

Introduction

The South African National Oral Health Strategy (SANOHS) adopted by the National Department of Health has re-evaluated how oral health care is delivered in the various provinces in South Africa. Without being too prescriptive the SANOHS has three basic tenets for each district: (1) The provision of appropriate disease prevention and health promotion measures (2) The provision of basic treatment services that includes: an examination; bitewing radiographs; scaling and polishing; simple fillings, emergency relief of pain and sepsis, including dental extractions; and (3) The implementation of cost-effective and evidence-based strategies (SANOHS, 2005).

The implication of these tenets for oral hygienists is significant. It requires oral hygienists in the public sector to be primarily involved in the delivery of preventive oral health services as they are regarded as the main drivers of prevention programs in oral health.

With this in mind, it is important to assess the current activities of the oral hygienists so that oral health services can optimise their roles in the delivery of prevention strategies. In South Africa, no study has been done to assess the role and functions of the oral hygienist in the public health sector.

CHAPTER 1

1.1. LITERATURE REVIEW

1.1.1. Definition and scope of the oral hygienist

The oral hygienist is a licensed primary health care professional, oral health educator, and clinician who provide preventive, educational, and therapeutic services supporting total health for the control of oral diseases and the promotion of oral health (Johnson, 1992; Wilkins, 1999, p.3). Preventive services refer to the methods and or actions employed by the clinician or patient to promote and maintain oral health. Educational services are those methods used to generate awareness and good oral health care practices. Finally, therapeutic services refer to all clinical treatments designed to address and control disease and maintain the health of oral tissues (Wilkins, 1999. p. 3-5).

The majority of the oral hygienists' activity is concerned with the prevention and control of dental caries and periodontal diseases, the most prevalent oral diseases in the general community (Baltutis et al, 2000).

The scope of practice of a qualified oral hygienist includes being able to carry out the following clinical or technical procedures on the instructions of, and under reasonable supervision of a dentist; provisional examination and charting of conditions in the mouth, with particular reference to the teeth and periodontium; scaling, root planing and polishing of the teeth, including trimming and polishing of restorations; performing dental radiography and clinical photography; topical application of agents appropriate to the practice of the oral hygienist, including caries-preventive agents, tooth desensitising agents, surface anaesthetics and

plaque-controlling agents; application and removal of periodontal packs and taking of impressions and the casting of study models and primary work models (Health Professions Council South Africa, 2000).

All five dental institutions in South Africa namely the Universities of the Witwatersrand, Western Cape, Pretoria, KwaZulu-Natal and the Medical University of Southern Africa provide training of oral hygienists including training in expanded functions which allow OHs to perform additional clinical duties.

According to the HPCSA, regulation 1150 of 17 November 2000, the scope of practice of the qualified oral hygienist with expanded function training includes: placement of temporary fillings as an emergency measure prior to referral to a dentist or dental therapist; temporary cementing of inlays, crowns and bridges; placement of glass ionomer cement on sensitive dentine or cervical abrasion lesions; placement of soft linings in dentures as tissue conditioners; taking of cytological smears, for example, to test for Candida infections; performing specified functions in orthodontics that includes; cephalometric tracings; relief of trauma caused by intra and extra-oral appliances and the placement of pre-activated orthodontic appliances and the removal of orthodontic attachments and bands, and administering of applicable local analgesia as appropriate to the scope of the profession of oral hygiene (HPCSA, 2000).

1.1.2. Profile of oral hygienists in South Africa

There is limited published information on the profile of oral hygienists in South Africa and the challenges they face. South African oral hygienists are employed

primarily in private dental practices, followed by governmental institutions (van Wyk et al, 1998). A national survey of South African oral hygienists Gordon and Rayner (2005) estimated that only 15% of OHs were employed by the Department of Health, 73% in the private sector and the remainder in non-traditional settings. This was similar to records reflected by the Health Professions Council of South Africa in 2005.

The role and supply of oral hygienists are of increasing interest worldwide and oral hygienists constitute one of the largest and fastest growing groups of oral health service providers internationally (Johnson, 1992). This is due to the increased awareness of dental professionals and communities of the role of oral hygienists in the provision of oral health services, a growing acceptance of the importance of oral health as a part of total health, renewed emphasis on setting and attaining health goals and, the recognition of oral hygienists as a major resource for attaining these goals (Johnson 1992; Baltutis et al 2000). The work role of the oral hygienist is consistent with present service requirements and future-orientated health planning (Johnson, 1992).

1.1.3. Oral disease profile in South Africa

The South African oral disease profile suggests that most dental treatment needs can be addressed by the oral hygienist (van Wyk et al, 2004) and since the vast majority of the population (80%) depends on the public health sector for dental treatment, oral hygienists have an important role to play in the provision of oral health services.

There is anecdotal evidence of increasing frustration among oral hygienists employed in the public sector reflecting their inability to perform their full range of duties in the oral health services. This is due to various factors such as: lack of resources, problems in management, low morale due to poor salaries, and the low priority that oral health, more specifically prevention of oral diseases is given in the public service.

The National Children's Oral Health Survey (van Wyk et al, 2004) of 2002 classified the severity of dental caries as low by WHO standards, but the high levels of untreated caries in all age groups in South Africa is a cause for concern. Further, this survey revealed that more than 80% of caries in children went untreated and the greatest need was for preventive services. The possible reasons for this high percentage of untreated caries amongst children and need for preventive services included the inadequacy of resources (human and facilities) and the lack of awareness of oral health amongst the majority of the South African population (van Wyk et al, 2004).

The National Oral Health survey (1988/89) reported that adults in South Africa had a high prevalence of gingivitis, periodontitis, shallow pocketing and presence of calculus (Van Wyk, 1994). These oral diseases can be easily treated and prevented by both private and public sector oral hygienists. Oral hygienists can play an essential role in reducing the prevalence and preventing the progression of these oral diseases which, if neglected would result in early tooth loss (van Wyk and van Wyk, 2004). Tooth loss increases the demand for rehabilitative

services which requires skilled personnel (dentists) and special resources that are more expensive.

The nature of dental problems indicates that a team approach is the rational way to promote oral health. Dentists working on their own have few opportunities to exploit the full range of possibilities available for preventing dental caries and periodontal diseases (Johnson, 1992). An option for prevention is a preventively orientated high-risk strategy that depends on behaviour change using health education and promotion methods using oral hygienists (Sheiham, 1992). In 2002, the adoption of the high-risk strategy for prevention of oral diseases in the population as a whole was challenged. Batchelor and Sheiham (2002) showed that caries occurred in the whole population and not only in high-risk groups. Sheiham (2006) suggested that from a public health perspective, policy for preventive strategies should be based on a population approach. Oral hygienists are in an ideal position to adopt either the high-risk strategy for individual patients or use the whole population approach implementing oral health promotion, brushing, fluoride and fissure sealant programs for the prevention and control of oral diseases in the population.

The role of health professionals is to nurture and enable health promotion through education and advocacy. Health education is an essential part of health promotion that is vital for initiating and maintaining successful, effective, preventive oral health programs (Sheiham, 1992). A systematic review of evidence for the effectiveness of oral health education (Kay and Locker, 1996) showed that oral health education interventions have a small positive and

temporary effect on plaque accumulation, but the effect on knowledge level is consistent and positive.

