among other factors, the rapid urbanization occurring in these countries. In a study of rural children in Cameroon by Attin, Mbiydzemo, Villard, Kielbassa and Helliwag (1999:145), it is shown that the decayed component of the DMFT index predominates. This is similar to findings of the National Oral Health Survey (Department of Health 1994:33,45, 57, 62).

Comparison of National Surveys:

The recent national oral health survey (Department of Health 2000), shows that the DMFT of the population of KwaZulu-Natal is considerably lower than results obtained from the earlier one (Department of Health 1994), as seen in Table 3.8. This could be attributed to the:

- inclusion of a larger rural component in the latest survey
- use of fluoridated toothpastes by a larger sector of the population
- increased awareness of oral health.

TABLE 3.8 - Comparison of the national oral health surveys for children in the different age groups in KwaZulu-Natal

Age Group	NOHS 1988/89 (1994)		NOHS 2000 (2000)		
	6 year	12 year	6 year	12 year	15 year
dmft/ DMFT	3,7	1,8	2,9	1,14	1,87
dt/ DT	3,0	1,6	2,5	1,00	1,56
mt/ MT	0,5	0,1	0,1	0,1	0,21
ft/ FT	0,2	0,5	0,4	0,05	0,08

(Department of Health 1994, 2000)

The high decayed component is significant as an indicator of the large backlog in dental care that exists in the majority of the population (Reddy 1986:135). This can be attributed to the fact that a small sector of the population had access to an effective and efficient health care system (vide 3.3.1:54), while the majority had little or no access to dental care.

The missing component reinforces the fact that extractions are the main type of dental care provided by the public sector (vide 3.7.1:77). The low filled component shows that restorative care has been performed on a very small segment of the population.

Race-related patterns of dental caries:

Historical inequities in oral health service provision have resulted in race-related patterns in dental caries (Table 3.9) in the population (Du Plessis 1999).

TABLE 3.9 - Dental caries status of the different races in the 6 and 12 year age groups in KZN

Age Group	6 year				12 year				
	Race	Black	Coloured	Indian	White	Black	Coloured	Indian	White
dmft/ DMFT		4,1	4,4	4,1	2,1	2,6	2,2	1,1	1,7
Decayed Teeth		4,1	2,9	3,3	1,0	2,5	1,8	0,8	0,8
Missing Teeth		0	1,1	0,6	0,2	0,1	0,1	0,1	0,1
Filled Teeth		0	0,2	0,1	0,8	0,1	0,2	0,1	1,2

(Du Plessis, 1999)

The large decayed component predominates in the Black, Coloured and Indian groups, indicating the large backlog in oral health care. The White group shows a high filled, and low missing and decayed parts. This reinforces the inequities in oral health service provision of the past.

Urban-rural distribution:

Many local studies (Khan 1992; Jinnahbhai, Laher & Jumna 1994; Van Wyk, Van Rooyen, Gugushe & De Araujo 1996:1309; and Moola & Khan 1997:97) reveal that the DMFT is higher in urban areas than in rural ones (Tables 3.10 - 3.12).

TABLE 3.10 – Dental caries status in six year old children in KwaZulu-Natal

Study	Dental caries status	Rural area			Urban area	
		Groutville	Kwa Mashu	Nqutu		
Moola & Khan (1997:97)	DMFT	1,02	2,35	2,35		
	DMFT	1,2	2,7	3,51		
	% Decayed	34	49	57		
	% Caries-free	61	39,5	41,8		
Van Wyk, et al. (1996:1309)	DMFT (dmft)	Mangusi				
	% Caries-free	0,34 (3,56)				
		20,04				

TABLE 3.11 – Dental caries status in twelve year old children in KwaZulu-Natal

Study	Dental caries status	Rural area		Urban area	
		Groutville	Kwa Mashu		
Khan (1992)	DMFT	0,6	0,8		
Van Wyk, et al. (1996:1309)	DMFT	Mangusi			
	% Caries-free	1,78			
		29,5			
Jinnahbhai, et al. (1994)	DMFT	Groutville			
		0,6			

TABLE 3.12 – Dental caries status in fifteen year old children in KwaZulu-Natal

Study	Dental caries status	Rural area
Khan (1992)		Groutville
	DMFT	1,0
Van Wyk et al. (1996:1309)		Mangusi
	DMFT	3,6
	% Caries-free	24,2

Table 3.13 shows the DMFT scores in children in each of the regions of KwaZulu-Natal, where rural areas have lower levels in dental caries than urban ones.

TABLE 3.13 - DMFT/ dmft in 6, 12 and 15 year old children per region of KZN

Region	6 year	12 year	15 year
Durban	3.5	1,3	1.9
Ladysmith	3.3	2,5	4.0
Ulundi	2.4	0,4	0.6
Pietermaritzburg	3.0	1,2	1.3
Josini	2.3	0,6	1.3
Newcastle	1.6	0,7	1.6
Port Shepstone	3.2	0,9	1.8

(Department of Health 2000)

This is supported by Gugushe and Du Plessis (1998:409) and Mackeown, Cleaton-Jones and Hargreaves, (1995:182). The latter study reinforced the fact that urban groups had higher energy intakes than rural communities with consequent increased levels of dental caries. This fact is particularly important in KwaZulu-Natal that has a significant rural component that is undergoing urbanization.

Goals for oral health:

In the six year age group, the caries-free component is only 32% (Department of Health 1994). This is lower than the World Health Organization goal for oral health for the year 2000 of 50% (Federation Dentaire Internationale 1982:74), and the South African goal for 2010 of 70% (Department of Health 1999:7).

The recent national survey (Department of Health 2000) reveals that in the twelve year age group, the DMFT is 1,2. This is significantly lower than the WHO goal of 3 (Federation Dentaire Internationale 1982:74), and the South African goal for 2010 of 1,5 (Department of Health 1999:7).

However, it is important to determine the Significant Caries Index of individual populations (vide 2.2.2:16) when districts formulate their plans, in order to provide care to populations at highest risk.

3.4.3 PERIODONTAL DISEASE

International Studies:

The trends in periodontal disease are similar to dental caries. The prevalence seems to be decreasing in developed countries, and increasing in developing countries (World Health Organization 1990:4). Renson et al. (1985:245) believe that the major contrast relates to 'generally low or moderate levels of bleeding or calculus' in industrialized countries, and 'generally high levels' in developing countries. This may be due to poor oral hygiene, as well as systemic factors that could modify the disease process. The factors responsible for the improvement in dental caries status in developed countries have been found to be the same for periodontal disease.

Comparison of Local Surveys:

Many other studies (Chikte, Gugushe, Rudolph and Reinach 1990:245; Mackeown et al. 1995:182 and Attin et al. 1999:145) revealed that there is a low prevalence of children with healthy gingival conditions. Gingivitis with bleeding and calculus was predominant in the younger age groups, with poor oral hygiene being the most important etiological factor.

Gugushe (1998:41) revealed that the prevalence of periodontal disease is directly related to socio-economic status. He concludes that disadvantaged populations generally have poorer periodontal status than non-disadvantaged ones. He attributes this to two main factors. The first is the poor oral hygiene practices commonly seen in lower socio-economic groups. The second is limited access to oral health care that leads to lower levels of utilization of dental services. The main focus of oral health services to this group is for the relief of pain and sepsis.

The National Oral Health Survey of South Africa (Department of Health 1994) revealed that in all population groups, the main problem areas were bleeding on probing and the presence of calculus. As age increased, shallow pockets became more obvious. Deep pockets and severe periodontal destruction were seen predominantly in the older age groups.

Primary data from the recent national oral health survey (Department of Health 2000) shows a similar picture (Table 3.14); with bleeding and calculus being the main findings. Bleeding levels range from 12% in Pietermaritzburg, to 28,1 in Josini. Calculus ranges from 41,2% in Ulundi, to 81,6% in Port Shepstone. Shallow pockets of 4-5mm. range from 0,3% in Port Shepstone, to 27,2% in Pietermaritzburg. There were very low values for deep pockets.

TABLE 3.14 – Prevalence of periodontal disease in 15 year old children in KZN

Region	KZN	Ladysmith	Josini	Durban	PmBurg	Ulundi	Newcastle	PShepstone
Healthy	8.6	4.7	7.9	6.8	1.1	25.3	23.2	5.9
Bleeding	17.3	15.4	28.1	18.2	12.0	19.7	1.3	11.8
Calculus	55.1	67.2	50.3	47.9	58.1	41.2	74.1	81.6
Pocket 4-5mm	16.3	11.4	9.8	22.9	27.2	11.7	1.4	0.3
Pocket 6mm/ more	2.5	0.7	3.7	4.2	1.6	1.5	--	0.4
Not Recorded	0.2	0.6	0.3	--	--	0.5	--	--

(Department of Health 2000)

The Community Periodontal Index for the fifteen year age group for the number of sextants needing different type of care is shown in Table 3.15.

TABLE 3.15 – Severity of periodontal disease in 15 year old children in KZN

Periodontal status	Mean number of sextants
Healthy sextants	2,03
Bleeding	1,34
Calculus	2,23
Shallow pockets	0,36
Deep pockets	0,04
Bleeding or higher	3,96
Calculus or higher	2,60
Shallow pockets or higher	0,40

(Department of Health 2000)

The mean number of sextants needing scaling was taken as 2,60 (calculus or higher), for calculations done in this study on the computer programme.

The periodontal disease status of KwaZulu-Natal is very similar to other third world populations (World Health Organization 1990:14). Both of

these surveys reveal that the treatment need for the large majority of the population is mainly for oral hygiene instructions and scaling and polishing, both of which can be carried out by dental auxiliaries.

3.4.4 DENTAL FLUOROSIS

In KwaZulu-Natal there are minimal levels of fluorosis, as 87% of children examined were recorded within the *normal* to *very mild* range (Table 3.16). Urban areas reveal low levels, while rural show slightly higher ones. This may be due to water being obtained from other sources such as boreholes (Table 3.7:56).

TABLE 3.16 - Percentage of 12 year old children with varying levels of dental fluorosis

Severity (%)	KZN	Ladysmith	Josini	Durban	PmBurg	Ulundi	Newcastle	PShepstone
Normal	66.1	41.7	50.7	79.6	72.2	57.8	86.4	77.1
Questionable	12.1	24.5	10.4	6.6	11.6	21.8	3.9	12.2
Very mild	9.1	16.5	17.2	2.2	7.2	14.5	2.5	4.0
Mild	4.2	9.8	7.1	2.1	4.3	1.9	1.2	1.3
Moderate	2.2	4.6	2.5	1.4	2.1	1.9	2.3	1.8
Severe	0.3	2.4	—	—	—	—	1.0	—
Not Recorded	5.9	0.5	12.1	8.1	2.6	2.1	2.7	3.7

(Department of Health 2000)

Fluoride levels in drinking water should be examined in areas that show significant scores as *mild*, *moderate* and *severe*. These figures should be monitored after fluoridation has been implemented.

3.4.5 NEED FOR DENTAL CARE (SUBJECTS)

Tables 3.17 and 3.18 show that the need for dental care is greatest in the six year age group. There also seems to be minimal need for specialized care such as crowns, veneers and pulp treatment, all of which are excluded from the basic package.

TABLE 3.17 - Type of care needed per age group expressed as a percentage

Type of Care	5 Year	6 Year	12 Year	15 Year
Dental Care	43.7	62.3	52.3	59
Preventive Care	12.6	11.5	8.6	10.8
Fissure Sealant	7.7	34.9	31.6	22.7
One-Surface Filling	15.7	17.1	18.2	25.0
2 /more Surface Filling	12.6	15.4	11.3	13.2
Extraction	21.6	28.2	12.1	12.2
Pulp Care/ Restoration	0	0.1	0.5	0.5
Crown	0	0	0.5	1.5
Veneer/Laminate	0	0.1	0	0

(Department of Health 2000)

Table 3.18 reveals that the need for care varies among regions. It is significantly higher in Port Shepstone, which ranges from 75,5% (five year) to 92,5% (fifteen year). The need is much lower in Newcastle, ranging from 19,2% (twelve year) to 30,8% (six year).

TABLE 3.18 - Percentage of children needing dental care per region of KZN

Region	5 Year	6 Year	12 Year	15 Year
Durban	43,0	60,8	52,6	56,5
Josini	39,1	45,3	39,5	47,1
Port Shepstone	75,5	85,8	90,5	92,5
Newcastle	21,5	30,8	19,2	23,8
Ladysmith	55,2	69,3	60,0	81,2
Pietermaritzburg	28,1	71,8	46,0	59,9
Ulundi	47,3	73,3	62,4	52

(Department of Health 2000)

3.4.6 ORAL MUCOSAL DISEASES

Myburgh (1999:280) discussed the Oral Health Strategy for the African Region: 1999-2008. This document recognizes that oral health has to become an integral part of community health; and should include new epidemiological priorities such as AIDS, noma and oral cancer. AIDS is particularly important in KwaZulu-Natal due to its epidemic proportions.

