6.3 System Description - Intervention
6.3.1 The purpose of the activity (F1) is described as promotional preventive and therapeutic. Examples of these are as follows:

I. Promotional practice
   a. Oral hygiene education promotion programmes, e.g. in media, (radio, television, newspapers, magazines).
   - schools
   - health departments of governments (federal, state, local).
   - community groups (service, religious, parents and citizens, mentally handicapped associations).
   - professional organizations (dental and medical associations)
   - family.

   b. Dietary behaviour programmes promoting oral health, using family, media, community groups, government health departments, hospitals, child welfare clinics and representatives of provider organisations, community lobby groups. For example, in Australia these include
      - educational institutions (dental faculty, education department, medical faculty, colleges of auxiliary health providers)
      - professional associations (The Australian Dental Association, Australian Medical Association, Doctors Reform Society, Dietitians Society)
      - research foundations (Dental Health Education and Research Foundation, Australian Standards Bureau, Institute of Dental Research)
      - government departments (health department, education department)
      - community organizations (CHOICE [consumer organization])

II Disease prevention programmes are provided to communities and groups by: (71a, 71b)
   a. fluoridation of public water supplies;
   b. systemic and topical fluoride group programmes
      i. fluoride tablet programmes in schools
      ii. fluoride toothpaste brushing campaigns in schools
      iii. fluoride mouthrinse programmes in schools
c. topical fluoride applications to individuals
   i. school dental service operators:
      - school dental therapists in school dental clinics.
      - school dental personnel in school groups.
   ii. private dental practitioners in private dental clinics.
   iii. dental operators in government and other community
        clinics to special needs groups, e.g. disabled, elderly,
        or to special population groups, e.g. armed forces.
   iv. oral hygiene programmes, e.g. toothbrushing instruction
       programmes by
       - family
       - school dental service operators, either on a classroom
         education basis and/or to individual children attending
         the school dental service. (345, 347a)
       - special health educators, (e.g. in New South Wales
         from the Dental Health Education and Research
         Foundation (280a)).
       - other health workers, e.g. nurses in hospitals,
         community clinics.
       - private dental practitioners.

III Therapeutic programmes, e.g. provision of dental clinics as part
   of government health departments, commercial companies, charities,
   religious groups and private clinics.

6.3.2 The F1-F2 relationship
6.3.2.1 Description of Promotional and Preventive
       Practices to Consumer Type by Provider Type:
       F1-F2

The consumer within the system can by classified as follows:

A. General public
   1. Community water fluoridation (Health Department and Public
      Works [government]). Community salt fluoridation.
   2. Oral hygiene education and dietary advice through community
      media - television, radio, newspapers.
   3. Availability of oral hygiene aids - toothbrushes, toothpaste,
      dental floss and wood-sticks by commercial companies,
      government health departments, health personnel, oral health
      personnel - government and private.
B. Special groups

1. School water fluoridation by other health personnel and technical assistants, e.g. school topical fluorides and supplement programmes, mouth rinsing, toothbrushing, fluoride supplements, e.g. tablets, milk, topical application of fluoride solutions and gels by oral care personnel, health care personnel, educational personnel (e.g. teachers), parents and other voluntary groups.

2. Dietary advice to school groups, pregnant women, family by oral care personnel, other health personnel, family.

3. Oral health education by oral health personnel, health care personnel, others, e.g. parents.
   e.g.; by:
   i. family
   ii. school dental service to school classes
   iii. school teachers (science and biology lessons)
   iv. special foundations, (e.g. the Dental Health Education and Research Foundation) to schools, community groups, e.g. service groups, parents and citizens associations
   v. commercial companies using media, e.g. pamphlets and posters to schools, parent groups, other community groups
   vi. university student programmes
   vii. workplace programmes.