As reported by Sheiham (1992) and years later by Murray (1999), the main public health strategies for the improvement of oral health include: implementation of water fluoridation, use of fluoridated toothpastes, controlling the frequency of sugar intake, improving oral hygiene practices, and reducing tobacco smoking. Oral hygienists have a key role to play in promoting these strategies to improve oral health.

In addition to the knowledge of these public oral health strategies, there is ongoing recognition in public health sector locally and internationally to utilise oral hygienists for the promotion of oral health to the wider population.

1.1.4. Aetiology and Prevention of Dental Caries and Periodontal diseases

The teeth and periodontal structures are specialised structures that are important in determining the condition of the mouth. Dental caries and periodontal disease are so widespread that virtually everybody in the world, certainly has either one or both of these diseases present in their mouths (Murray, 1999, p. 2)

‘Periodontal (gum) disease’ is a result of inflammatory responses and chronic destruction of the tissues that surround and support teeth. Dental plaque is the principle aetiological factor in the pathogenesis of periodontal disease. Scaling and polishing of the teeth by an oral hygienist is a non-surgical intervention that is intended to prevent periodontal disease and supplement patients’ home-care plaque control (Wilkins, 1999). The role and contribution of oral hygienists in

maintaining periodontal health has increased in recent years. In the United Kingdom approximately 50% of all adult modalities of treatment provided under the National Health Service regulations consist of the patient having nothing more than an examination and a scale and polish (Bernie et al, 2005).

Dental caries as defined by WHO is a 'localized, post-eruptive, pathologic process of external origin involving softening of the hard tooth tissue proceeding to the formation of a cavity'. The requirement for the development of a carious lesion is micro organisms (bacterial plaque), carbohydrate (sucrose), and a susceptible tooth (Wilkins, 1999, p. 238). The use of fluorides provides the most effective method for the prevention and control of dental caries. Although fluorides are associated primarily with dental caries, the action of fluoride on bacterial plaque has therapeutic and preventive effects on the control of periodontal infections and maintenance of oral health. Fluoride is important for optimum oral health at all ages (Wilkins, 1999, p. 456).

The objective of Oral Health Education (OHE) is to produce a change in behaviour that will result in sufficient reduction of plaque accumulation to prevent the initiation and progression of dental caries and periodontal diseases (Murray, 1999, p123). In 1988 (Uitenbroek et al) showed that OHs were successful in providing oral health education to patients as they positively influenced the attitude, knowledge, motivation and perceived oral health needs of patients.

Placement of fissure sealants is a recommended procedure to prevent caries on occlusal surfaces of permanent molars (Ahovuo- Saloranta et al, 2005; Murray 1999, p. 78). Fissure sealants are preventive agents placed to protect pits and

fissures from dental caries. Wendt and Koch (1988) showed that after 8 years, 80% of sealed fissures had total retention with no caries. Fissure sealants are an effective preventive treatment with 75% retention and a low failure rate (Ahovuo-Saloranta et al, 2005; Heifetz et al, 2007).

1.1.5. Oral Health services in South Africa

In South Africa, the public oral health sector offers two types of services to children firstly, clinic-based services (curative, restorative and prophylactic treatment) and secondly school-based services focused on primary prevention in oral health. School-based services are part of a comprehensive oral health care program available to communities living in various districts within regions (Maraj and Kroon, 2004). These services focus on primary preventive approaches that include oral health promotion and specific protection initiatives that incorporate oral health education, brushing, fluoride and fissure sealant programs.

Supervised regular use of fluoride mouthrinses is associated with a reduction in caries in children. Evidence for more than half a century supports the benefits of the use of fluoridated toothpastes in preventing dental caries (Marinho et al, 2003b).

Oral hygienists in South Africa are responsible for developing, implementing and co-ordinating school-based services. These activities are carried out with the assistance of schoolteachers. Screening is implemented to identify children and communities that are at risk of oral diseases. Schools that are selected receive both clinic and school-based services and several only school-based services

due to insufficient resources. The distribution of services is rotated to ensure that all schools have an opportunity to participate in both types of programs over a period of time (Maraj and Kroon, 2004). In South Africa no recent work has been done to justify the role of oral hygienists in the public sector. Therefore it is important to assess the current activities of oral hygienists to optimise their use for the delivery of oral health services to the population.

1. 2. Aim

To determine the activities that oral hygienists perform in the public sector in Gauteng and KwaZulu – Natal provinces.

1. 3. Objectives

To determine:

1. The demographic profile of oral hygienists employed in the public health services in Gauteng and KwaZulu-Natal provinces
2. The current duties, tasks and responsibilities undertaken by these oral hygienists
3. The factors that may hinder the provision of services by oral hygienists in the public sector

1. 4. Study design:

This was a cross sectional descriptive study and all data was collected by means of a questionnaire.

1. 5. Ethical clearance

Ethical approval was obtained from the University of the Witwatersrand ethical committee, reference number M060539. Permission to carry out the study was granted by Gauteng and KwaZulu-Natal branches of Oral Health Services (Appendix 1 and 2).

The oral hygienists were informed of the purpose of the questionnaire (Appendix 3). Anonymity and confidentiality was ensured. Completed and returned questionnaires implied permission being granted by oral hygienist to participate in the study.

1. 6. Sampling

1. 6.1. Study population.

The study population consisted of all registered (with HPCSA) oral hygienists in current employment (full-time and part-time) within the public services in Gauteng and in KwaZulu - Natal provinces in 2005. The human resource records of the Oral Health Services in Gauteng and KwaZulu - Natal in 2005 showed that 21 and 20 oral hygienists were employed in each province respectively (n = 41). All 41 oral hygienists received a questionnaire that was hand delivered.

1. 6. 2. Sampling calculation

The confidence level was set at 80%. The sample size calculation was done using the Epi Info 2002 software system. The minimum sample required at a confidence level of 80% was 31.

1. 7. Exclusion criteria

Oral hygienists employed in the private sector, the national defence force and academic institutions were excluded from the study.

1.8. Appendices

Appendix 1 – Consent letter from KwaZulu - Natal Oral Health Services

Appendix 2 – Consent letter from Gauteng Oral Health Services

Appendix 3 – Cover letter for Questionnaire

Appendix 4 – Questionnaire

Appendix 5 – Ethics Clearance Certificate

1. 9. Survey instrument

A self administered questionnaire, together with an information sheet (Appendix 3) was hand delivered to all OHs to obtain their demographic data and to elicit information about their activities, functions and or roles in the public sector.

1.9.1. Questionnaire

The questionnaire was developed from a comprehensive literature review of related studies as no similar studies were done for oral hygienists employed in the public sector. The questionnaire consisted of 15 closed and 2 open ended questions to obtain the necessary information (Appendix 4). The questionnaire was in English language and all participants received an unmarked sealed hand-delivered envelope containing the questionnaire.

The questionnaire was piloted with oral hygienists in the Division of Oral Health Auxiliary Training (OHAT) at the University of the Witwatersrand.

1. 10. Data collection

Participants were provided with an addressed postage paid envelope to return the questionnaire. The initial response after a six week period was less than 50%. A second set of questionnaires was delivered to all the participants to improve the response rate. After an additional four-week waiting period the responses received (32) constituted the final sample size and no further responses were accepted for data analysis.

1.11. Statistical analysis

All the data obtained from closed and open-ended questions was analysed using descriptive statistics with Epi Info version 2002. Results are displayed using a graph and tables.