Soft tissue lesions include fungal, bacterial and viral infections, as well as lesions of unknown origin (Naidoo & Chikte 1999:619). The most common oral manifestation of HIV/ AIDS in sub-Saharan Africa is oral candidiasis, with prevalence ranging from 17% to 94% (Naidoo and Chikte 1999:619). Other oral manifestations include herpetic stomatitis, recurrent aphthous ulcers, hairy leukoplakia, Kaposi's sarcoma, gingival and periodontal lesions, and salivary gland disease (Naidoo and Chikte 1999:624).

Xerostomia is another oral manifestation commonly seen in these patients. It may be due to the salivary gland disease, or as a result of medication taken for the management of AIDS. This has resulted in more white spot lesions and nursing bottle caries (Naidoo & Chikte 1999:625).

The authors also state that the number, type and size of oral lesions are directly related to prognosis and the level of immunosuppression (Chikte and Naidoo 2000:662). They believe that further intensive research needs to be done for the African region. However, the importance of universal infection control was highlighted.

Currently, HIV training and diagnostic workshops are being held for health care workers and oral health personnel within the Southern Africa Region (Chikte 2000:666), as it is believed that oral health personnel can contribute significantly in the diagnosis and management of this disease.

This is because oral examinations are fast, cheap and easy to perform, and can be used to screen high-risk populations (Naidoo and Chikte 1999:626).

3.4.7 TRAUMATIC INJURIES

Due to high levels of crime and violence in KwaZulu-Natal, the management of maxillo-facial injuries is essential at all levels of the district health system. In the study by Kassan, et al. (2000:359), interpersonal violence was the most common cause of facial fractures. A large part of maxillo-facial trauma consisted of hard and soft tissue injuries. Gunshot injuries accounts for the highest level of homicide in KwaZulu-Natal (vide 3.3.7:58). It was found that with low velocity gunshot injuries to the face, initial treatment should be carried out within 12 hours of presentation to prevent post-treatment complications.

Peden and Butchart (1999:331) believe that clinical trauma services at primary, secondary and tertiary levels are poor, and there are too few trained staff available. In order to treat maxillo-facial injuries adequately, dentists must be trained to treat such cases at all levels of the district health system.

3.5 ORAL HEALTH PERSONNEL

3.5.1 TOTAL NUMBER AND DISTRIBUTION IN THE PUBLIC SECTOR

KZN has an acute shortage of all categories of oral health personnel in the public sector (Table 3.19). There are also specialists and one dental technician, but they will not be discussed in this study, as their services do not form part of the basic package (Department of Health: KZN 1999a).

TABLE 3.19 - Oral health personnel in the public sector of KZN

Category of Oral Health Personnel	Number
Dentists	35
Dental therapists	14
Oral hygienists	15
Dental assistants	94
Dental technicians	1
Community service dentists	32

(Department of Health: KZN 1999a)

Dentists make up a significant part of the oral health workforce of KZN. There are 35 full-time dentists and 32 newly qualified dentists doing community service (Department of Health 1999a). According to Reid (2001:329), the first group of dentists started community service in July 2000, and was introduced by the National Department of Health to improve the provision of health services to all citizens of South Africa.

The dentist: population ratio recommended by the oral health policy document (Department of Health 1999:11) is 1:60 000. Regional distribution (Table 3.20) varies from 3,6:100 000 in Durban to 0 dentists in Empangeni/Josini.

Dental therapists carry out basic curative procedures such as extractions and fillings. Their original role in South Africa was to provide basic oral health care to underserved rural areas (Prinsloo 1994:4). Due to a

scarcity of posts and poor remuneration within the public sector, dental therapists were subsequently allowed private practice. This has exacerbated the problem of inequitable distribution between rural and urban areas, and the private and public sectors. The existing dental therapist: population ratio is very low compared to that proposed by the draft policy document (Table 2.5:14). The only regions in KZN that have dental therapists are Durban and Empangeni (Table 3.20).

Oral hygienists are mainly responsible for the oral health prevention and promotion. The optimal oral hygienist: population ratio proposed by the policy document is significantly higher than that which exists in this province (Table 3.20). Oral hygienists work only in Port Shepstone and Durban regions.

Dental assistants assist dental operators (dentists and therapists), and can also do health promotion. The optimal ratios proposed by the policy document is dental operator: dental assistant is 1:1,5. All regions have a shortage of dental assistants, with Ladysmith and Ulundi regions being the worst (Table 3.20).

TABLE 3.20 - Regional distribution of oral health personnel in KwaZulu-Natal, expressed as units per 100 000 population

# Region	A	B	C	D	E	F	G	H
Dentists	0,7	1,1	0,1	0,2	0	3,6	0,3	0,3
Dental therapists	0	0	0	0	0	0,4	0	0,2
Oral hygienists	0,1	0	0	0	0	0,4	0	0
Dental assistants	0,2	1,1	0	0	0,6	1,7	0,4	0,3
Dental technicians	0	0	0,3	0	0	0,3	0	0

(Department of Health: KZN & Health Systems Trust 1996)

The regions are named from A to H according to the old demarcation system.

3.5.2 ATTRITION AND FILLING OF POSTS WITHIN THE PUBLIC SECTOR

According to the Department of Health: KwaZulu-Natal (1999b:8), attrition of health personnel within the public sector is high. The attrition rate for dentists in KwaZulu-Natal for 1999/2000 was six out of 35. These high numbers may be due to:

- perceived poor working conditions (short-staffed and overworked),
- emigration to other countries such as Dubai, Great Britain and the United States of America,
- losses to the private sector of South Africa,
- abolition of limited private practice, and
- stricter control measures and monitoring of overtime payment claims.

The rate of filling of posts is very low in this province, as seen in Table 3.21. This can be attributed to the freezing of posts due to financial reasons (Department of Health: KwaZulu-Natal 1999b:14)

TABLE 3.21 – Deficit in number of oral health personnel for 1999/2000

Personnel	Posts required	Posts approved
Dentists	773	78
Dental therapists	488	37

(Department of Health: KwaZulu-Natal 1999b)

3.5.3 DENTISTS IN THE PRIVATE AND PUBLIC SECTORS

The dentist: population ratio of 1: 16 000 for the total number of dentists in KwaZulu-Natal appears satisfactory. Table 3.22 reveals that the majority of dentists practise within the private sector, but serve only thirteen percent of the population (Van Rensburg and Van Rensburg 1999:215). The existing ratio in the public sector is very high compared to the optimal

ratio of 1:60 000 recommended by the policy document (Department of Health 1999:13).

TABLE 3.22 – Dentists in the private and public sectors of KZN

	Number of Dentists	Dentist: Population Ratio
Public Sector	35	1: 214 775
Private Sector	504	1: 2229
Total number	539	1: 16 030

(Van Rensburg and Van Rensburg 1999:215)

3.5.4 NON-GOVERNMENTAL ORGANIZATIONS (NGO)

There are a number of organizations providing oral health services within this province (Schmid, Cochrane, Wanamaker, Khalfe and Holness 1999:121). Many work in collaboration with the Department of Health, while others operate independently. Of the 106 such services listed in South Africa, 40 are offered in KwaZulu-Natal. However comprehensive data on these services is not available.

Examples of such organizations are:

- World Vision Child Survival Programme in the Bergville area, and is involved in health education at school level.
- Methodist Zululand Mission Air Transport (ZUMAT) which uses airplanes to transport personnel to remote rural areas
- Phelophepa Health Train and the Red Cross Flying Dentist initiatives which serve many inaccessible areas of this province
- Sai Baba health camps where volunteer personnel provide basic dental care.

3.5.5 COMMUNITY HEALTH WORKERS

“Community health workers can play a useful role in the provision of health care to disadvantaged communities” (Sheiham 1988:28). This is because they are well accepted by the local population, and understand local tradition and attitudes to health.

In KwaZulu-Natal there are 717 community health workers employed by the public sector (Department of Health: KwaZulu-Natal & Health Systems Trust 1996:109). They are believed to cover almost 20% of homesteads in this province, especially in the peri-urban informal settlements and farming areas. The National Household Survey of Health Inequities in South Africa (Hirschowitz and Orkin 1995:xix) reveals that almost 90% of African respondents thought that the introduction of community health workers would improve health services in South Africa.

3.6 DENTAL FACILITIES IN THE PUBLIC SECTOR

There is a shortage of dental facilities within KwaZulu-Natal (Department of Health: KZN 1999a). There is one academic hospital in the Durban region, affiliated to the University of Durban-Westville. This institution currently trains dental therapists and oral hygienists. Table 3.23 shows the different types of dental facilities that are available within the public sector of this province.

TABLE 3.23 - Public sector dental clinics in KZN

Type of facility	Number
Academic hospital	1
Dental clinic	18
Health center	5
Prison clinics	4
Satellite clinics	20

(Department of Health: KZN 1999a)

There are great inequalities in the number of facilities between regions. Table 3.24 shows that dental chairs are available in each region of KZN. However all of them are not in use, due to a lack of human resources in the public sector. X-ray equipment is also available within each region within this province (Department of Health: KZN & Health Systems Trust 1996:90).

TABLE 3.24 - Regional distribution of dental chairs in KwaZulu-Natal

# Region	A	B	C	D	E	F	G	H	Total	%
Clinic	2	8	5	1	1	25	3	1	46	27
Comm. health center				1		4		2	7	4
Hospital, academic						9			9	5
Hospitals community	3	2	3	3	4	3	1	4	23	14
Hospitals secondary	2	10		5	1	4	7	6	35	21
Hospitals tertiary		7				42			49	29
Total	7	27	8	10	6	87	11	13	169	100

(Department of Health: KZN & Health Systems Trust 1996:90)

The regions are named A to H according to the previous demarcation system.

3.7 SERVICE PROVISION DATA IN THE PUBLIC SECTOR

3.7.1 ORAL HEALTH SERVICE PROVISION DATA

Oral health services are provided at provincial facilities and the training institution (University of Durban-Westville). The service provision data (Department of Health 2000a:49) was obtained for the period January to December 1998 (Table 3.25). It revealed that extractions were done on 88% of patients attending provincial facilities, and 54% at the training institution. Oral health prevention and promotion is negligible, as is the management of trauma. This reinforces the findings of the latest national oral health survey (Department of Health 2000) where extractions were found to be the main type of oral health service provided.

TABLE 3.25 - Oral health service provision data of KZN for the period January to December 1999

Selected Procedures	Provincial	Training Institution
Attendance	240 440	29 974
Extractions	212 316	16 290
Analgesia/ anaesthesia	1 567	268
X-rays	5 653	243
Fillings (temporary)	1 447	293
Fillings (amalgam-teeth)	15 210	2 037
Fillings (composite-teeth)	12 477	4 288
Trauma	531	—
Oral surgery – fractures	745	—
Scale and polish	5 829	520
Fluoride	1 887	71
Fissure sealants	5 694	593
Oral hygiene instruction	11 983	683
Visits	4 013	551

(Department of Health: KwaZulu-Natal 2000a:49)

3.7.2 LEVEL OF ORAL HEALTH SERVICE PROVISION

Oral health services have not been devolved to district level according to the primary health care approach (Department of Health: KZN and Health Systems Trust 1996:93), as seen in Table 3.26. More than 50% of oral health services are performed at hospital level. The use of mobiles, clinics and community health centers are minimal. Part-time district dentists have been employed in the Newcastle region to do emergency dental care.

TABLE 3.26 - Level of oral health service provision per region of KwaZulu-Natal

# Region	A	B	C	D	E	F	G	H
Clinic	7 485	34 572	9 686	311		48 291	515	4 001
Community Health Centre				12		31 957		5 031
District Dentist (Part Time)							481	
Hospital Academic						4371		
Hospital Community	1 224	3 269	2 038		6 059			3 137
Hospital Secondary	4 192	15 418		13 558	291	9 992	13 198	18 398
Hospital Tertiary		16 398				40 997		
Mobile Services	214				162	1 966		
Local/District Offices	2 500							
Total Number	15615	69657	11724	13881	6512	137574	14194	30567

(Department of Health: KZN & Health Systems Trust 1996:93)

The regions are named A to H according to the previous demarcation system.

3.7.3 PATTERNS OF UTILIZATION OF ORAL HEALTH SERVICES

The National Oral Health Survey of South Africa shows that the majority of patients attend private dentists or dental clinics mainly for the treatment of dental symptoms (Department of Health 1994:143), which include toothache, dental abscess, broken teeth or 'gum problems' (Table 3.27).

TABLE 3.27 - Reasons for last visit to a private dentist / public clinic

Reasons for last visit	Blacks (%)	Indians (%)	Whites (%)	Coloureds (%)
Symptomatic reasons	75,6	51,8	25,5	43,6
Routine examination	3,1	6,3	34,4	6,7
Fillings	2,4	18,7	17,9	14,0
Scaling	7,9	13,3	4,1	12,6

(Department of Health 1994)

This table shows that a comparatively lower number of patients attend for routine dental examinations in all groups, except the White sector. This reinforces the fact that Whites have had access to first-world oral health services in the past, while this type of care was deficient in large sectors of other race groups (vide 3.3.1:53). This has resulted in a lack of awareness in many people due to inaccessibility, unavailability and unaffordability of oral health care. However a significant number of people in the Indian, Coloured and White groups required 'fillings' of teeth.