C. Individuals

1. By family members;
2. By dental practitioners in private or government practices;
3. By dental therapists in the school dental service;
4. By dental hygienists in private or government practices (2,3 and 4 providers give instruction in oral health education and oral hygiene, self-care and also topical fluorides).
5. By pharmacists and their assistants in chemist shops - explanation of oral hygiene aids for self-care.
6. By media oral health education.
7. By commercial advertising of oral hygiene aids for self-care.
8. By doctors to individual patients - advice on diet, oral hygiene.
9. By community nurses and other health personnel in community
health clinics.

10. By other health workers in health care institutions (e.g., nurses as in hospitals and other care institutions).

6.3.2.2 Description of Therapeutic Practice To Consumer Type by Provider Type.

Therapeutic practice by trained personnel according to the Status Intervention Index (SII) \((45b)\) can be described on a continuum as follows: (See table 6.)

I. Tooth-periodontal care, i.e. maintenance of status and restoration of gingival health is provided to the following groups:

1. **The community.** This is not done on a community basis in Australia and other developed countries. However in developing countries health workers do scaling to the general community.

2. **Groups.** e.g. School Dental Service provide prophylaxes and scaling by dental therapists to classes within schools. Prophylactic services are supplied to disadvantaged groups, e.g. handicapped, elderly, hospitalized.

3. **Individuals.** Prophylaxes and scaling is provided in private practice by dental hygienists and dentists and in government services by health workers, school dental therapists, dental hygienists, dentists.

II. Tooth restoration, surgery, dento-alveolar tissue recontour, reposition, replacement and dento-facial tissue removal and replacement are only provided to individuals and all in a very organized setting - either a school dental clinic, a government clinic, a commercial clinic (e.g. B.H.P. Broken Hill), other dental clinics, e.g. charity clinics, hospitals (government or private), private dental offices. These services are provided by operating health and oral health care personnel.

As can be seen by the F1-F2 description of the oral health care system, promotional and preventive practice including maintenance care are delivered both to communities, groups and individuals, but therapeutic practice of tooth-periodontal care, tooth-restorative care, removal and replacement of tissues are provided in a very organized care setting to the individual by specifically trained personnel. These care settings for individual treatments may however be organized,
Table 6. STATUS INTERVENTION AND THERAPEUTIC CARE.

<table>
<thead>
<tr>
<th>Absence of need for care</th>
<th>Mouth Disease Prevention</th>
<th>Tooth Gingiva Care</th>
<th>Tooth Restoration</th>
<th>Dento/Alveolar Tissue Removal Replacement</th>
<th>Dento-facial Tissue Removal Replacement</th>
</tr>
</thead>
</table>

therapeutic care

\(^a\)Adapted from: Beach D. Status intervention index Mimeoograph, Atami, Japan. Health Performance Institute Standards Division 1981.
administered and financed by communities, groups or individuals.

The actual most effective method of treatment will be a factor determining the level of consumer participation. The simpler the treatment application, the less organized settings required. This is not to say that there are not organizational structures supporting promotional and preventive practice. For example, the organizational system for public water supply supports the provision of fluoridation of the water supply. The educational system supports the provision of preventive practice within the school dental service. The overall health system supports prophyaxis and oral health education within hospitals, homes for the aged, and handicapped. The commercial sector supports the media advertising and distribution of oral hygiene self-care aids. Currently research is being undertaken to look at common factors in different environmental organization forms of care/intervention settings. (459, 234)

6.3.3 Further Description of Performers (Consumer-Provider)
6.3.3.1 Consumers of the Activity (F2 [I and III]).

A description of the consumers of oral care also involves an analysis of their (a) demographic characteristics, (b) oral morbidity, (c) treatment needs, (d) utilization of oral health care services, (e) personal oral hygiene and knowledge of preventive practices, and (f) attitudes and perceptions. (234, 459)

Taking Australia as an Example for Description of F2 (I).