CHAPTER 2

2. RESULTS

Due to the small sample size (n= 32) part of the results from the two provinces were combined and analysed as a single cohort.

2.1. Response rate and demographic data

There was a combined response rate of 78% (N=32).

Almost all 30 (94%) of the respondents were female. Of the 30 females, 14 (47%) were employed in GP and 16 (53%) in KZN. One male was employed in each of the provinces.

Table 1. Demography and response rate by population group and province

	GP	KZN	TOTAL N=32
Asian	1	1	2
Black	9	14	23
White	4	2	6
Coloured	1	0	1
TOTAL	15 (47%)	17(53%)	32 (100%)

Thirty (30), 94% of OHs were employed fulltime, 17 in KZN and 13 in GP. The 2 (6%) OHs who were employed part-time were from GP.

The average age of the OHs was 36.84 years (range=22–50; mode=24; median=37 and SD 8.46).

The majority 23 (72%) of the OHs were Black; of these 14 (61%) were employed in KZN and 9 (39%) in GP; six (19%) of whom were White, 2 (6%) Indian and only 1 (3%) Coloured was employed.

2.2. Level of employment, training and years of service in the public sector as an oral hygienist

Table 2: Level of employment and distribution of oral hygienists by province

Level of employment	GP	KZN	Total number OHs
			N
Junior	4	8	12 (37%)
Senior	1	4	5 (16%)
Chief	10	5	15 (47%)
Assistant director	0	0	0 (0%)
TOTAL	15 (47%)	17 (53%)	32 (100%)

There are four levels at which OHs are employed by the Department of Health. Almost half (47%) were employed as chief OHs, 37% as junior and none as

assistant director. The mean number of years of service was 9.43 (Range=1-24; mode=2; median=10 and SD of 6.5).

2.3. Grievances of oral hygienists on level of employment in the public sector

Most of the grievances (78%) were related to lack of promotion and the majority expressed frustration at being in the same level for several years. Some of the responses included:

- “Have been employed for 7 years and still junior level oral hygienist”
- “Working for 10 years as an oral hygienist and not been considered as senior”
- “Employed for 12 years as a dental assistant, studied for 3 years and employed for 8 years as an oral hygienist in the same institution and still employed at a junior level”

2.4. Community-based and Clinic-based Services provided by oral hygienists

For ease of data analysis, the activities were separated into two groups; community-based and clinic-based services. Community-based and clinic-based services included all duties, tasks and responsibilities of oral hygienists in the public sector. Community-based services included services provided in the community, for example, at schools, crèches, antenatal clinics, other institutions and mobile dental units. Clinic-based services included services provided in the

dental clinic. Each of these services, that is, the community and clinic-based services was further divided into preventive and other services. Preventive services included all procedures or interventions aimed at primary prevention, that is, health promotion and specific protection activities to address, control and maintain oral health. Other services included taking of radiographs and impressions, placement of GIC or temporary restorations and the administration of local anaesthetics.

2.5. Community-based Services

Community-based services was measured in sessions. Each day consisted of 2 sessions, the morning (up to 5 hours per day) and afternoon (2 hours per day) with a maximum of 10 sessions per week. These sessions were further divided into two groups of 1 up to 5 sessions and 6 up to 10 sessions.

2.5.1. Sessions spent by the oral hygienists providing Community-based preventive Services

Table 3.1 shows that 74% of responses (n=80), spent 1 to 5 sessions and 26% (n=28) 6 to 10 sessions per week providing community-based preventive services. The majority of preventive services provided by OHs in the community included OHE (84%), brushing programs (75%) and examination and charting and or screening of individuals (69%). Forty one percent did brushing and fluoride programs and a little over a third (34%) provided HIV related work.

Table 3.1: Sessions spent by oral hygienists performing preventive community-based services

Preventive Procedures	Number of sessions spent per week by oral hygienists		Total number of respondents N=32
	1 – 5	6 – 10	n (%)
Exam/Charting/ Screening	19	3	22 (69)
OHE	18	9	27 (84)
Brushing programs only	18	6	24 (75)
Brushing and Fluoride programs	9	4	13 (41)
Scaling and Polishing/Root Planing	2	2	4 (13)
Fissure Sealants	5	2	7 (22)
HIV Related work	9	2	11(34)
Total number of responses n (%)	80 (74%)	28 (26%)	108 (100%)

2.5.2. Sessions spent by the oral hygienists providing other Community-based Services

Table 3.2 shows that only 6 (19%) OHs provided other services that included the placement of GIC and temporary restorations or fillings.

Table 3.2: Sessions spent by oral hygienists performing other community-based services

Other Procedures	Number of sessions spent per week by oral hygienists		Total number of respondents N=32
	1 – 5	6 – 10	n (%)
GIC/Temporary Fillings	5	1	6 (19)

Of the total number of responses for the community-based services (n=114, Table 3.1 and 3.2), 95% of responses showed that mainly preventive services were provided in the community and 5% (Table 3.2) other community-based services.

Community-based services were provided mainly at schools (90%), followed by HIV institutions (57%), crèches (43%), orphanages and antenatal clinics (36%) and only (7%) in mobile dental units.

The average (mean) number of sessions spent per week on management and administration duties was 2.4 sessions per week with a range of 0 to 10 (mode and median is 0, SD of 3.08).

2.6. Clinic-based Services

Clinic-based service was measured by number of patients treated by oral hygienists in the dental clinic. Oral hygienists usually spend afternoon sessions (approximately 2 hours per day) providing treatment to individual patients. Clinic-based service was divided into preventive and other services. The number of patients treated per week has been divided into 2 categories:

Category 1 = 1 up to 20 patients per week

Category 2 = more than 20 patients per week

2.6.1. Clinic-based preventive services provided by OHs

Table 4.1 shows preventive clinic-based services provided by oral hygienists. The majority of the responses (n=85) showed that 65% of OHs treated 1 up to 20 patients and the remaining 35% (n=46) more than 20 patients per week. The most common preventive services provided was scaling and polishing/root planning (88%), examination and charting (84%) and OHI (75%). This was followed by topical application of fluorides (60%) and the placement of fissure sealants 59%.

Table 4.1: Number and percentage of patients that received preventive clinic-based services from oral hygienists

Preventive Procedures	No of patients treated by oral hygienists per week		Total number of respondents N = 32
	Category 1 (1 – 20)	Category 2 (>20)	n (%)
Examination and charting	17	10	27(84)
OHI	12	12	24 (75)
Scaling and Polishing/Root Planing	19	9	28 (88)
Topical fluoride applications	13	8	21 (60)
Fissure Sealants	14	5	19 (59)
HIV related work	10	2	12 (38)
Total number of responses n (%)	85 (65%)	46 (35%)	131 (100%)

2.6.2. Other Clinic-based services provided by OHs

Table 4.2: Number of patients that received other clinic-based services

Other Procedures	No of patients treated by oral hygienists per week		Total number of respondents N = 32
	Category 1 (1 – 20)	Category 2 (> 20)	n (%)
Taking of impressions	3	1	4 (13)
Taking of radiographs	6	2	8 (25)
Administration of local anaesthetics	10	4	14 (44)
GIC/Temporary Fillings	12	1	13 (41)
Total number of responses n (%)	31 (79%)	8 (21%)	39 (100%)

Table 4.2 shows that 79% of respondents (n=31) provided other clinic-based services to 1 up to 20 patients and only 21% (n=8) treated more than 20 patients per week. The most common procedure was the administration of local anaesthetics (44%) to facilitate other potentially painful treatment procedures followed by placement of GIC or temporary restorations or fillings (41%).