3.7.4 PRIMARY HEALTH CARE SERVICES

Significant primary health care services are performed at fixed clinics, community health centers, satellite clinics and mobile services in all regions of KZN (Department of Health: KwaZulu-Natal and Health Systems Trust 1996:9). They include antenatal care, child health prevention, family planning and school health services.

The amount of care between clinics and mobiles varies according to region. From Table 3.28, it can be seen that a relatively large amount of mobile services are carried out in regions A, B and F. However, limited, or no oral health services are performed on mobiles in these regions.

TABLE 3.28 - Number of child health visits at clinics and mobiles per region of KZN

#Region	A	B	C	D	E	F	G	H
Clinic Visits	247302	411324	155393	160621	134067	1666671	233712	596373
Mobile Visits	180923	153530	80231	54480	88807	158480	57512	100188
% PHC mobile	73,2	37,3	51,6	33,9	66,2	9,5	24,6	16,8
Oral health care on mobiles	214	—	—	—	162	1966	—	—

(Department of Health: KZN & Health Systems Trust 1996:9)

The regions are named A to H according to the previous demarcation system.

3.7.5 PRIMARY HEALTH CARE TEAMS

The Department of Health KwaZulu-Natal (1999b:12) calculated the number of posts needed for primary health care teams for this province, using the human resource: population ratio of 1:15 000 (Table 3.29).

TABLE 3.29 - Primary health care teams required in KZN

Region	Number of teams
Durban	227
Pietermaritzburg	80
Port Shepstone	45
Newcastle	48
Ladysmith	37
Empangeni/ Josini	80
Ulundi	43
Total	560

(Department of Health KwaZulu-Natal 1999b)

In KwaZulu-Natal, 560 teams were required, varying according to the population size of the region. The oral health personnel defined for each

team were one dental therapist and one oral hygienist, and dentists would be shared between teams.

3.7.6 ORAL HEALTH PERSONNEL PROJECTIONS OF THE DEPARTMENT OF HEALTH: KZN

The Department of Health: KZN (1999b) calculated requirements for certain categories of oral health personnel (Table 3.30). They used the human resource: population ratio method, based on national norms (operator: population ratio = 1: 15 000). They took into account expected attrition rates and primary health care teams (3.5.2:73).

Table 3.30 - Oral health personnel projections of the Department of Health

Year	2001	2002	2003
Dentists	130	130	133
Dental therapists	534	535	548

(Department of Health KZN: 1999b)

In the discussion of the results of the document by the Department of Health: KwaZulu-Natal (1999b:13), they conclude that these projections are '*extremely far-fetched and unobtainable in the expected period of time*'

3.8 SUMMARY

The situation analysis provides an overview of the entire province of KwaZulu-Natal. The socio-demographic status was examined, and trends in oral diseases were reviewed. The existing human resources and facilities were examined, and the service provision data was appraised. This information would enable the planner to consider all variables during the planning process.

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CHAPTER 4 – MATERIALS AND METHODS

4.1 INTRODUCTION

In this chapter, the way in which data is processed to plan oral health services for KZN using the basic oral health care package is explained. The purpose of this processing was to determine the number and categories of oral health personnel required to satisfy the needs of this province. Calculations were done using the computerized oral health personnel planning model (WHO/ FDI 1989:44) for the years 2000 and 2010. Discussions were held with the Department of Health: KZN, who fully supported this project (Annexure A:166).

4.2 SOURCES OF DATA

Data was obtained from primary and secondary sources (University of Pretoria 2000:20). A primary source is the original work of the author, and is derived during the course of the study. A secondary source is about the primary source, and contains information that has been analyzed, and sometimes published by researchers.

4.2.1 DENTAL CARIES

Recent unpublished data obtained from the national oral health survey conducted in 1999/2000 was used as baseline data for this study (Department of Health 2000). It measured dental caries levels in the six, twelve and fifteen year age groups. Each region of the province was measured. This information was compared to the earlier National Oral Health Survey of South Africa (Department of Health 1994) and recent local surveys conducted in KwaZulu-Natal.

The Decayed, Missing, Filled Teeth index (DMFT) was used to measure dental caries. This index measures the resultant destruction by, and accumulated treatment for past and present dental caries (Spencer 1980:311). The decayed component (DT) can be interpreted as *unmet treatment need*, the filled element (FT) as *successful treatment done*, and the missing part (MT) as *teeth lost due to caries*.

The World Health Organization/ Federation Dentaire Internationale (1989: 44) computer model was used to calculate the number of oral health personnel required to provide the basic package. This model utilizes data for the 0-14, 15-29, 30-64 and 65+ year age groups in its calculations. Therefore the dental caries levels of the 6, 12 and 15 year age groups, of the recent national oral health survey (Department of Health 2000) were projected to the cohorts recommended for the computer model. The DMFT, filled teeth (FT) and missing teeth (MT) for the different age cohorts were calculated as follows:

Decayed, Missing, Filled Teeth (DMFT):

Step i: Calculate the difference in years between minimum and maximum ages in a particular age cohort:

Cohort	0-14	15-29	30-64	65-90
No. of years	14	15	34	25

Step ii: Calculate the difference in caries levels between two age groups for a particular cohort (obtained from Table 3.8:61).

For example: between the 12 and 15 year age groups.

$$\text{DMFT (15 year)} - \text{DMFT (12 year)} = 1,87 - 1,14 = \underline{0,73}$$

Step iii: Calculate the increment per year in the DMFT to project subsequent cohorts:

$$\text{Increment} = \frac{\text{Difference in caries levels}}{\text{Difference in years}} = \frac{0,73}{3} = \underline{0,24}$$

Therefore the increment per year is 0,24.

Step iv: Dental caries levels of the cohort were calculated by:

(increment X age difference) + caries level of previous cohort

Cohort	0-14	15-29	30-64	65-90
Projected DMFT	1,7	5,3	13,46	19,46

Missing Teeth (MT):

Missing teeth (MT) were calculated using the same formula:

Step i: Calculate the difference in years between the minimum and maximum ages in a particular age cohort.

Step ii: Calculate the difference in levels of missing teeth between the two age groups for a particular cohort.

This was done between the 12 and 15 year age groups.

Therefore MT (15 year) – MT (12 year) = 0,21 – 0,08 = 0,13

Step iii: Calculate an increment per year to project subsequent cohorts:

$$\text{Increment} = \frac{\text{Difference in MT}}{\text{Difference in years}} = \frac{0,13}{3} = \underline{0,04}$$

Therefore the increment per year is 0,04.

Since previous surveys (Department of Health 1994) and service provision data (Department of Health: KwaZulu-Natal 2000a:49) show that extractions were the main type of treatment performed, the *Missing Teeth* component increases significantly with age. Therefore the increment was increased by 10% for each successive cohort.

Step iv: Missing teeth of the cohort were calculated by:

(increment X age difference) + MT level of previous cohort

Cohort	0-14	15-29	30-64	65-90
Increment	—	0,04	0,14	0,24
Missing teeth	0,2	0,8	5,56	11,56

Filled Teeth (FT):

Filled Teeth (FT) was calculated using the same formula:

Step i. Calculate the difference in years between the minimum and maximum ages in a particular age cohort.

Step ii: Calculate the difference in levels of filled teeth, e.g. this was done between the 12 and 15 year groups.

$$\text{Therefore FT (15 year) – FT (12 year) = } 0,08 - 0,05 = \underline{0,03}$$

Step iii: Calculate an increment to project subsequent cohorts:

$$\text{Increment} = \frac{\text{Difference in FT}}{\text{Difference in years}} = \frac{0,03}{3} = \underline{0,01}$$

Therefore the increment is 0,01.

The previous oral health survey (Department of Health 1994) and service provision data (Department of Health: KwaZulu-Natal: 2000a:49) show that the number of fillings performed are very low. However the number

still increases with age, but at a lower rate. Therefore the ratio was increased for each successive cohort by five percent.

Step iv: Filled teeth of the cohort were calculated by:

(increment X age difference) + FT level of previous cohort

Cohort	0-14	15-29	30-64	65-90
Increment	---	0,01	0,06	0,11
Filled teeth	0.08	0,23	2,27	5,02

The dental caries projections for the various age cohorts as used in the computer model are summarized in Table 4.1:

TABLE 4.1 - Dental caries projections for age cohorts used in this study

Age cohorts	0-14	15-29	30-64	65+
Decayed Missing Filled Teeth (DMFT)	1.7	5.3	13.6	19.5
Missing Teeth (MT)	0.2	0.8	5.6	11.6
Filled Teeth (FT)	0.1	0.2	2.3	5.0
New Fillings Teeth (NFT)	1.0	2.7	7.5	5.3
Replacement Fillings Teeth (RFT)	0.5	1.4	9.3	4.9
New Fillings Surfaces (NFS)	1.5	4.9	18.8	13.3
Replacement Fillings Surfaces (RFS)	0.8	2.5	23.3	12.3
Extractions (E)	0.2	0.6	4.8	6.0

(Calculations according to WHO/ FDI computer model 1989:44)

These projections (Table 4.1) were compared to the dental caries levels obtained for the various age groups of the National Oral Health Survey of South Africa (Department of Health 1994) in Table 4.2.

TABLE 4.2 - Dental caries status for different age groups in South Africa

Age (Years)	Blacks	Coloureds	Indians	Whites	Total
20-24	5,3	11,2	5,9	9,6	6,8
25-29	6,8	16,4	7,9	11,6	8,7
30-34	9,0	21,2	10,2	18,9	12
35-44	9,9	24,6	11,9	19,9	13,8
45-54	13,7	26,1	14,6	23,5	17,5
55-64	16,9	28,4	18,1	26,3	20,6

(Department of Health 1994)

DMFT levels in this survey were slightly higher than those obtained in the projections in Table 5.1, as derived from the recent national oral health survey (Department of Health 2000). These findings are consistent with the dental caries status of the six, twelve and fifteen year age groups, where the recent survey showed lower DMFT levels than the previous one (Table 3.8:66).

4.2.2 Periodontal Disease:

The periodontal status was obtained from primary data obtained from the national survey carried out in 1999/2000 (Department of Health 2000). This was compared to the previous national survey (Department of Health 1994).

The index used is the Community Periodontal Index of Treatment Needs (CPITN). This index was developed by the WHO for epidemiological surveys of periodontal health and treatment need (Ainamo, Barmes, Beagrie, Cuttress, Martin and Sardo-Infirri 1982:281).

Codes used for measuring periodontal disease are translated into treatment needs as represented in Table 4.3.

TABLE 4.3 - Codes used in the Community Periodontal Index of Treatment Need

Periodontal Status	Code	Code	Treatment Need
No signs of disease	0	0	No treatment
Gingival bleeding after gentle probing	1	I	Improvement in personal oral hygiene (Code 1)
Supra- or sub-gingival calculus	2	II	I + Scaling (Codes 2 & 3)
Pathologic pockets 4-5mm deep	3		
Pathologic pocket 6 mm or deeper	4	III	I + II + Complex Treatment (Code 4)

(Ainamo et al. 1982:281)

4.2.3 Preventive Care

Preventive care for the 0-14 year age cohort would be an essential component of the human resource plan. The need for preventive care (vide 3.4.5:74) was assessed for the 5, 6, 12 and 15 year age groups from the recent national oral health survey of 1999/ 2000 (Department of Health 2000).

4.2.4 HIV/ AIDS

Since KZN has the highest incidence of AIDS in South Africa, information obtained in the situation analysis was used in the human resource plan.

4.2.5 Trauma and Injury

Due to the high levels of trauma and injury in this province, calculations would be included for the emergency care of maxillo-facial injuries at all levels of the district health system.

4.3 PLANNING APPROACHES USED

A combination of the health-needs, service targets and the demand-based approaches was used in this study in order to achieve a comprehensive workable plan.

4.3.1 HEALTH-NEEDS APPROACH

In the first stage of this study, baseline data was established for the planning process. The health needs approach was used to determine the *optimal number* of oral health personnel required to provide the complete package to the state-dependent population for the year 2000. The optimal number was compared to the existing number of oral health personnel in this province.

4.3.2 SERVICE TARGETS APPROACH

This method was used for the long term plan, that would optimally utilize all existing human resources. Referring to the literature review (vide 2.4.3.31), a special feature of this method is that it is *micro-analytical*, which means that each component activity of the package can be regarded separately (Hall 1978:67). Target groups were chosen from the situation analysis, and procedures of the package were selected for the special needs of these groups.

4.3.3 DEMAND-BASED APPROACH

This approach was used to calculate the number of human resources required to provide emergency care for the relief of pain and sepsis for the long term. This is because policy documents (Department of Health 1997) recommend that at least a *minimal level* of oral health care should be available to anyone who demands it.

The human resource requirements for fillings were also calculated by this method for the entire population in the long-term plan. Fillings will be provided for the entire population, as demand for care will greatly decrease, due to the implementation of water fluoridation and other preventive efforts.

4.4 CALCULATION OF HUMAN RESOURCES

4.4.1 PROCEDURE FOR CALCULATIONS

The WHO/ FDI manual (1989) was used together with the WHO computer programme to calculate human resource requirements for KwaZulu-Natal.

The programme can be adapted to a specific situation as it allows the planner to alter one, a few, or many data elements. When data is fed into this programme (input), it automatically calculates the number of human resources required as full-time equivalents.

Selection Criteria:

- It can be adapted to special situations in a country, e.g. in this study, preventive care was calculated for a developing country, and restorative care for a country with a stable caries level.
- Additional time can be allocated to special group care for target groups, e.g. AIDS patients, AIDS orphans, the large disabled cohort, and the increasing elderly population.
- This model allows for the *selection* and *deletion* of specified treatments, from a large range of routine oral health procedures.

- The need for care can be calculated for the present situation, and in relation to future national goals. Therefore the process usually involves two or more sets of calculations.

The age cohorts used in this model are 0-14 years (school-based programmes), 15-29 years (transition from school to alternatively funded services), 30-64 years (continued alternatively funded services) and 65 years and over (special programmes for the elderly).

Data input include:

- Decayed, Missing and Filled Teeth - calculated from the recent national oral health survey, and projected for the different age cohorts (vide 4.2.1:89).
- Missing Teeth – as above.
- Filled Teeth – as above.
- Number of sextants needing scaling (vide 3.4.3:72)
- Percentage population for each recommended procedure
- Time and frequency of procedure
- Percentage demand for care

Calculations are based on a 1750-hour working year, with a fifteen-year replacement period for restorations. Each of the procedures prescribed in the basic oral health care package were analyzed separately for the different age cohorts used in this study. Estimations were initially prepared for services needed per person, expressed in minutes, for each of the procedures covered in the package. It was then divided by the number of years in a cohort to reach minutes per person per year.

4.4.2 LIMITATIONS OF THE MODEL:

- Calculations are made for the general population, and do not take into account variations of need of different communities e.g. urban, semi-urban and rural. There are significant differences in disease levels among these groups. There is also diversity in the availability of care, treatment expectations and the use of services (WHO/ FDI 1989:38).

However, this study will serve as a baseline provincial oral health policy document. Subsequently, each district would conduct its individual situation analysis to determine its special requirements. Resources can then be allocated to the different districts for the specific needs, determinants and circumstances of each community (Department of Health 2001).

- This model may over-project for human resources resulting in a surplus of personnel. This is because of a lack of awareness in oral health care in many sectors of the population (vide 3.7.3:85).
- This model does not take into account the capacity of training institutions for oral health personnel in the country.

4.5 FORMULATION OF HUMAN RESOURCE PLAN

The human resource requirements were considered together with modifying factors obtained in the situation analysis. Targets and objectives were set for the provision of oral health care in this province. The various options were appraised, and the human resource plan was formulated. This would ensure an equitable distribution and efficient utilization of all oral health personnel in meeting the oral health needs of

the province. The plan was prepared for implementation in two phases, i.e. short and long-term.

4.6 SUMMARY

After a thorough appraisal of the literature and situation analysis, the materials and methods used in the study were discussed. The WHO/ FDI (1989) manual and computer programme were used to calculate the number of oral health personnel in this study. Dental caries projections for age cohorts used by this model were performed. From this information, a human resource plan for KwaZulu-Natal was devised.



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CHAPTER 5 - HUMAN RESOURCE PLAN FOR KWAZULU-NATAL

5.1 INTRODUCTION

The situation analysis provides a comprehensive overview of conditions in the province of KwaZulu-Natal, and the human resource situation for oral health care. It reveals a gross shortage and inequitable distribution of all categories of oral health personnel in each region of this province. The WHO/ FDI manual and computer model (1989) were used to calculate the human resource requirements for the human resource plan.

5.2 CALCULATION OF OPTIMAL NUMBER OF PERSONNEL

Baseline data was obtained for this study by using the Needs-Based Approach (vide 2.4.2:26), in order to determine the *degree* of shortage of oral health personnel in this province. Calculations were done to determine the *optimal* number of personnel required for carrying out *all* procedures in the basic oral health care package for the year 2000 for the state-dependent population (Table 5.2 a-d).

These results would be compared to the existing number of personnel before formulating the human resource plan.

5.2.1 MANUAL CALCULATIONS FOR PROCEDURES PRESCRIBED IN THE BASIC ORAL HEALTH CARE PACKAGE

✦ Preventive Care

Calculations were made for preventive care for all age cohorts, using the formula:

$$\text{Time per person per year} = \frac{\text{Time required X frequency of programmes}}{\text{Number of participants}}$$

0-14 year cohort:

Groups

$$\text{Time per cohort} = 15 \text{ mins/group} \times 1.0 = 15 \text{ minutes}$$

Individuals

$$\text{Time per cohort} = 15 \text{ minutes} \times 4.0 = 60 \text{ minutes}$$

$$\text{Time per person per year} = \frac{15 + 60 \text{ minutes}}{15 \text{ years}} = \underline{5 \text{ minutes/ person/ year}}$$

15-29 year cohort:

Individuals

$$\text{Time per cohort} = 15 \text{ minutes} \times 5.0 = 75 \text{ minutes}$$

$$\text{Time per person per year} = \frac{75 \text{ minutes}}{15 \text{ years}} = \underline{5 \text{ minutes/ person/ year}}$$

30-64 year cohort:

Individuals

$$\text{Time per cohort} = 15 \text{ minutes} \times 1.0 = 15 \text{ minutes}$$

$$\text{Time per person per year} = \frac{15 \text{ minutes}}{34 \text{ years}} = \underline{0.4 \text{ minute/ person/ year}}$$

65-80 year cohort:

Individuals

$$\text{Time per cohort} = 15 \text{ minutes} \times 1.0 = 15 \text{ minutes}$$

$$\text{Time per person per year} = \frac{15 \text{ minutes}}{15 \text{ years}} = \underline{1.0 \text{ minute/ person/ year}}$$

其 Emergency Care for the relief of pain and sepsis

Calculations for emergency care include dental extractions and surgical care. Additional time for surgical care was included in these calculations due to the high level of trauma, crime and violence in KZN (vide 3.3.7:63).

其 Extractions

Calculations were done by using the formula:

$$\text{Time per person per year (minutes)} = \frac{\text{Time X Frequency}}{\text{Number of years in the cohort}}$$

where:

Frequency is determined by the computer model by inputs of DMFT, MT and MT.

Time estimates are obtained from the WHO/ FDI (1989) recommendations for these procedures, which are 7.5 minutes per extraction.

0-14 year cohort:

$$\text{Time per person per year} = \frac{7.5 \times 0.2}{15} = \frac{1.5}{5} = \underline{0.1 \text{ minute/ person/ year}}$$

15-29 year cohort:

$$\text{Time per person per year} = \frac{7.5 \times 0.6}{15} = \frac{4.5}{15} = \underline{0.3 \text{ minute/ person/ year}}$$

30-64 year cohort:

$$\text{Time per person per year} = \frac{7.5 \times 4.8}{34} = \frac{36}{34} = \underline{1.0 \text{ minute/ person/ year}}$$

65-80 year cohort:

$$\text{Time per person per year} = \frac{7.5 \times 6.0}{15} = \frac{45}{15} = \underline{3.0 \text{ minutes/ person/ year}}$$

✦ Surgical Care

Surgical care was calculated from a fixed amount of time allocated per person per year, which is:

- 0-14 year cohort = 60 minutes for 5% of the cohort
- All other cohorts = 150 minutes for 5% of the cohort

It is calculated from the formula:

$$\text{Time/ person/ year} = \frac{\text{Time (minutes)} \times \text{percentage population}}{\text{Number of years in the cohort}}$$

0-14 year cohort:

$$\text{Time per person per year} = \frac{60.0}{15} \times \frac{5.0}{100} = \underline{0.2 \text{ minute/ person/ year}}$$

15-29 year cohort:

$$\text{Time per person per year} = \frac{150.0}{15} \times \frac{5.0}{100} = \underline{0.5 \text{ minute/ person/ year}}$$

30-64 year cohort:

$$\text{Time per person per year} = \frac{150.0}{34} \times \frac{5.0}{100} = \underline{0.2 \text{ minute/ person/ year}}$$

65-80 year cohort:

$$\text{Time per person per year} = \frac{150.0}{15} \times \frac{5.0}{100} = \underline{0.5 \text{ minute/ person/ year}}$$

✦ Periodontal Care: Scaling of teeth

Time estimates for scaling for the different age cohorts were obtained by using the CPI data for mean number of sextants needing scaling (Department of Health 2000). These levels were increased by five percent for each successive cohort. The percentage population requiring different types of periodontal care was also obtained (Table 3.14:72).

According to the WHO/ FDI (1989:51), the recommended scaling time per person per year is five minutes per sextant per individual. This was calculated by the formula:

$$\text{Scaling time per person per year} = \frac{W \times T(S) \times PS(i)}{N}$$

where: W is the number of sextants needing scaling,
 $T(S)$ is the minutes for scaling per sextant,
 $PS(i)$ is the number of sessions per cohort for scaling,
 N is the number of years in the cohort.

0-14 year cohort:

$$\text{Time/ person/ year} = \frac{2.6 \times 5 \times 2.0}{15} = \underline{1,7 \text{ minutes/ person/ year}}$$

15-29 year cohort:

$$\text{Time/ person /year} = \frac{3.1 \times 5 \times 4.0}{15} = \underline{4,1 \text{ minutes/ person/ year}}$$

30-64 year cohort:

$$\text{Time/ person/ year} = \frac{3.6 \times 10.0 \times 5.0}{34} = \underline{5,1 \text{ minutes/ person/ year}}$$

65-80 year cohort:

$$\text{Time/ person/ year} = \frac{4.1 \times 10.0 \times 4.0}{15} = \underline{10,9 \text{ minutes/ person/ year}}$$

✂ Restorative Care

Calculations were only made for those procedures contained in the basic package, which included one to three surface fillings and fissure sealants. However fissure sealants were only calculated for the 0-14 year cohort. Time estimates recommended by the WHO/ FDI (1989) for restorative care are:

- Fissure sealants - T(ARR): 5 minutes per ARR
- New Fillings Teeth - T(NFT): 15 minutes per NFT

Frequency was determined by the calculations done by the computer model using the DMFT, MT and FT.

The WHO/FDI (1989:33) made the following assumptions in the calculations for restorative care:



- For all cohorts, with respect to the permanent dentition, the total DMF is accounted for by FT, plus $\frac{1}{2}$ MT, plus the sum of the teeth to have, or which have had non-interventive care.
- MT entries assume that half the teeth had been previously filled. FT entries are reduced in comparison to cumulative NFT figures by $\frac{1}{2}$ MT.

✦ New 1-3 surface fillings:

New fillings were calculated by: $\frac{\text{Time (minutes)} \times \text{Frequency}}{\text{Number of years in the cohort}}$

0-14 year cohort:

$$\text{Time/ person/ year} = \frac{15 \text{ minutes} \times 1,5}{15} = \underline{1,5 \text{ minutes/ person/ year}}$$

15-29 year cohort:

$$\text{Time/ person /year} = \frac{15 \text{ minutes} \times 4,9}{15} = \underline{4,9 \text{ minutes/ person/ year}}$$

30-64 year cohort:

$$\text{Time/ person/ year} = \frac{15 \text{ minutes} \times 18,8}{34} = \underline{8,1 \text{ minutes/ person/ year}}$$

65-80 year cohort:

$$\text{Time/ person/ year} = \frac{15 \text{ minutes} \times 13,3}{15} = \underline{13,3 \text{ minutes/ person/ year}}$$

✦ Fissure Sealants

Calculations were only done for the 0-14 year age cohort.

Fissure sealants were calculated by: $\frac{\text{Time (minutes)} \times \text{Frequency}}{\text{Number of years in the cohort}}$

0-14 year cohort:

$$\text{Minutes/ person/ year} = \frac{5 \text{ minutes} \times 0,7}{15 \text{ years}} = \underline{0,2 \text{ minute/ person/ year}}$$

✦ Special Group Care

This part does not involve a specified type of treatment, but covers the *extra time* needed to provide domiciliary or institutional care (WHO/ FDI 1989). Special group care was included in this study, for all age cohorts, due to the high level of disability (vide 3.3.8:64) and the debilitating effects of HIV/ AIDS (vide 3.3.6:62) in KwaZulu-Natal.

Special group care can involve any aspect of oral health care, and should be provided to the target groups that require such care. Time estimates used were 150 minutes for five percent for all age cohorts.