Of the total number of responses for clinic-based services (n= 170, Table 4.1 and 4.2), more than seventy percent (77%) of responses showed that the majority of

services provided to patients were preventive and 23% other clinic-based services.

2.7. Reasons for working in the public sector as an oral hygienist

Almost all of the respondents 94% (n=30) cited providing a service to the community as the main reason for working in the public sector.

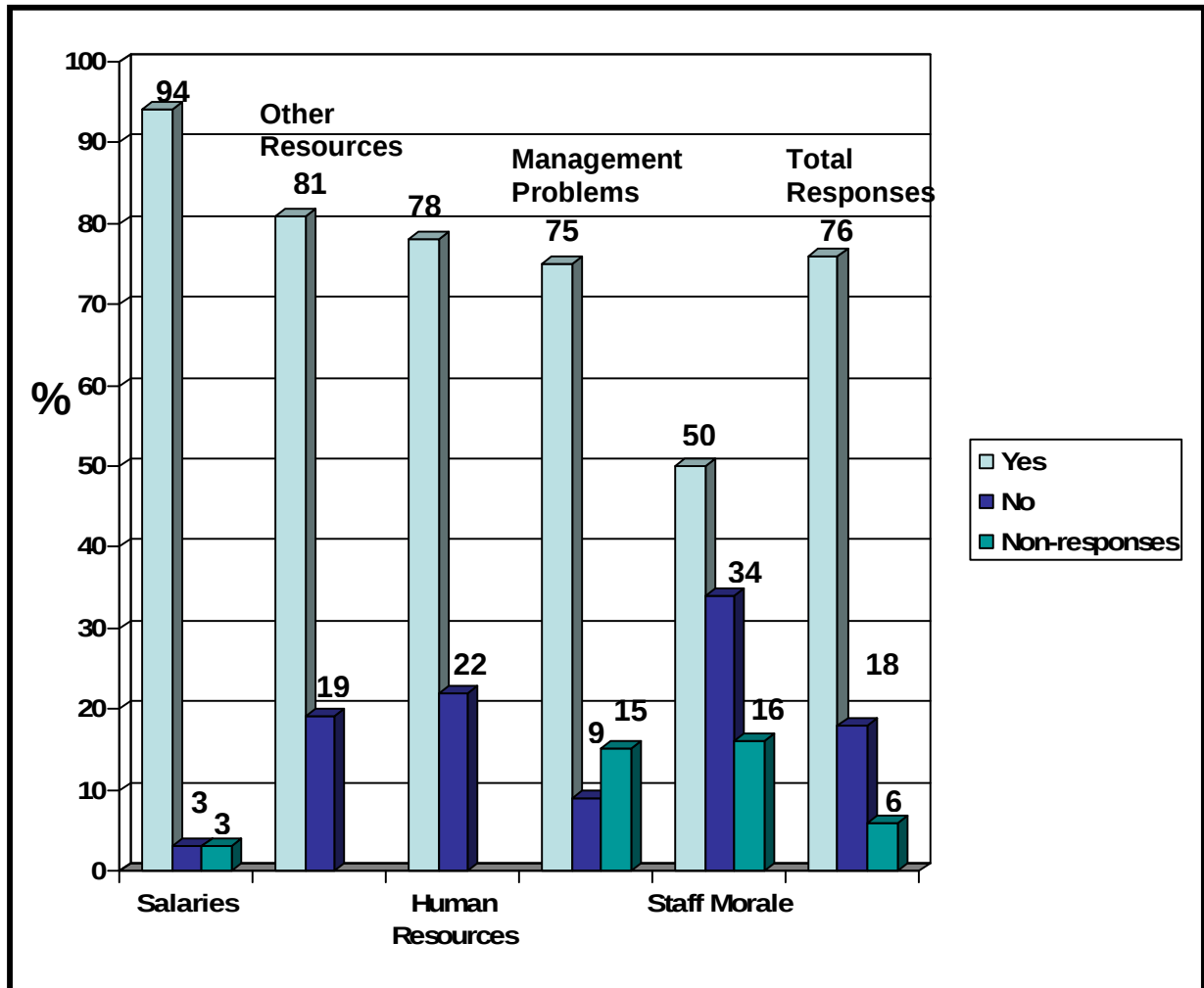
Sixty three percent expressed the view that they remained in their jobs because of professional satisfaction whilst the remaining 37% continued to work in the public sector because of job security.

The majority (92%) of OHs indicated that the salaries in the public sector were not competitive.

2.8. Responses regarding the barriers and constraints experienced in the public sector

Figure 1 shows the barriers and constraints experienced by oral hygienists. Ninety four percent (n=30) reported that salaries in the public sector were poor, and 81% had problems with access to resources that included transport, mobile dental units, dental materials and finances. Seventy eight percent indicated that human resource was insufficient and 50% said that staff had a low morale. Three quarters of OHs experienced problems with management. The majority (76%) of responses showed that OHs felt that there were numerous barriers and constraints that hindered the effective and efficient provision of services of oral hygienists in the public sector.

Figure 1: Barriers and constraints experienced by OHs in the public sector



2.9. Reasons for barriers and constraints experienced

Some examples of the experiences reported by oral hygienists indicating the challenges that they face.

2.9.1. Human resources

Almost 80% (n=25) of OHs that reported a shortage of either oral hygienists or dental nurses in the workplace. These were some of their responses:

- “Too few oral hygienists”; “more oral hygienists needed” and “shortage of oral hygienists”
- “ I am the only oral hygienist in the region”
- “ Only one oral hygienist per district”
- “Schools have more than 500 children, difficult to manage”
- “Only 5 oral hygienists in the Ethekezeni district which is the largest in KZN”
- “Not enough dental assistants”

2.9.2. Other resources

More than eighty percent (n=26) reported shortages of resources such as transport, mobile dental units and finances. Their responses are shown below:

- “There are insufficient funds for oral health services”
- “No cars”; “using car in pool, transport not available for daily use”; “if there are no cars you cannot do community work”
- “No mobile units available”; “we do not use mobile units”; “2 mobile units for 8 oral hygienists”
- “Not enough dental materials, as it is dependant on the availability of funds”

2.9.3. Poor salaries

Almost all 94% (n=30) complained of poor salaries in the public sector. Some of their responses included:

- “Managers do not see the need for us to be promoted for better salaries”
- “No rural and scarce-skill allowances, like OHs employed in other provinces, Eastern Cape, Limpopo Province and Northern Cape”
- “Poor motivation for promotion and salaries”
- “No recognition given for academic achievements”
- “Salaries must be reviewed as oral hygiene is one of the essential services in primary health care”

2.10. Education and opportunities for promotion for OHs in the public sector

Of the 32 respondents, 20 (63%) qualified with a diploma and 12 (37%) with a degree. Two thirds (66%) of the OHs had completed the training in expanded functions. Ninety seven percent (n=31) were interested in studying further. Six (19%) chose to study through correspondence, 16 (50%) part-time and 9 (28%) preferred full time study.