Calculations for Special Group Care were done by using the formula:

$$\text{Minutes/ person/ year} = \frac{\text{Time (minutes) X Percentage Population}}{\text{Number of years in a cohort}}$$

0-14, 15-29, 65-80 year cohorts:

$$\text{Minutes/ person/ year} = \frac{150 \text{ minutes}}{15 \text{ years}} \times \frac{5.0}{100} = \underline{0.5 \text{ minute/ person/ year}}$$

30-64 year cohort:

$$\text{Minutes/ person/ year} = \frac{150 \text{ minutes}}{34 \text{ years}} \times \frac{5.0}{100} = \underline{0.2 \text{ minute/ person/ year}}$$



TABLE 5.1 - Summary of calculations for the complete basic oral health care package for 2000

Cohort	Type of care	Total time in minutes (Column 3)	Divide column 3 by number of years in cohort	Minutes per year (Column 5)
0-14	Preventive Care	75	15	5.0
	Sp. Group Care	7.5	15	0.5
	Scaling	26	15	1.7
	Extractions	1.5	15	0.1
	Surgical Care	3.0	15	0.2
	Simple fillings	22.5	15	1.5
	Fissure Sealants	3.5	15	0.2
	Total			
15-29	Preventive Care	75.0	15	5.0
	Sp. Group Care	7.5	15	0.5
	Scaling	62.0	15	4.1
	Extractions	4.5	15	0.3
	Surgical Care	7.5	15	0.5
	Simple fillings	73.5	15	4.9
	Total			
30-64	Preventive Care	15.0	34	0.4
	Sp. Group Care	7.5	34	0.2
	Scaling	180.0	34	5.1
	Extractions	36.0	34	1.0
	Surgical Care	7.5	34	0.2
	Simple fillings	282.0	34	8.1
	Total			
65-80	Preventive Care	15.0	15	1.0
	Sp. Group Care	7.5	15	0.5
	Scaling	164.0	15	10.9
	Extractions	45.0	15	3.0
	Surgical Care	7.5	15	0.5
	Simple fillings	199.5	15	13.3
	Total			

5.2.2 COMPUTER CALCULATIONS FOR EACH PROCEDURE

Calculations were subsequently done for each age cohort on the WHO/ FDI (1989) computer model, as seen in Tables 5.2 a-d. Minor differences between calculations obtained from the computer model and manual may be due to the rounding off of results in the computer model.

TABLE 5.2a – Time estimates for the total package to the 0-14 year age cohort for 2000, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Preventive Care: Group		1.0	15.0	15.0	--
Individual		4.0	15.0	60.0	--
Subtotal					5.0
Special Group Care	5.0		150.0	7.5	0.5
Scaling (2.6)	55.0	2.0	5.0	26.0	1.7
Extractions		0.2	7.5	1.5	0.1
Surgical Care	5.0		60.0	3.0	0.2
Fissure Sealants		0.7	5.0	3.5	0.2
New fillings		1.5	15.0	22.5	1.5
TOTAL					9.2

(Calculations according to WHO/ FDI computer model 1989:44)



TABLE 5.2b – Time estimates for the total package to the 15-29 year age cohort for 2000, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Preventive Care: Group		0.0	15.0	0.0	--
Individual		5.0	15.0	75.0	--
Subtotal					5.0
Special Group Care	5.0		150.0	7.5	0.5
Scaling (3.1)	55.0	4.0	5.0	62.0	4.1
Extractions		0.6	7.5	4.5	0.3
Surgical Care	5.0		150.0	7.5	0.5
New fillings		4.9	15.0	73.5	4.9
TOTAL					15.3

(Calculations according to WHO/ FDI computer model 1989:44)

TABLE 5.2c – Time estimates for the total package to the 30-64 year age cohort for 2000, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Preventive Care: Group		0	15.0	0	--
Individuals		1.0	15.0	15.0	--
Subtotal					0.4
Special Group Care	5.0		150.0	4.5	0.2
Scaling (3.6)	55	5.0	10.0	180.0	5.1
Extractions		4.8	7.5	36.0	1.0
Surgical Care	5.0		150.0	7.5	0.2
New fillings		18.8	15.0	282.0	8.1
TOTAL					15.0

(Calculations according to WHO/ FDI computer model 1989:44)



TABLE 5.2d – Time estimates for the total package to the 65-80 year age cohort for 2000, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Preventive care: group		0	15.0	0	--
Individual		1.0	15.0	15.0	--
Subtotal					1.0
Special group care	5.0		150.00	4.5	0.5
Scaling (4.1)	55.0	4.0	10.0	164.0	10.9
Extractions		6.0	7.5	45.0	3.0
Surgical care	5.0		150	7.5	0.5
New fillings		13.3	15.0	199.5	13.3
TOTAL					29.2

(Calculations according to WHO/ FDI computer model 1989:44)

5.2.3 CALCULATION OF DEMAND FOR CARE

All calculations, done up to this stage, give time estimates of the *need* for oral health care. However, in order to obtain more realistic projections, the *demand* for care also has to be taken into consideration.

Demand is the *health services that the consumer is willing to buy, or ask for* (vide 2.4.4:35). However demand is affected by the availability of human and financial resources, as well as the awareness and attitudes to oral health care by the consumer (Department of Health 1994:141). Demand for oral health care in the public sector is mainly due to symptomatic reasons, and very few patients attend for routine dental examinations (vide 3.7.3:84).

However all demand is not met, and this is known as 'unmet demand' (vide 2.4.4:35). The demand for care that is actually used is the 'met' or 'effective' demand, and can be translated into utilization of services. Calculation of demand is dependent on current utilization rates and behaviour patterns of the consumer (vide 2.4.4:35). However, technological changes, such as water fluoridation, may also affect demand for care.

Therefore in this study, in order to determine demand for care, levels and patterns of utilization of the population of South Africa were studied (vide 3.7.3:84). In South Africa (Department of Health 1994:140), the patterns of utilization vary between race groups as shown in Table 5.3.

TABLE 5.3 - Patterns of utilization with regard to type of dental service mostly used

	Blacks (%)	Indians (%)	Whites (%)	Coloureds (%)
Private Dentists	28,7	57,7	88,2	70,0
Public Clinic	44,0	28,2	7,2	22,7
None	27,3	14,1	4,2	6,7

(Department of Health 1994)

It was found that most of the Coloured, Indian and White respondents in South Africa used private facilities. However in the Black population, only 28,7% used private dentists.

It must be remembered that 87% of the population of KwaZulu-Natal use public health services (vide 3.2.2:54), and only five percent of the African population has access to medical aid (vide 3.3.1:58).

Utilization patterns for KZN were then calculated (Table 5.4) by weighting results obtained in Table 5.3, with percentage population of this province.

TABLE 5.4-Utilization patterns of KZN, weighted according to percentage population

	Blacks	Indians	Whites	Coloureds	Total
Public Service	35,9	2,6	0,4	0,3	39,2
None	22,3	1,3	0,3	0,1	24,0

Therefore in this study, demand would be weighted at 40% for all age cohorts. In determining the optimal number of oral health personnel required for the year 2000, the effects of water fluoridation would not be included at this stage.

Calculation of need and demand for age cohorts of KwaZulu-Natal:

Minutes of need were calculated from Table 5.1 (110), and percentage demand of 40% was determined, as per section 5.2.3 (115). These results were fed into the computer programme, together with percentage population of each age cohort. Minutes of demand were determined by the computer programme. These findings are summarized in Table 5.5.

TABLE 5.5 - Summary of need and demand for the different age cohorts in KZN

Age Cohorts	Minutes of Need	% Demand	Minutes of Demand	% Population
0-14	9.2	40	3.7	35.8
15-29	15.3	40	6.1	29.4
30-64	15.0	40	6.0	29.9
65-80	29.2	40	11.7	4.9

- These calculations resulted in a weighted average of 5.5 minutes per person per year.
- Calculations were done for number of hours per year worked per operator = 1 750.
- This resulted in a human resource: population ratio of 1:19 091.
- Number of human resources required were:
= $\frac{\text{Total number of state-dependent population}}{\text{Human resource: population ratio}}$
= $\frac{7\,716\,900}{19\,091}$
= 404 oral health personnel are required to provide the complete basic oral health care package to the state-dependent population for the year 2000.

Calculations were then performed for each category of personnel:

- Procedures to be performed by oral hygienists:
preventive care
scaling of teeth
- Procedures to be performed by dental operators:
emergency care - extractions, surgical care
restorative care - fillings, fissure sealants
- Special group care:
This does not cover any specified type of treatment, but is *additional time allocated* for both dental operators and oral hygienists to provide extra care for special patients (vide 5.2.1:104).

The optimal numbers required to provide the complete package to the entire state dependent population for 2000 were 184 dental operators and 220 oral hygienists (Table 5.6). These figures will serve as baseline data for the rest of the planning process.

TABLE 5.6 – Optimal number of oral health personnel required for the complete package for 2000

Personnel	#Dental operator	\$Dentist	\$Dental therapist	Oral hygienist	*Dental assistant
Number required	184	31	153	220	276

Dental operator refers to dentists and dental therapists

* Calculated according to operator: assistant ratio of 1:1.5 proposed by policy document (Department of Health 1999)

\$ Calculated by dentist: therapist ratio of 1:5 (Department of Health 1999)

The optimal numbers were compared to existing numbers of oral health personnel in the province (Table 5.7). It can be concluded that there is an acute shortage of oral health human resources in KwaZulu-Natal. These results revealed that the *optimal number* of oral health personnel required to provide the complete basic oral health care package were unrealistic. Therefore, in the following section, modifying factors for KwaZulu-Natal will be appraised before formulating the human resource plan.

TABLE 5.7 - Comparison of existing and optimal numbers of oral health personnel required for the complete package for 2000

Personnel	* Existing Number	#Optimal Number
Dentists	65	31
Dental therapists	14	153
Oral hygienists	15	220
Dental assistants	94	276

*(Department of Health KwaZulu-Natal 1999) #(Calculations by WHO/ FDI computer model: 1989)

5.3 MODIFYING FACTORS

Human resource planning cannot be done in a static state, but should consider the rapidly changing situation in this province. Therefore factors that modify the human resource plan were then appraised.

5.3.1 POPULATION PROFILE

KwaZulu-Natal has a significant state-dependent population (87%), many of whom live in deprived socio-economic conditions (vide 3.3.1:58). The large rural component (56,9%) has limited geographical access to health services. Low educational levels contribute to decreased oral health awareness in a large sector of the population.

KwaZulu-Natal has the highest prevalence of HIV/AIDS in South Africa (Whiteside and Sunter 2000:73). Projections show that population numbers do not increase significantly due to the effects of this disease (vide 3.2.2:54). However it will result in many sick people and numerous AIDS orphans (vide 3.3.6:62). This province also has the highest number of handicapped people in the country (vide 3.3.8:64), and crime and violence statistics are significant (3.3.7:63).

5.3.2 PUBLIC SECTOR FUNDING

The increasing incidence of notifiable diseases (vide 3.3.5:62) and HIV/AIDS has resulted in a depleted public health service budget. Human and financial resources are very scarce, and priority is given, by the public sector, to these life-threatening diseases. Consequently, budgetary allocations for oral health care are minimal.

5.3.3 POLICY DOCUMENTS

The White Paper for the Transformation of the Health System in South Africa (Department of Health 1997) recommends the prioritization of

service delivery to target groups, with a shift toward prevention and promotion within the district health system.

5.3.4 CARE PROFILES AND PROCEDURES

There are large differences between the number of oral health human resources in the public and private sectors. Even though dentist: population ratios appear to be satisfactory in this province (vide 3.5.3:79), oral health services are inaccessible to the large state-dependent population due to financial constraints.

In the public service, extractions are the main type of service provided. Oral health prevention and promotion is negligible. Special care for the large handicapped population is minimal, and the management of the maxillo-facial injuries due to trauma is neglected.

Many non-governmental organizations work independently of each other, resulting in a duplication of services in some areas, with a deficiency of service provision in others (vide 3.5.4:80). This province has a large number of community health workers, many of whom work in peri-urban and rural areas (vide 3.5.5:81). Primary health care services have obtained extensive coverage within KwaZulu-Natal, and are carried out at schools, crèches, and mother and child clinics (vide 3.7.4:85).

5.3.5 ORAL HEALTH STATUS

The DMFT of the population of this province appears to be stable (Table 3.8:66), and many of the World Health Organization goals for the year 2000 (Table 2.3:16) have been reached. With the introduction of fluoridated water and fluoride toothpastes, these levels should decrease further in the long term (Renson et al. 1995:238; Chikte et al. 1996:697).

However, when the Significant Caries Index for 12 year old Black children in South Africa of 4,30 is considered, it is clear that certain sectors of the population have higher caries levels than others (vide 2.2.2:16). This index has not been determined for KZN. However, in this study, it is hoped that screening programmes will reveal these high-risk groups.

The HIV/AIDS epidemic is associated with oral manifestations, many of which can be alleviated by oral health care (vide 3.4.6:75). Therefore greater time has to be allocated for special group care for such high-risk individuals.

5.3.6 DEMAND FOR ORAL HEALTH CARE

- Factors increasing demand for oral health care (Hall 1978:59) are:
 - Oral health promotion efforts performed in the short-term would increase the awareness of the population in oral health care, and health services available (Schou and Blinkhorn 1993).
 - As accessibility, availability and acceptability of oral health services improve in the short-term, more people will attend for dental procedures, other than for symptomatic relief of pain. This would redress the large backlog in oral health care.

- Factor decreasing demand for oral health services:
 - Water fluoridation, which would result in a decrease in the dental caries levels mainly in children (Murray 1986; Renson et al. 1985; Du Plessis et al. 1995). This would reduce the need for preventive care in large sectors of the population, thereby decreasing the oral health personnel requirement.

This can be accomplished by employing all dentists doing compulsory community service to underserved areas only. This will greatly increase the human resource pool in rural areas.

Incentives should be provided to existing oral health personnel, within the public sector, to work in rural areas (Mejia 1978:272). They could include post-graduate study bursaries, additional remuneration packages, and an efficient and effective working environment. Therefore existing dental facilities and infrastructure should be upgraded, if necessary, to support personnel.

5.5.2 SERVICE PROVISION BY ORAL HYGIENISTS

From Table 5.10, it can be seen that, after re-allocation to regions, there will be a very small number of oral hygienists in each region within the public sector. Therefore oral hygienists should be utilized to provide preventive care to target groups.

✦ Preventive Care

- Oral health prevention, promotion and education programmes should be focused on target groups as recommended by the policy documents (vide 2.2.2:13). They include:
 - pre-school children at mother and child clinics,
 - school children as part of school-health programmes,
 - pregnant women at ante-natal clinics,
 - elderly and handicapped individuals at institutions, and
 - AIDS patients and AIDS orphans at hospitals and institutions.

- Courses in Oral Health Care – oral hygienists should provide courses in oral health care to the various cadres of people who provide health

education to the community. They include school-teachers, school-health nurses, primary health care nurses and community health workers.

- Incorporation of oral health care into district health programmes – oral hygienists should have collaborative discussions with the authorities at district level, on how to incorporate oral health prevention, promotion and education into the existing comprehensive health programmes of the region. They should also devise special programmes for the districts in which they are located.

Annual Examination

The screening of school children for dental caries has been found to stimulate dental attendance in children in all social classes (Donaldson and Kinirons 2001:143).

Examination time is included in the time allowances for each category of procedure, and includes visits for check-ups and for specific care (WHO/FDI 1989:26). All the target groups will have access to an annual examination, as prescribed by the basic oral health care package. If any further dental treatment is required, patients should be referred to dental clinics at district hospitals for the other procedures recommended by the basic package.

5.5.3 SERVICE PROVISION BY DENTAL OPERATORS

Emergency care for the relief of pain and sepsis

Pain in the oral cavity is the foremost reason that patients attend the dental clinic (Scully 1989:323). It is often found that, the best way to treat pain, is by removing the cause (Scully 1988:128), e.g. incision and drainage of an acute dental abscess provides immediate pain relief.

Emergency care for the relief of pain and sepsis will be provided on demand to the entire state-dependent population, and will include:

- extractions, and incision and drainage for the removal of pus,
- prescription of essential drugs (antibiotics and analgesics),
- temporary fillings for the relief of acute pain,
- surgical treatment of maxillo-facial injuries,
- diagnosis and management of the oral manifestations of Aids,
- and infection control measures.

Restorative Care and Bite-Wing Radiographs

According to the Department of Health (1994), only 32% of the six-year age group is caries-free. This is low compared to the World Health Organization goal for 2000 of 50% (FDI 1982:74). However, the mean DMFT of the twelve-year age group in KZN is 1,2. This is relatively low compared to other countries (Table 5.9:126). The DMFT of KZN varies from 0,4 in Ulundi to 2,5 in Ladysmith (Table 3.13:69), which shows that rural areas have significantly lower levels of dental caries. Therefore the Significant Caries Index needs to be done for each population when district-specific plans are being formulated (vide 2.2.2:16).

The 0-14 year cohort was chosen as the target group for restorative care in the short-term plan. Children will be screened at schools and clinics by oral hygienists, school health nurses and teachers. Referral should be done to dental operators at the nearest health facility within the district. Restorative care will focus on simple one to three surface fillings for the management of the dental caries in the 0-14 year age cohort.

Bite-wing radiographs are also recommended by the basic oral health package. Most regions within this province have access to x-ray equipment (vide 3.6:82), and radiographs are currently being taken at the

training institution and provincial clinics (vide 3.7.1:83). However due to the shortage of financial resources, and the high cost involved in the provision of this procedure, bite-wing radiographs will not be included in the calculations. The existing x-ray equipment can be used in the management of dental emergencies.

5.5.4 WATER FLUORIDATION

As discussed in the literature review (vide 2.2.1:12), it can be concluded that water fluoridation is one of the cheapest and most cost-effective methods of caries prevention. According to the Department of Health (1998), the cost of adjusting the fluoride concentration in drinking water is less than one rand per person per year. It is 18 times cheaper than toothpaste, and 61 times cheaper than filling a tooth.

Renson, et al. (1985:238) has reported a reduction or stabilization of mean DMFT in many countries due to water fluoridation, as demonstrated in Table 5.9. This will result in a reduction in the need, and therefore demand, for dental care in the long term.

Table 5.9 - Mean reduction in DMFT of 12 year old children in countries following water fluoridation

Country	Year	DMFT	Year	DMFT	% Coverage by 1982
Hong Kong	1968	2.0	1980	1.8	98
Australia	1975	4.8	1983	2.8	65
Colombia	1965	7.1	1980	4.8	37
Brazil	1975	7.2	1980	7.2	23
Singapore	1970	3.0	1979	2.8	100

(Renson et al. 1985:238)

The article, by McDonagh, Whiting, Wilson, Sutton, Chestnut, Cooper, Misso, Bradley, Treasure and Kleijnen (2000:855), reviewed the safety and efficacy of fluoridation on drinking water. It measured the change in

prevalence of dental caries from baseline to final examination, in fluoridated compared to control areas. Adverse effects were also measured.

Results showed that in fluoridated areas, there was a significant increase in the proportion of children without caries in 19 out of 30 analyses. The range (median) of the mean difference in the percentage of children without caries was 5,0% - 64% (14,6%). In addition, 15 of 16 analyses found a significantly greater mean change in decayed, missing and filled primary/ permanent teeth in the fluoridated areas than in the non-fluoridated ones. The mean change in decayed, missing and filled primary/ permanent teeth was 2,25 teeth.

McDonagh et al. (2000:855) also revealed a dose-dependent increase in dental fluorosis. At a water fluoride concentration of 1,0 p.p.m, the prevalence of fluorosis was 48%, and fluorosis of esthetic concern was 12,5%. Therefore during the implementation of water fluoridation, existing water fluoride levels and dental fluorosis should be carefully monitored.

Murray (1986:44) summarized the findings of many water fluoridation studies. He found that a 50 to 60% reduction in dental caries levels in the permanent dentition was seen, if exposure occurred from birth to two years. However all studies showed a reduction of less than 50% when water fluoridation was started at four years or older. The post-eruptive benefits of fluoride are mainly on smooth tooth surfaces, whereas the pre-eruptive effects are on pit and fissures and smooth surfaces.

Water fluoridation has been legislated nationally (Republic of South Africa 2000), and should be implemented at provincial level as soon as possible. Therefore negotiations should be conducted between the Departments of Health, Water Affairs and Forestry, and Umgeni Water as a matter of priority.

5.6 LONG TERM PLANS

5.6.1 INTRODUCTION

From Table 5.7 (118), it is evident that the full basic oral health care package cannot be provided to the entire state-dependent population. Therefore procedures were selected for the long-term plans, concentrating on target groups, to ensure that the population receives the best available oral health care within limited resources.

Two sets of calculations were done for the long-term plan:

- The first set of calculations was done to determine the number of oral health personnel required, using current *DMFT levels* as calculated in Table 4.1.
- Subsequently, due to the anticipated effects of water fluoridation, a second set of calculations using decreased DMFT levels, were done. The DMFT of the 0-14 year cohort was decreased by 30%, and the other three cohorts by 10%.

5.6.2 PROCEDURES RECOMMENDED FOR DENTAL OPERATORS

✦ **Emergency care for the relief of pain and sepsis**

Policy documents recommend that at least a *minimal* level of oral health care should be provided to the state-dependent population. This will include all procedures recommended in the short-term plan (vide 5.5.3:124), including extractions and surgical care.

Calculations done for emergency care were the same as for those done for optimal levels (vide 5.2.1:104) since this care would be available to all age cohorts. (Table 5.11 a-d:135).

✦ Restorative Care and Bite-Wing Radiographs

Simple one to three surface fillings will be provided to all age cohorts in the long term plan. Replacement fillings are not included in the calculations because the amount of restorative care performed in the public sector has been very low.

Due to the high cost of x-rays, bite-wing radiographs would not be included in the calculations. X-ray equipment is available in all regions of KwaZulu-Natal (vide 3.6:82) and should be used in the management of dental emergencies.

$$\text{Minutes/ person/ year} = \frac{\text{Time (minutes)} \times \text{Frequency}}{\text{Number of years in the cohort}}$$

0-14 year cohort:

$$\frac{15 \text{ minutes} \times 1,5}{15 \text{ years}} = \underline{1,5 \text{ minutes/ person/ year}}$$

15-29 year cohort:

$$\frac{15 \text{ minutes} \times 4,9}{15 \text{ years}} = \underline{4,9 \text{ minutes/ person/ year}}$$

30-64 year cohort:

$$\frac{15 \text{ minutes} \times 18,8}{34 \text{ years}} = \underline{8,1 \text{ minutes/ person/ year}}$$

65-80 year cohort:

$$\frac{15 \text{ minutes} \times 13,3}{15 \text{ years}} = \underline{13,3 \text{ minutes/ person/ year}}$$

✦ Fissure sealants

Kidd and Joyston-Bechal (1997:169) state that fissure sealing *all* posterior teeth may be regarded as “overtreatment”. It should be done on high caries-risk patients. These include children with special needs e.g. handicapped, poor oral hygiene, high level of caries in the primary dentition and caries-susceptible e.g. deep pits and fissures.

Primary data of the recent national survey (Department of Health 2000) reveals the greatest need of 34.9% and 31.6% are in the six and twelve year age groups respectively. The average number of teeth requiring sealing is 1.2 and 2.1 respectively. Therefore in this study, sealants would be provided for high-risk children for the 0-14 year age cohort on a referral basis only.

Fissure sealants were calculated by: $\frac{\text{Time (minutes)} \times \text{Frequency}}{\text{Number of years in the cohort}}$

$$\text{Minutes/ person/ year} = \frac{5 \text{ minutes} \times 0,7}{15 \text{ years}} = \underline{0,2 \text{ minute/ person/ year}}$$

5.6.3 PROCEDURES RECOMMENDED FOR ORAL HYGIENISTS

✦ Preventive care

By 2010, the primary health care teams of this province should have been established (vide 3.7.5:86). It is hoped that oral health promotion and education will be completely integrated into the general health programmes at district level at this stage. Target groups would include all those recommended in the short-term plan.

Currently 67,6% of the population of KwaZulu-Natal has access to piped water (vide 3.3.4:61). Approximately five million consumers are from urban areas, and one million are from rural areas (Umgeni Water 2000:3). The national goal for 2005 (Table 2.1:15) is to ensure that 40% of the population with piped water systems receives fluoridated water.

However it is hoped that the entire population that is currently supplied by Umgeni Water will receive fluoridated water by 2010. This will translate to 67,6% of the total population receiving fluoridated water, and will result in a need for specific prevention procedures for about 33% of the population. This will also decrease the oral health personnel requirement.

Annual Examination

An annual examination would be available for all target groups listed under preventive care. Patients should be referred to the dental clinics in that district for further care.

Scaling of teeth

The recent national survey (Department of Health 2000) shows that a significant percentage of the population (55%) has calculus and bleeding on probing (Table 3.14:72). The draft South African Oral Health Policy (Department of Health 2001:13) indicates that there is good evidence to recommend scaling for initial therapy in patients with active periodontitis when combined with maintenance therapy. However, this document also states that there is no evidence to show that there are benefits of root planning in periodontal therapy.

Due to the high level of HIV/ AIDS, scaling of teeth would be provided in the long term plan for the 0-14 and 15-29 year cohorts, due to these

groups being considered as *high risk* (vide 3.3.6:62). Oral manifestations of AIDS, such as gingival and periodontal lesions, can be managed effectively by scaling of teeth, and oral hygiene instructions (Naidoo and Chikte 1999:624).