Oral hygienists reported specific fields of interest for further study. More than forty percent (n=13) wanted to study further in the field of dentistry, 10 (31%) management, 3 (9%) public health and the remaining respondents were interested in either social science, HIV/AIDS counselling or commerce.

Twenty five (78%) oral hygienists said that there were no opportunities for promotion and only 5 (16%) felt that opportunities for promotion were available for oral hygienists in the public sector.

CHAPTER 3

3. DISCUSSION

3.1. Response rate

There was an overall response rate of 78%. In the National Survey done by Van Wyk et al, in 1998, of the 300 questionnaires mailed, only 47% of the OHs responded. Similarly Gordon and Rayner (2004) reported that out of a sample of 853, the response rate after two mailings was only 51%. In this study the response rate is considered representative of the sample population as it meets the minimum sample size required as calculated by Epi Info 2002 software system.

3.2. Gender distribution and age

The majority of the respondents, 94% (30) were female. This is comparable with the studies done by Gordon and Rayner (2004) and Bhayat et al (2008) who reported that the majority of OHs were female, 99.5% and 94% respectively. The large number of female respondents was expected because traditionally a career in oral hygiene is pursued predominantly by females.

The average age was 37 years with a range of 22 to 50 years. Similarly Gordon and Rayner (2004) reported an average age of 33 years and a range of 20 to 52 years.

3.3. Racial distribution

The racial profile of OHs employed in the public sector in the two provinces was similar to the demography of the population reported by Statistics South Africa (2007), 79.7% Black, 9.1% White, 8.8% Coloured and 2.4% Indian. The racial distribution of oral hygienists suggests that they would have some knowledge of language and understanding of the cultural aspects of communities in which they work. This enables oral hygienists in the public sector to address the needs of diverse groups within the population in the respective provinces.

3.4. Employment and years of service in the public sector

Oral hygienists can be employed at four levels in the public sector with clear guidelines regarding their remuneration. The lowest remuneration is at a junior level, increasing to a senior, chief, the highest being assistant director. In both KZN and GP, OHs were only employed at three levels, 37% as junior, 16% as senior and 47% as chief oral hygienist.

Although the average years of service was 10 years with a maximum of 24 years, none of the OHs were employed as assistant director. The main reason for oral hygienists' dissatisfaction was that they were employed for many years by the Department of Health but remained at the same level of employment. Some oral hygienists reported that after 7 and 10 years of uninterrupted service they were still employed at a junior level. Oral hygienists that were employed for several years (7, 10, 12 and 24 years) were not offered a promotion or better remuneration.

To improve salaries or create new posts managers have to motivate for financial support from limited funds. Furthermore the Department of Public Service and Administration (DPSA) have specific guidelines for salary adjustments and the creation of new posts. Posts have to be financed, advertised and potential candidates interviewed before a suitable candidate is appointed (DPSA, 2007). These processes hinder the creation new posts and fail to offer any assurance of a better remunerated position to currently employed oral hygienists.

More than 90% of OHs reported that the salary in the public sector was poor and not competitive with that of the private sector. Almost eighty percent said that there were no opportunities for promotion within the public sector. The main reasons cited by OHs was the lack of recognition of the profession and insufficient motivation by managers to improve salaries or create promotion opportunities. Oral hygienists also reported that academic achievements were not recognised for better remuneration or promotion.

In Australia the high demand for oral hygienists in the private sector has empowered public sector oral hygienists to demand better salaries. Oral hygienists in Australia, Denmark and Switzerland receive the highest remuneration when compared to their international counterparts (Baltutis et al. 2000). In New Zealand OHs were satisfied with their remuneration (Ayers et al, 2006). Gordon and Rayner (2004) reported that OHs felt that more public sector positions should be created in South Africa. Oral hygienists also questioned whether further education or training would result in better remuneration.

The dissatisfaction of oral hygienists with salaries, employment and promotion opportunities in the public sector is clearly a lack of acknowledgement by the Department of Health and its staff of the important role of the OH, their lack of recognition of the need to establish higher level posts nor do they provide the financial resources for employment or promotion.

Van Wyk et al (1998) and Gordon and Rayner (2005) reported that only 20% and 15% of OHs were employed by the Department of Health respectively. The dominance of OHs in the private sector does not only exist in South Africa. Johnson (1992) reported that the private sector accounted for eighty five percent of workplaces for oral hygienists in Canada, Japan, Nigeria, Switzerland, United Kingdom and the United States. Similarly, employment profiles of OHs in Australia show that more than ninety five percent of OHs are employed in the private sector. Italy and Norway differ in that public health services dominate the health services resulting in the majority of OHs (80%) being employed in the public sector (Baltutis et al, 2000).

The difference in employment of OHs between the private and public sectors in South Africa is clearly a consequence of fewer public dental facilities, employment opportunities and poor salaries in the public sector. Bhayat et al (2008) reported that in South Africa less than 10% of OHs worked in the public sector which is one of the reasons for the lack of sustainable and effective preventive oral health programs.

3.5. Community-based Services provided by oral hygienists

Ninety percent of community-based services were provided mainly to learners at schools. It is common practice for OHs to spend mornings (up to 5 hours per day) in the community and afternoons (approximately 2 hours per day) performing clinic-based activities. Almost 75% of responses showed that OHs spent 1 up to 5 sessions per week performing community-based services. Based on these responses, OHs spent more time performing community-based services compared to clinic-based services. Due to time constraints only twenty six percent of responses showed that OHs spent more than 6 sessions per week in the community. The time spent with learners is usually determined by schools to prevent unnecessary interference with the school curriculum. Similarly time spent doing oral health programs at other institutions is restricted to the availability of patients and the daily activities of the institution.

3.5.1. Community-based Preventive Services provided by oral hygienists

The majority of OHs (n=27) provided Oral Health Education (OHE) to individuals and the community. OHE is an essential part of health promotion and education. It aims to decrease the accumulation of plaque and influence dietary practices for the prevention, initiation and progression of oral diseases. OHE is often questioned and scrutinized due to the difficulty in measuring its impact and outcomes. However, it is well documented that OHE activities are effective for the control of dental caries and reducing the risk to disease in individuals and communities (Meskin et al, 1978; Kay and Locker, 1996; Slayton, 2005).

Van Wyk (2004) recommended the integration of oral health strategies into programs in all sectors to encourage and promote oral health. Oral hygienists can play a significant role to play in the provision of educational services to non-dental individuals. Nurses, parents, caregivers and teachers are in an ideal position to provide health promotion for the prevention of oral diseases provided they are well informed (Akpabio et al, 2008; Clemmens and Kerr, 2008). Parents and caregivers have an important role to play in prevention of oral diseases in children (Akpabio et al, 2008). Collaborative practice is important to improve oral health knowledge and dental health services in the population (Reitz and Jadeja, 2004).

Schools are ideal environments for the implementation of brushing and brushing and fluoride (BF) programs with the assistance of the teachers. Three quarters of the OHs did brushing programs using fluoridated toothpastes. The use of fluoridated toothpastes is an essential public health measure for the prevention of dental caries. The efficacy of its use has been proven for many years (Zimmer, 2001). Brushing programs are also effective in promoting oral health awareness in the community and the use of fluoridated toothpastes provides additional caries protection in children's teeth (De Sousa et al, 2002; Marinho et al, 2003b; Maraj and Kroon, 2004).

More than 40% of OHs did brushing and fluoride programs at schools. A clear reduction in the incidence of dental caries in children has been associated with supervised regular use of fluoride mouthrinses (Marinho et al, 2003a).

Examination, charting and screening is necessary for early identification of high-risk patients for dental caries and periodontal diseases. In addition the information can be used to plan preventive programs for communities. Almost seventy percent of OHs reported doing examination, charting and screening in the community. This not only assists in early identification of oral diseases, but more importantly, non-restorative needs such as OHE can be addressed by OHs. Further, patients with identified restorative needs would then be referred for treatment (Öhrn et al, 1996).

In South Africa, the most common need in children is preventive services that include fissure sealants (van Wyk and van Wyk, 2004). Fissure sealants are an important preventive measure for the control and or prevention of dental caries. Scaling and polishing and root planing procedures are essential for the maintenance of gingival and periodontal health. The low response for fissure sealants (22%) and scaling and polishing and root planning (13%) was not unexpected due inadequate and insufficient dental facilities, equipment and materials. Furthermore the community settings such as schools, HIV institutions, crèches, antenatal clinics and orphanages are not ideal to perform these procedures. The resources required to provide these services include a dental chair with adequate lighting, a water source, an evacuation system and specific dental instruments and materials. Oral hygienists complained of lack of dental materials and too few or no mobile dental units. Access to mobile dental units, portable dental equipment and materials would facilitate the provision of these services in the community. Mobile dental units are typically characterized by

buses, campers, trailers and trucks that have been customised to function as a dental clinic. Portable dental equipment involves the use of smaller systems that are easier to transport by car (Holtshousen and Smit, 2007). The lack of resources (facilities, equipment and materials) could be one of the reasons for the high levels of periodontal and gingival diseases and untreated dental caries in the population (Van Wyk et al, 2004).

A comprehensive school-based service usually focuses on specific protection programs that include oral health education, brushing, brushing and fluoride and fissure sealant programs. School-based oral health care programs that include interventions such as examination, dental health education, scaling and polishing, placement of fissure sealants and daily tooth brushing with fluoridated toothpastes supervised by teachers are effective in reducing the levels of dental caries (Lalloo and Solanki, 1994).

The second most common institution for provision of community-based services was HIV institutions. More than a third of the OHs performed activities at these facilities. Due to the high prevalence of HIV/AIDS (30.2%) in South Africa (National Department of Health, 2006) there has been an increase in the number of institutions established for care of patients suffering from HIV/AIDS. Studies indicate that over 50% of patients with HIV/AIDS present with oral lesions associated with HIV (Yengopal and Naidoo, 2008). Oral hygienists therefore have a valuable role to play in the care of these patients.

The primary and most important role of OHs in the community is as a preventive health care provider and a leader in dental health education. These roles were

strongly promoted by Taljaard 25 years ago and again confirmed by Reitz and Jadeja and van Wyk in 2004.

3.5.2. Other Community-based Services provided by oral hygienists

Other services included taking of radiographs and impressions and expanded duties performed by oral hygienists. There were only six responses that included the placement of GIC or temporary fillings or restorations. Although two-thirds of OHs were trained in expanded functions the response to the application of these functions was particularly low. The contributing factors could be the lack of need for these types of services in the communities; the setting and or the environment was not conducive to perform these services or once again a lack of materials and facilities to perform these activities.

Of the total number of responses for community-based services more than ninety percent (95%) consisted of preventive services and five percent other services. Preventive services impacts on individuals and publics' awareness of oral health. Furthermore a decline in dental caries experience can be attributed to increases in preventive services (Baltutis et al, 2000). This further highlights the critical role of OHs in oral health promotion and prevention in the population.

3.6. Clinic-based Services provided by oral hygienists

Oral hygienists in the public sector spend afternoons (about 2 hours daily) performing clinic-based services that involve the treatment of individual patients.

Sixty five percent of responses (Table 4.1) showed that oral hygienists provided preventive services to one up to twenty patients per week or at best four patients per afternoon. These small numbers are not unexpected as each procedure requires about 30 minutes for treatment of individual patients. Other reasons include the low utilization of services, low clinic attendances, failed appointments or the lack of awareness of oral health in the population (Van Wyk, 1994). In South Africa, the majority of patients who utilize public health services are from low income groups. Low clinic attendances can be due to the lack of financial resources for transport and thus the inability to access services. Oral hygienists who spent more time providing clinic-based services were able to treat more than twenty patients per week.

3.6.1. Clinic-based Preventive Services provided by oral hygienists

More than eighty percent of OHs did examination and charting, S&P and RP procedures. Oral hygienists perform examination and charting routinely on patients. The National Oral Health Survey (NOHS) of 1988/89 reported the presence of calculus as the most common periodontal condition and a high prevalence of gingivitis, periodontitis and shallow pocketing in adults. These findings were confirmed a decade later by van Wyk et al (2004). Scaling and polishing and root planing supplements a patient's home care plaque control and contributes to the maintenance of gingival and periodontal health of patients. Scaling and polishing and examination and charting can be provided solely by oral hygienists (Bernie et al, 2005). It is easier to provide comprehensive

treatment to high risk patients for dental caries and periodontal diseases in the dental clinic. Three quarters of OHs reported giving oral hygiene instructions (OHI) to individual patients. OHI is important to create awareness and promote good oral health practices in individual patients and the community. Oral hygienists play a key role in changing oral health practices of individuals and communities for prevention of oral diseases.

If OHs spent time doing examination and charting, OHI, S&P and root planning, more opportunities would be created for dentists to perform other more complex procedures. The role of the oral hygienist is therefore not only to provide services for prevention and control of dental caries and periodontal diseases but also to make it possible for dentists to provide a comprehensive service in the public sector.

Sixty percent of OHs did topical fluoride applications and a similar percentage placed fissure sealants. The dental clinic provides an ideal environment for perform these procedures. Marinho et al (2004) found that the use of topical fluorides (mouthrinses, gels or varnishes) achieved a modest reduction in caries when compared to the use of fluoridated toothpaste. However, fissure sealants on occlusal surfaces of teeth are an effective procedure for the prevention of dental caries (Ahovuo-Saloranta et al, 2005). Perhaps materials for these procedures should be easily available at all clinics and more emphasis should be placed on fissure sealants. Furthermore opportunities should be created for patients to access these types of services.

Oral hygienists include examination and charting, OHI, S&P, RP, fluoride applications and fissure sealants in their clinic-based services essential procedures for the prevention and control of both periodontal diseases and dental caries.

3.6.2. Other Clinic-based Services provided by oral hygienists

The most common procedures performed by OHs (Table 4.2) was the administration local anaesthetics and the placement of restorations. Table 4.1 shows that scaling and polishing and RP was the most common preventive procedures performed by OHs. Local anaesthetics can be administered during scaling and root planing procedures to decrease discomfort and facilitate instrumentation in deep pockets in periodontal and gingival diseases. Local anaesthetics also reduce sensitivity during placement of restorations in large carious lesions. Therefore administration of local anaesthetics can be linked to the clinic-based procedures such as S&P, RP procedures and the placement of restorations.

The dental clinic is a favourable environment for the placement of GIC and temporary fillings or restorations. These procedures reduce pain and discomfort and slow down the caries process. Forty one percent of OHs performed these procedures in the dental clinic.