Scaling time per person per year would be calculated as described in Section 5.2.1(106):

0-14 year cohort:

$$\text{Time/ person/ year} = \frac{2,6 \times 5 \times 2,0}{15} = \underline{1,7 \text{ mins/person/year}}$$

15-29 year cohort:

$$\text{Time/ person/ year} = \frac{3,1 \times 5 \times 4,0}{15} = \underline{4,1 \text{ mins/person/year}}$$

5.6.4 SPECIAL GROUP CARE

Target groups would include the elderly, handicapped, AIDS patients and orphans, and calculations were done as described in section 5.2.1. By 2010, the AIDS epidemic would have peaked, resulting in a large number of people with full-blown AIDS, and many AIDS orphans (vide 3.3.6:63).

Therefore time estimates for special group care will be increased to 150 minutes for 10% of the 0-14 and 15-29 year age cohorts. The 30-64 year cohort would remain at 150 minutes for 5% of the population, due to this group being economically active. The 65-80 year cohort would also increase to 150 minutes for 10% due to their increasing numbers.



0-14 year cohort:

$$\text{Minutes/ person/ year} = \frac{150 \text{ minutes}}{15 \text{ years}} \times \frac{10,0}{100} = \underline{1,0 \text{ min/ person/ year}}$$

15-29 year cohort:

$$\text{Minutes/ person/ year} = \frac{150 \text{ minutes}}{15 \text{ years}} \times \frac{10,0}{100} = \underline{1,0 \text{ min/ person/ year}}$$

30-64 year cohort:

$$\text{Minutes/ person/ year} = \frac{150 \text{ minutes}}{34 \text{ years}} \times \frac{5,0}{100} = \underline{0,2 \text{ min/ person/ year}}$$

65-80 year cohort:

$$\text{Minutes/ person/ year} = \frac{150 \text{ minutes}}{15 \text{ years}} \times \frac{10,0}{100} = \underline{1,0 \text{ min/ person/ year}}$$



TABLE 5.10 - Summary of calculations for selected procedures in the basic oral health care package for 2010

Cohort	Type of care	Total time in minutes (Column 3)	Divide column 3 by number of years in cohort	Minutes per year (Column 5)
0-14	Preventive Care	75.0	15	5.0
	Sp. Group Care	15.0	15	1.0
	Scaling	26.0	15	1.7
	Extractions	1.5	15	0.1
	Surgical Care	3.0	15	0.2
	Simple fillings	22.5	15	1.5
	Fissure Sealants	3.5	15	0.2
	Total			9.7
15-29	Sp. Group Care	15.0	15	1.0
	Scaling	62.0	15	4.1
	Extractions	4.5	15	0.3
	Surgical Care	7.5	15	0.5
	Simple fillings	73.5	15	4.9
	Total			10.8
30-64	Sp. Group Care	7.5	34	0.2
	Extractions	36.0	34	1.0
	Surgical Care	7.5	34	0.2
	New fillings	282.0	34	8.1
	Total			9.5
65-80	Sp. Group Care	15.0	15	1.0
	Extractions	45.0	15	3.0
	Surgical Care	7.5	15	0.5
	New fillings	199.5	15	13.3
	Total			17.8

(Calculations according to WHO/ FDI 1989)

5.6.5 CALCULATION OF ORAL HEALTH PERSONNEL REQUIREMENT USING CURRENT DMFT LEVELS

Calculations were also done using the computer model to determine the total number of oral health personnel required in the long term using *current DMFT levels* (Tables 5.11 a-d).

TABLE 5.11a – Time estimates for the provision of selected procedures for the long-term plan for the 0-14 year age cohort, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/cohort (minutes)	Time/ year (minutes)
Preventive Care: Group		1.0	15.0	15.0	--
Individual		4.0	15.0	60.0	--
Subtotal					5.0
Special Group Care	10.0		150.0	15.0	1.0
Scaling	55.0	2.0	5.0	26.0	1.7
Extractions		0.2	7.5	1.5	0.1
Surgical Care	5.0		60.0	3.0	0.2
Fissure Sealants	10.0	0.7	5.0	3.5	0.2
New Fillings		1.5	15.0	22.5	1.5
TOTAL					9.7

(Calculations according to WHO/ FDI 1989)



TABLE 5.11b – Time estimates for the provision of selected procedures for the long term plan for the 15-29 year age cohort, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Special Group Care	10.0		150.0	15.0	1.0
Scaling	30	4.0	5.0	62.0	4.1
Extractions		0.6	7.5	4.5	0.3
Surgical Care	5.0		150.0	7.5	0.5
New Fillings	40	4.9	15.0	73.5	4.9
TOTAL					10.8

(Calculations according to WHO/ FDI 1989)

TABLE 5.11c – Time estimates for the provision of selected procedures for the long term plan for the 30-64 year age cohort, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Special Group Care	5.0		150.0	7.5	0.2
Extraction		4.8	7.5	36.0	1.0
Surgical Care	5.0		150.0	7.5	0.2
New Fillings		18.8	15.0	282.0	8.1
TOTAL					9.5

(Calculations according to WHO/ FDI 1989)



TABLE 5.11d – Time estimates for the provision of selected procedures for the long term plan for the 65-80 year age cohort, expressed in minutes per person per year

Type of Care	Percentage population	Frequency	Time (minutes)	Time/ cohort (minutes)	Time/ year (minutes)
Special Group Care	10		150.00	15.0	1.0
Extraction	40	6.0	7.5	45.0	3.0
Surgical Care	5.0		150	7.5	0.5
New Fillings		13.3	15.0	199.5	13.3
TOTAL					17.8

(Calculations according to WHO/ FDI 1989)

Calculation of need and demand for age cohorts of KwaZulu-Natal

Minutes of need were calculated from Table 5.10(134), and percentage demand was determined as per section 5.2.3(115). These results were fed into the computer programme, together with percentage population of each cohort. Minutes of demand were determined by the computer programme. These findings are summarized in Table 5.12.

TABLE 5.12 - Summary of need and demand for the different age cohorts for the long term plan

Age Cohorts	Minutes of Need	% Demand	Minutes of Demand	% Population
0-14	9.7	40	3.9	35.8
15-29	10.8	40	4.3	29.4
30-64	9.5	40	3.8	29.9
65-80	17.8	40	7.1	4.9

(Calculations according to WHO/ FDI 1989)

- These calculations resulted in a weighted average of 4,1 minutes per person per year.
- Calculations were done for number of hours per year worked per operator = 1 750.
- This resulted in a human resource: population ratio of 1:25 610.
- Number of human resources required were:

$$= \frac{\text{Total number of state-dependent population}}{\text{Human resource: population ratio}}$$

$$= \frac{7\,912\,650}{25\,610}$$

$$= 309$$
oral health personnel are required to provide selected procedures of the basic oral health care package for the year 2010.

Calculations were then performed for each category of personnel as described in section 5.2.3 (118).

TABLE 5.13 – Number of oral health personnel required for the long term plan

Category	#Dental operator	\$Dentist	\$Dental therapist	Oral hygienist	*Dental assistant
Number required	196	33	163	113	294

Dental operator refers to dentists and dental therapists

* Calculated according to operator: assistant ratio of 1:1.5 proposed by policy document (Department of Health 1999)

\$ Calculated by dentist: therapist ratio of 1:5 (Department of Health 1999)

During the initial stages of implementation of the long term plan, if there are inadequate financial and human resources, the number of oral health personnel can be almost halved by providing simple fillings to the 0-14 and 15-29 year cohorts only (Table 5.14). The other cohorts can be provided for as, and when, resources become available.

TABLE 5.14 – Number of oral health personnel required for the long term plan, with provision of simple fillings to the first two cohorts only

Personnel	#Dental operator	\$Dentist	\$Dental therapist	Oral hygienist	*Dental assistant
Number required	106	18	88	113	159

5.6.6 CALCULATION OF ORAL HEALTH PERSONNEL REQUIREMENT USING DECREASED DMFT LEVELS DUE TO WATER FLUORIDATION

Calculations were done using the decreased DMFT levels anticipated due to the implementation of water fluoridation (Table 5.15).

TABLE 5.15 - Dental caries projections showing reduced levels of DMFT due to water fluoridation for age cohorts used in this study

Age cohorts	0-14 (30% reduction)	15-29 (10% reduction)	30-64 (10% reduction)	65+ (10% reduction)
DMFT	1.2	4.8	12.2	17.6
MT	0.2	0.8	5.6	11.6
FT	0.1	0.2	2.3	5.0
NFT	0.7	2.7	6.7	4.9
NFS	1.1	4.9	16.8	12.3
Extractions	0.2	0.6	4.8	6.0

(Calculations according to WHO/ FDI computer model 1989:44)

However, in the computer programme, the effects of water fluoridation on DMFT levels only affected the time estimates for Restorative Care: fillings. Therefore Table 5.16 will only show this aspect of the new calculations.

TABLE 5.16 – Time estimates for restorative care for the long term plan, taking into account reduced DMFT due to the effect of fluoridation, expressed in minutes per person per year

Cohort	Frequency	Time	Time per cohort	Time per year
0-14	1.1	15.0	16.5	1.1
15-29	4.9	15.0	73.5	4.9
30-64	16.8	15.0	252.0	7.2
65-90	12.3	15.0	184.5	12.3

(Calculations according to WHO/ FDI 1989)

Calculation of need and demand for age cohorts of KwaZulu-Natal

Need and demand was calculated as in section 5.6.5 (135) and is summarized in Table 5.17.

TABLE 5.17 - Summary of need and demand for the different age cohorts taking into account the effects of water fluoridation

Age Cohorts	Minutes of Need	% Demand	Minutes of Demand	% Population
0-14	9.3	40	3.9	35.8
15-29	10.8	40	4.3	29.4
30-64	8.6	40	3.4	29.9
65-80	16.8	40	6.7	4.9

- These calculations resulted in a weighted average of 3.9 minutes per person per year.
- Calculations were done for number of hours per year worked per operator = 1 750.
- This resulted in a human resource: population ratio of 1:26 923.
- Number of human resources required were:

$$= \frac{\text{Total number of state-dependent population}}{\text{Human resource: population ratio}}$$

$$= \frac{7\,912\,650}{26\,923}$$
- = 294 oral health personnel are required to provide selected procedures of the basic oral health care package for the year 2010 taking into the effects of water fluoridation.

Calculations were then performed for each category of personnel as described in section 5.6.5, and represented in Table 5.18.

TABLE 5.18 – Number of oral health personnel required for the long term plan taking into account the effects of water fluoridation

Personnel	#Dental operator	\$Dentist	\$Dental therapist	Oral hygienist	*Dental assistant
Number required	181	30	151	113	272

From Table 5.18, it can be seen that water fluoridation decreases the number of oral health personnel required. Therefore the immediate implementation of water fluoridation should become a priority for the provincial Departments of Health, and Water Affairs and Forestry.

5.7 SUMMARY

The optimal number of personnel required to provide the complete package was calculated, and compared to existing numbers and distribution in KZN. The human resource plan was formulated for the short and long terms.

Due to the shortage of human resources, the short term plan aimed to provide at least a minimal level of oral health care to the state-dependent population, by equitably redistributing all existing personnel to each region of this province. Selected dental procedures would be provided to target groups, and water fluoridation was identified as a priority.

In the long term plan, due to changing epidemiologic priorities in the province, target groups were also used to provide selected procedures to sectors of the population who needed them most. The human resource plan was therefore formulated to ensure the optimal utilization of human resources in the provision of oral health care to the state-dependent population of KwaZulu-Natal.

CHAPTER 6 - DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

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CHAPTER 6 - DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

6.1 DISCUSSION

Human resources take up between sixty and seventy-five percent of the health sector recurrent budget (Green 1994:291). Therefore planning for oral health personnel should be comprehensive and thorough in order to make optimal use of all available resources.

Planning for oral health personnel should be done many years in advance since production takes a long time, and is expensive to the state (Mejia & Fulop 1978:13). It must also be remembered that oral health care has received low priority by the South African government and the consuming public. Therefore, budgets and other resources are minimal; and plans should be formulated which make optimum use of these limited resources.

The situation analysis revealed that KwaZulu-Natal had the highest population of all the provinces of South Africa, with eighty seven percent being state-dependent. This province is beset by high levels of poverty, disease, disability and trauma. KZN has the highest prevalence of HIV/AIDS in South Africa.

Historical circumstances have resulted in gross inequities in the health care system of this province (vide 2.3.1:19). There is also a significant rural component that lives in areas with scattered terrain and inadequate transport systems (vide 3.3.1:58). Access to health facilities is inadequate, and oral health awareness is low.

The dental caries status within this province appears to be stable (vide 3.4.2:66), and the WHO goal for 2000, and South African goal for 2010, of the twelve year age group has already been reached. The Significant Caries Index for KZN has not been determined (vide 2.2.2:16). However national and local surveys reveal a large backlog in oral health care that needs to be redressed (vide 3.4.2:65).

There are adequate numbers of oral health personnel in this province (vide 3.5.3:77). However, most of them work in the private sector, and serve only thirteen percent of the population. Non-governmental organizations provide oral health services to many underserved communities in this province (vide 3.5.4:80). This is often done in an uncoordinated manner, resulting in a duplication of services in some areas, and a lack of care in others. There is an established primary health care network performing health prevention and promotion to large sectors of the population of this province (3.7.4:85). Extensive coverage of deep rural areas is obtained by mobile services.

To overcome the problem of health services historically being focused towards the Medical Model (vide 2.3.4:23), the National Department of Health has based its health services on the primary health care approach functioning within the district health system. Policy documents recommend that a basic package of oral health services should be available for all state-dependent people. Goals for oral health have been proposed for 2005 and 2010. Target groups have been defined and priority areas identified for the provision of oral health care.

A combination of planning approaches was used in this study in order to achieve a more comprehensive overall plan for this province. The WHO/ FDI (1989) manual and computer model were utilized to calculate the number of human resources needed.

The human resource plan for KwaZulu-Natal was formulated for the short and long terms. Baseline data was obtained by calculating the optimal number of human resources required to provide the complete package to the state-dependent population for 2000 (vide 5.2:103). This was compared to the number and distribution of existing personnel (3.5.1:77), and revealed a shortage and inequitable distribution of oral health personnel in all regions.

The short-term plan was drawn up to provide, at least a minimal level of, oral health care to all state-dependent people. All existing oral health personnel would be equitably redistributed to each region of KZN, and an emergency oral health service would be available to this population. Due to the shortage of personnel, target groups were identified for selected procedures.

Significant sectors of the population of KZN receive water from Umgeni Water. The implementation of water fluoridation was identified as a priority, as international studies have shown decreases in dental caries levels after this initiative was carried out. This would translate to a decreased oral health personnel requirement.

The long term plan was formulated, taking into account the anticipated decrease in dental caries due to fluoridation (vide 2.2.1:12), and the new epidemiologic priorities caused by HIV/ AIDS (vide 3.4.6:75). The AIDS pandemic would have peaked by 2010, resulting in many AIDS patients and orphans (3.3.6:63). In addition, this province has the largest disabled population in South Africa (vide 3.3.8:64), an increasing aged cohort, and an escalating number of victims of crime and violence (3.3.7:63). Therefore additional time was included in the long term plan for special group care to address the specific needs of these populations.

Due to an anticipated shortage of human and financial resources, target groups were again identified for selected dental procedures. Oral health services would refocus on prevention and special group care. Restorative care would initially be provided to the first two age cohorts. If resources become available, provision can be made to the older age groups.

The number of oral health human resources required, as determined by this study, is shown in Table 6.1. During the initial stages of implementation of the long term plan, if there are inadequate financial and human resources, the number of oral health personnel can be almost halved by providing simple fillings to the 0-14 and 15-29 year cohorts only. The other cohorts can be provided for as resources become available.

TABLE 6.1 – Human resource requirements calculated for 2000 and 2010 for selected procedures of the basic oral health care package

Year	Human resources	Dental operators	Oral hygienists
2000 complete package (optimal number, baseline data for planning process)	404	184	220
2010 with current DMFT levels (selected procedures to target groups)	309	196	113
2010 with reduced DMFT due to fluoridation (selected procedures to target groups)	294	181	113
2010 with current DMFT levels (selected procedures to target groups, & simple fillings provided to the first two cohorts only)	219	106	113

Calculations were done for the *complete* package for 2000, and for *selected procedures* only for 2010. However, the required number of dental operators increased in the long term plan, mainly due to the additional time allocated for special group care and the increasing population numbers. However the effects of water fluoridation decreased the human resource requirements significantly.

LIMITATIONS OF THE STUDY:

- 6.1.1 The supply of human resources will change due to the:
- movement of personnel between the private and public sectors
 - number of dentists allocated for community service varies each year
 - number of human resources affected by HIV/AIDS has not been determined.
- 6.1.2 Population projections used in this study have taken into account the effect of AIDS. The effects of interventive measures on this disease have not been considered.
- 6.1.3 Demarcations for the regions of KwaZulu-Natal are currently being revised. Regional boundaries may change which could alter population distribution.
- 6.1.4 The district health system has not been implemented fully in this province.
- 6.1.5 Planning was done for the province of KwaZulu-Natal as a whole. The WHO/FDI (1978) oral health personnel planning model does not take into account the special needs of individual communities.

6.2 CONCLUSIONS

- 6.2.1 There is a gross shortage and inequitable distribution of oral health personnel within the *public* service of KwaZulu-Natal. About six percent of all the dentists in this province work within the public sector. They are expected to serve eighty seven percent of the population.
- 6.2.2 There are high morbidity and mortality rates in this province, which uses up a significant proportion of the total health budget of the province. It is therefore improbable for any major increase in the oral health budget in the near future.
- 6.2.3 Due to the shortage of human and financial resources, it will not be possible to implement the complete basic package for all state-dependent people.
- 6.2.4 Oral health services in KwaZulu-Natal have not been completely devolved to district level. Minimal health prevention and promotion is being done, with the focus being on curative care.
- 6.2.5 Dental facilities and infrastructure are scarce in several regions of this province. Therefore many people of low socio-economic status do not have access to basic oral health services, and often lack an awareness of oral health care.
- 6.2.6 The dental caries status of the population of KwaZulu-Natal appears to be stable. Water fluoridation and other preventive efforts will contribute further towards lowering these levels. This will decrease the number of personnel required to provide basic oral health services. Therefore dental personnel can re-focus their efforts towards other priority areas, such as the management of oral manifestations of AIDS and special group care.

6.3 RECOMMENDATIONS

Human resource planning for a province must be done within the national political framework, health policies and plans of a country. Therefore policy documents were consulted during the formulation of the human resource plan.

The health human resource development process of a country (vide 2.1:11) is composed of three inter-related components (Mejia 1978:17). They are human resource production (tertiary institutions), management (health services) and planning (health planners). Therefore recommendations for this study will be made under these three headings.

6.3.1 TERTIARY INSTITUTIONS

Training of the correct number and mix of oral health personnel:

- An alteration in the number of oral health personnel trained necessitates critical evaluation between training institutions and service organizations. Therefore discussions should be held between these bodies to ensure that the correct mix of appropriately skilled oral health personnel are trained. This is because training of such personnel is very expensive to the state, and therefore should not be conducted in a haphazard manner (Mejia & Fulop 1978:12). However, the effects of increasing the number of oral health personnel trained will not be seen during the duration of this study (2000 – 2010).
- According to Rossouw (1996:24), South Africa has reached “*optimal levels of supply*” of dentists. If present trends in training continue, “*the present numbers will carry us comfortably to meeting the needs of*

dentists until 2010". Therefore there should not be an increase in the overall number of dentists trained in South Africa.

- The role of dental therapists and oral hygienists in the provision of oral health care in South Africa should be re-evaluated and re-defined. Training of larger numbers of dental therapists and oral hygienists (vide 2.5.3:46) has been proposed, and the creation of a single category of dental auxiliary (vide 2.5.4:47) should be considered.
- The capacity of training institutions should be expanded to train all categories of oral health personnel. Students should be trained to function at each level of the district health system, focusing on the primary health care approach.

Intersectoral Collaboration:

- Courses in oral health care should be provided to teachers, nurses and community health workers by tertiary institutions. Discussions should be held with teacher and nursing colleges to incorporate oral health care into their training curricula.

Continuing education courses:

- Continuing education courses and workshops should be provided to update all oral health personnel in the diagnosis and management of HIV/AIDS, and infection control.

6.3.2 SERVICE ORGANIZATIONS

Equitable redistribution to all regions:

- Redistribute all existing oral health personnel equitably between regions so that, at least a minimal level of care is available. However supportive facilities and infrastructure should be available, and fully functional.

Recruit larger numbers of personnel into the public sector:

- Ensure that each region within the province has an adequate number of posts available for oral health personnel. This can be achieved by unfreezing existing posts, and by creating new ones where they are deficient.
- Provide incentives to attract all categories of oral health personnel into the public sector. Bursaries can be provided for under- and post-graduate training, where recipients are required to work in the public service for a defined period of time.
- Create supportive environments for oral health personnel in rural areas. Satisfactory living and working conditions should be provided in all regions of the province. Special allowances should also be paid to people working in underserved areas.

Utilization of the private sector:

- Innovative methods need to be devised to incorporate this large sector of personnel to deliver the basic package to the state-dependent population.

- Due to the shortage of personnel in the public service, many oral health facilities are equipped, but unused. Private sector personnel could therefore provide part-time services in public facilities.
- If facilities are not available in the public sector, private sector personnel could treat patients on a capitation basis in their own practices.
- Pro deo services by this sector for a few hours a month could be performed, with possible tax rebates or concessions.

Compulsory community service:

- Compulsory community service should be implemented for all categories of oral health personnel. This would greatly increase the number of personnel available in the public service.

Non-governmental organizations:

- Services are provided by the various organizations in an un-coordinated manner. The public service should synchronize these efforts to avoid duplication. The human resource component could be voluntary, with the state contributing towards materials and equipment.

Cooperation within the Department of Health:

- Primary health care programmes have achieved extensive coverage in this province (Table 3.28:86), at clinics and community health centers, and using mobile units. According to Gilbert, Chikte, Josie Perez, Brand and Rudolph (1994:501), increased access to oral health care can be achieved by the use of such units. Therefore oral health prevention and promotion should be integrated into these initiatives at district level. Oral hygienists should work with nurses in mother and child clinics and school health programmes. This will enable oral

health to be integrated into the existing comprehensive health care projects of the province.

Intersectoral Collaboration with the Department of Education:

- Oral health prevention and promotion can yield effective results at primary and secondary school levels (Reisine 1993:111) because schools have access to large numbers of children. Teachers and parents can therefore be utilized to implement these programmes, initially supervised by oral health personnel. However a study by Frasier, Jenny and Johnson (1979:204) revealed that, in order for these programmes to be most effective, parents and teachers should be involved from the inception of the project.

Use of Community Health Workers:

- This province has 717 community health workers employed by the public sector (vide 3.5.5:81). They could help to increase community participation in the formulation of specific oral health plans for the districts, and raise the oral health awareness among the local population.

Water Fluoridation:

- Water fluoridation will play a significant role in improving the oral health status of the population. Therefore, the provincial health department should facilitate intersectoral collaboration between itself, and the Department of Water Affairs and Forestry, and Umgeni Water as a priority. When implemented, this initiative will greatly decrease the dental caries levels, thereby decreasing the oral health personnel requirements.

6.3.3 HEALTH PLANNERS

Creation of a central database:

- Planners within the KwaZulu-Natal Department of Health should create a central database specially designed for oral health, which should be updated on a regular basis.
- Each district should undertake a comprehensive situation analysis due to diversity among communities (Department of Health 2001). Procedures, methodologies and materials should be developed that fit the requirements of each district. From this information, strategies and targets can be chosen for the special needs of each community. However, community participation is essential at this stage.
- **Coordinate the implementation of the basic oral health care package:**
 - Planners should coordinate activities during the implementation of the package, which should be constantly monitored, re-evaluated and revised if necessary.
 - In-service training, support and supervision should be made available to providers of oral health care during the implementation of the basic oral health care package.

6.4 SUMMARY

This chapter discussed the human resource plan for the provision of the basic oral health care package to the state-dependent population of KwaZulu-Natal. This plan would be implemented at provincial level, and would provide the framework for community-specific oral health services. Recommendations were made for the various components of human resource development i.e. tertiary institutions, health services and planners, to ensure an equitable distribution and efficient utilization of oral health personnel in meeting the special oral health needs of the population of KwaZulu-Natal.

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ANNEXURE A – LETTER OF SUPPORT: DEPARTMENT OF HEALTH KWAZULU-NATAL

**PROVINCE OF
KWAZULU-NATAL**

HEALTH SERVICES

**ISIFUNDAZWE
SAKWAZULU-NATALI**

ESIDAPULO

**PROVINSIE
KWAZULU-NATAL**

GEZONDHEIDSDIENSTE

NATALIA
X30 Longmarket Street
PIETERMARITZBURG

Telephone :
Telogo : 0331-462111
Pietermaritzburg
Telefax :

Fax :
Fakot: 0331-450792
Faks :

Private Bag : X3001
Indhlovane Island :
Pietermaritzburg : X300

Ref.:
Enquiries: Prof. Green-Thompson
Extension: 3176

21 April 1997

Dr P.K. Singh
Private Bag X03
DORMERTON
4015

Dear Dr Singh

***MASTERS DEGREE IN COMMUNITY DENTISTRY : PROTOCOL
DENTAL PERSONNEL PLANNING FOR KWAZULU-NATAL***

As discussed with you we support you undertaking the Masters Degree in Community Dentistry. The planned topic is a good one and the Department supports you undertaking it fully.

Yours sincerely

PROFESSOR R.W. GREEN-THOMPSON
SECRETARY, DEPARTMENT OF HEALTH
KWAZULU NATAL

RWC/rsingh