More than ninety percent (95%) of community-based services (Table 3.1) and more than seventy percent (77%) of clinic-based services (Table 4.1) provided by

OHS included preventive procedures. This outcome emphasizes the significant role that oral hygienists play in the prevention and control of oral diseases through both their clinic and community efforts.

3.7. Reasons for working in the public sector

Ninety four percent of OHS cited providing a service to the community as the main reason for working in the public sector. Similarly other studies in both private and public sectors in South Africa reported that 94% of OHS believed that they provided a worthwhile service to the public and contributed to community health which in turn provided career satisfaction (van Wyk et al, 1998; Gordon and Rayner, 2004). It is clear that OHS employed in both public and private sectors see themselves as community health providers.

More than sixty percent of OHS said they remained in their jobs because of professional satisfaction. This was consistent with the findings of Dreyer thirty one years ago and Gordon and Rayner (2004) who reported that the majority of OHS were satisfied with their choice of career.

3.8. Barriers and constraints experienced by oral hygienists

Van Wyk et al (2004) stated the fact that the majority of the population in South Africa presents with untreated dental caries could be a result of inadequate resources such as oral health personnel, dental facilities and dental services. The majority of OHS reported that they experienced barriers and constraints that hindered the provision of oral health services. The main reasons cited by OHS

was the lack of human and other resources, poor salaries and management problems.

Almost eighty percent of OHs felt that too few OHs were employed in the public sector. These findings were similar to Gordon and Rayner in 2004. Due to the small numbers of OHs it was difficult to meet the demand for services in their regions. The poor oral hygienist to population ratio limited the provision of comprehensive preventive programs. Oral hygienists had problems accessing resources such as finances, transport, mobile dental units and dental materials. Bhayat et al in 2008 reported that the lack of OHs and poor working conditions impacted on the implementation of public preventive programs. The lack of human and other resources impacts directly on the level and quality of the oral health services being provided in the public sector.

Seventy five percent of OHs said they experienced problems with management in their facilities. This can be attributed to most dental clinics being managed by clinicians without management skills or training as well as a lack of understanding of the role of OHs. Furthermore, legislation stipulates that OHs have to work on the instruction of, or under the supervision of a dentist (HPCSA, 2000). In poorly managed environments, disagreements impact negatively on the services being provided. The efficacy of OHs in the public sector is dependent on attitudes of supervising dentists or managers. Mutual recognition of each professional's expertise and contribution can improve communication and dissolve tensions permitting effective service delivery (Baltutis et al, 2000).

3.9. Qualifications and further educational interests

Almost all of the OHs (n=31) were interested in studying further with sixty nine percent favouring correspondence or part time study. This preference could be due to dependence of OHs on a monthly income or fear of losing a post in the public sector. Thirty seven percent of OHs indicated that they remained in their employment because of job security.

There are limited opportunities for further training for OHs. This includes training in expanded functions, upgrading a diploma to a degree and possibly dental therapy. Two thirds of the OHs had completed the training in expanded functions and only twelve had qualified with a degree. The difference in qualification does not influence the remuneration of OHs in the public sector. Therefore it is understandable that OHs may not be keen to upgrade their qualifications. Oral hygienists were mainly interested in studying further in the dental field, followed by management and public health. Similarly Gordon and Rayner (2005) reported that the majority of OHs expressed interest in dentistry. Entrance for dental therapy, dentistry and public health training is limited and determined by entrance requirements specified by institutions. This may discourage oral hygienists to pursue these career opportunities.

3.10. Limitations of the study

The limitation of this study is its self reporting bias. The questionnaire was also not validated, direct comparisons cannot be made and analysis must be interpreted with caution.

CONCLUSION AND RECOMMENDATIONS

The response rate was 78% with the majority (94%) of respondents being female with an average age of 37 years. The racial profile of the OHs was in alignment with the demographic profile of the population in South Africa.

The average years of service was 10 years with a maximum of 24 years. Almost half (47%) were employed as chief oral hygienists. Ninety four percent (94%) complained that salaries were poor and 78% said that there were no opportunities for promotion in the public sector.

Ninety five percent of community-based services and 77% of clinic-based services included preventive procedures. The majority of community-based services (90%) were provided at schools followed by 57% at HIV institutions.

The vast majority (94%) of OHs cited providing a service to the community as the main reason for working in the public sector. Seventy six percent said they experienced constraints or encountered barriers that hindered the provision of services with the main reason being a lack of resources (81%).

Thirty one oral hygienists (97%) were interested in studying further and the majority were interested in further education in dentistry.

The most important aspect of a public oral health strategy is the prevention and control of oral diseases through health education and promotion (Sheiham, 1992; Murray, 1999). The SANOHS states that every district's oral health strategy must include disease prevention and health promotion; basic treatment services and cost-effective and evidence-based strategies. Oral hygienists have a key role to

play in the implementation of these preventive strategies; the high-risk individual strategy and whole population strategies in both their clinic and community efforts.

In South Africa the majority of the population is dependant on the public sector for oral health services. There are high levels of dental caries, gingival and periodontal diseases and a lack of oral health awareness in the population (van Wyk et al, 2004). The delivery of health care is based on the District Health System using the Primary Health Care (PHC) approach. World Health Organization (WHO) highlights PHC activities relevant to oral health that include promotion of healthy lifestyles, education and prevention through self-care and regular check-ups. The importance of oral hygienists for the integration of oral health with PHC was also emphasized by WHO (Monajem, 2006).

It is evident that the duties, tasks and responsibilities of oral hygienists in both KZN and GP include activities associated predominantly with the prevention and control of oral diseases and oral health promotion. There are huge opportunities to improve and expand oral health services to the population by increasing the availability of human, facility and financial resources.

The importance of oral hygienists in the public sector has been proven in many countries (Baltutis et al, 2000). With the increased emphasis on effective service delivery, OHs can be used to provide essential preventive services to communities. The work role of the oral hygienist is in line with service requirements of the SANOHS and future oral health planning (Johnson, 1992).

In South Africa, a decline in oral diseases (dental caries and periodontal diseases) can be achieved by enhancing the use of oral hygienists in the public sector. It is clear that the primary role of oral hygienists is a preventive health provider and leader in oral health education and promotion with the objective to increase oral health awareness and decrease the need for curative treatment in the population.

REFERENCES

Ayers, K., Meldrum, A.M., Thomson, W.M. & Newton, J.T. 2006. The working practices and job satisfaction of dental hygienists in New Zealand. *Journal of Public Health Dent.* Summer, vol. 66, no. 3, pp. 186-191.

Ahovuo-Saloranta, A., Hiiri, A. & Nordblad, A., et al. 2005. Pit and fissure sealants for preventing dental decay in the permanent teeth of children and adolescents (Review). *The Cochrane Library.* Issue 2.

Akpabio, A., Klausner, C.P. & Inglehart, M.R. 2008. Mother's or guardians' knowledge about promoting children's oral health. *J Dent Hyg.* Winter, vol. 82, no. 1, pp. 1.

Baltutis, L.M., Gussy, M.G. & Morgan, M.V. 2000. The role of the dental hygienist in the public health sector; an Australian perspective. *International Dental Journal.* vol. 50: pp29-35.

Batchelor, P. & Sheiham A. 2002. The limitations of a 'High-Risk' Approach for the Prevention of Dental Caries. *Community Dentistry Oral Epidemiology.* Vol. 30, pp 302-312.

Bhayat. A., Yengopal. V. & Rudolph. M.J. et al. 2008. Attitudes of South African oral hygienists towards compulsory community service. *International Journal of Dental Hygiene*. vol. 6, pp 8-12.

Beirne, P., Forgie, A., Worthington H.V. & Clarkson J.E. 2005. Routine scale and polish for periodontal health in adults (Review). *The Cochrane library*, Issue 2.

Clemmens, D.A. & Kerr, A.R. 2008. Improving oral health in women: nurses' call to action. *MCN American Journal of Maternal Child Nursing*. Jan-Feb. vol. 33, no.1. pp. 4-10.

Department of Public Service and Administration. Republic of South Africa. Circular No 1 [online], 2007. Available from : <www.dpsa.gov.za/documents> (accessed : 13/10/2008)

De Sousa. Mda. L., Wagner. M. & Sheiham. A. 2002. Caries reduction related to the use of fluorides: a retrospective cohort study. *International Dental Journal*. Oct. vol. 52, no. 5. pp. 315-20.

Gordon, N.A. & Rayner, C.A. 2005. South African Oral Hygienists' Interest in Further Education. *Journal of the Oral Hygienists' Association of South Africa*. vol. 6, pp. 7-9.

Gordon, N.A. & Rayner, C.A. 2004. A National Survey of Oral Hygienists in South Africa. *South African Dental Journal*. vol. 59, no. 5, pp. 184 -188.

Health Professions Council of South Africa. 2000. *Regulations Defining the Scope of the Profession of Oral Hygiene*.

Heifetz, S.B., Yaari, A. & Proskin, H. 2007. Anticaries effectiveness of a fluoride and nonfluoride sealant. *Journal California Dental Association*. vol. 35. no. 8, pp. 573 -7.

Holtshousen, W.S.J. & Smit, A. 2007. A cost-efficiency analysis of mobile dental clinic in the public services. *South African Dental Journal*. vol.62. no. 8, pp. 334-340.

Johnson, P.M. 1992. Dental hygiene practice: international profile and future directions. *International Dental Journal*. vol. 42, pp. 451-459.

Kay, E.J. & Locker, D. 1996. Is Dental Health Education Effective? A Systematic Review of Current Evidence. *Community Dental Oral Epidemiology*. vol. 24, pp. 231-235.

Lalloo, R. & Solanki, G.S. 1994. An evaluation of a school – based comprehensive public oral health care programme. *Community Dental Health*. vol. 11, no. 3, pp152-5.

Maraj, E. & Kroon, J. 2004 .The Impact of a School dental service on the Periodontal Health and Oral Hygiene Status of 6-year-old Sowetan Learners. *South African Dental Journal*. vol. 59. no. 9 , pp. 374-78.

Marinho, V.C., Higgins, J.P., Logan, S. & Sheiham A. 2003. Fluoride mouthrinses for preventing dental caries in children and adolescents. *Cochrane Database System Review*. vol. 3. CD002284.

Marinho, V.C., Higgins, J.P., Logan, S. & Sheiham A. 2003. Fluoride toothpastes for preventing dental caries in children and adolescents. *Cochrane Database System Review*. vol. 1. CD002278.

Marinho, V.C., Higgins, J.P., Logan, S. & Sheiham A. 2004. Combination of topical fluoride (toothpaste, mouthrinses, gels, varnishes) versus single topical fluoride for preventing dental caries in children and adolescents. *Cochrane Database System Review*. vol. 1. CD002781.

Meskin, L.W., Martens, L.V. & Katz, B.J. 1978. Effectiveness of community preventive programs on improving oral health. *Journal Public Health Dent.* vol. 38. no. 4, pp. 302-11.

Monajem, S. 2006. Integration of oral health into primary health care: the role of dental hygienists and WHO stewardship. *International Journal Dental Hygiene.* vol. 4, pp. 47-51.

Murray, J. J., 1999. *Prevention of Oral Disease.* 3rd Edition. New York: Oxford University Press Inc.

National HIV and Syphilis Antenatal Sero-prevalence Survey in South Africa in 2005 [online], 2006. National Department of Health, Available from: <www.doh.gov.za/docs/reports/2005/hiv.pdf> (accessed: 15/10/2008).

Öhrn, K., Crossner, C-G., Börgesson, I. & Taube A. 1996. Accuracy of dental hygienists in diagnosing dental decay. *Community Dentistry and Oral Epidemiology.* vol. 24, pp. 182-186.

Reitz, M & Jadeja, R. 2004. The collaborative practice of dental hygiene. *International Journal of Dental Hygiene.* vol. 2, Issue 1, pp. 36- 39.

Sheiham, A. 1992. The role of the dental team in promoting dental health and general health through oral health. *International Dental Journal*. vol. 42, pp. 223-228.

Sheiham, A. 2006. The distribution of Burden of Dental Caries in Schoolchildren: A critique of the High Risk Caries Prevention Strategy for Populations. *BMC Oral Health*. Jan, vol. 6, no. 1, pp. 3.

Slayton, R. 2005. Oral health promotion in children and adolescents. *Compend Contin Educ Dent*. May, vol.26, 5 suppl, pp. 30-5.

Statistics South Africa Mid-year population estimates [online], 2007. Statistics South Africa. Available from: < <http://www.statssa.gov.za/>> (accessed: 22/02/08)

South African National Oral Health Strategy [online], 2005. Department of Health, Oral Health Directorate, Pretoria. Available from: <<http://www.doh.gov.za/docs/index.html>> (accessed: 16/03/06)

Taljaard, L.T. 1983. The role of the Oral Hygienist in Public Dental Services. *Journal of Dental Association of South Africa*. Nov, pp 687-691

Uitenbroek, D.G., Schuab, R.M.H., Tromp J.A.H. & Kant, J.H. 1989. Dental hygienists' influence on patients' knowledge, motivation, self-care and perception of change. *Community Dentistry and Oral Epidemiology*. vol 4, pp. 87-90

Van Wyk, P.J. 1994. *National Oral Health Survey, South Africa 1988/89*.

Van Wyk, C.W., Toogood, S. & Scholtz, L., et al. 1998. South African oral hygienists: their profile and perception of their profession and career. *South African Dental Journal*. vol. 53, pp. 537-546.

Van Wyk, P.J., Louw, A.J. & Du Plessis J.B. 2004. Caries status and treatment needs in South Africa: Report of the 1999-2002 National Children's Oral Health Survey. *South African Dental Journal*. vol. 59 , no. 6, pp. 238-242.

Van Wyk, P.J. & van Wyk, C. 2004. Oral Health in South Africa. *International Dental Journal*. vol. 54, pp. 373-77.

Wendt, L. K. & Koch, G. 1988. Fissure sealant in permanent first molars after 10 years. *Swedish Dental Journal*. vol.12, no. 5, pp. 181-5.

Wilkins, E. M. 1999. *Clinical Practice of the Dental Hygienist*. 8th Edition. Philadelphia: Lippincott: Williams and Wilkins.

Yengopal, V. & Naidoo, S. 2008. Do oral lesions associated with HIV affect quality of life? *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* vol.10. no 106. pp. 890-7.

Zimmer, S. 2001. Caries-preventive effects of fluoride products when used in conjunction with fluoride dentrifice. *Caries Research.* vol.35. suppl 1. pp. 18-21.