In Australia the general public are the consumers of oral care. The population is almost 50 per cent male. The age distribution (1971) is such that 38 per cent are less than 20 years and 8.3 per cent are over 65 years. The life expectancy is 67 years for males and 74 years for females. Over 50 per cent of the population lives in 5 mainland capital cities and 85 per cent are classified as urban dwellers. Some 20 per cent of the population were born overseas. (304, 459a) The services they consume include the promotional, the preventive and the therapeutic. Promotional services through the media reach almost all members of the population. A primary preventive service, fluoridation of the water supply, reaches 67 per cent of the population. The largest therapeutic service, the School Dental Scheme, covers an estimated 37 per cent of primary school children (37). The results of studies of a sample household survey (156) in 1979 showed that between the ages of
2-14 years, 61 per cent had visited a dentist (includes dental technicians or dental therapists) within the last six months and only 1.3 per cent had seen a dentist more than 5 years ago. Thirty four per cent attended for fillings and 4.8 per cent for tooth cleaning and fluoride treatment. Twenty two per cent first visited a dentist at less than 3 years, 46 per cent between the ages of 3 and 5 years, 25 per cent between 5 and 7 years and 6 per cent at 7 years or more. In the group 15 years old or more (15c) almost all had visited a dentist (983 per 1000 people) and 28 per cent had seen one within the last six months. Within the last 12 months, of those visiting a dentist, 47 per cent had only one visit and 48 per cent had visited for fillings, 50 per cent for prophylaxis and for fluoride treatment.

For Australia, and, in particular New South Wales, there are many reports of surveys of consumers of oral care (15b, 15c, 32, 33, 34, 36, 40). Using the results reported in 1973 (459) which looked at three age groups: 8-9 years, 13-14 years, and 35-44 years, in a metropolitan and non-metropolitan area of Sydney, data available includes oral morbidity, treatment need requirements, utilization of dental services, personal oral hygiene and knowledge, and attitudes to and perceptions of dental treatment. (See Table 7.)

For the 13-14 year sample (459),
56 per cent perceived need for restorative care
76 per cent had visited a dentist in the previous 12 months
64 per cent received curative treatment
38 per cent had visited for symptomatic reasons
3.3 snacks per day, mean for the sample group
85 per cent perceived dental services as available
50 per cent travelled by car to the dentist

For the 35-44 year sample the following observations were reported (459),
21 per cent experienced toothache in the previous 12 months
57 per cent had visited a dentist in the previous 12 months
55 per cent of these had visited a private practitioner
42.2 per cent waited between one week and one month for an appointment
1.6 was the average number of visits in the previous 12 months
9 per cent had not visited the dentist within the previous 10 years
48 per cent received diagnostic treatment
36 per cent received restorative care
## Table 7. ORAL MORBIDITY.a

<table>
<thead>
<tr>
<th></th>
<th>8-9 years</th>
<th>13-14 years</th>
<th>35-44 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMFT*</td>
<td>2.3</td>
<td>6.7</td>
<td>19.4</td>
</tr>
<tr>
<td>% dmft</td>
<td>4.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% dt affected</td>
<td>19%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DT/DMFT</td>
<td>63%</td>
<td>38%</td>
<td>4%</td>
</tr>
<tr>
<td>Fillings required</td>
<td>1.4</td>
<td>2.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Extraction Required</td>
<td>0.04</td>
<td>0.13</td>
<td>0.4</td>
</tr>
<tr>
<td>Oral Hygiene Index</td>
<td>1.4</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Periodontal Index</td>
<td>0.9</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>F/F dentures</td>
<td>-</td>
<td>-</td>
<td>12%</td>
</tr>
</tbody>
</table>


*DMFT - Decayed, Missing and Filled Permanent Teeth
  dmft - decayed, missing and filled primary teeth
  DT - Decayed Permanent Teeth
  dt - decayed primary teeth
8 per cent flossed their teeth
67 per cent thought retention of natural teeth most important
71 per cent expect some pain during a dental visit
8 per cent thought that false teeth were better than natural teeth
63 per cent had symptomatic visit to the dentist

The above data for the potential consumers within the oral care system for Sydney, Australia outlines
1. the type of data necessary to enable a useful description of the system for planning, management and evaluation purposes.
2. patterns which can be established for use of the oral care system. Further data can be analysed or collected for specific consumer groups with specific needs within the system
3. patterns of oral health status and hence intervention needs can be assessed.
4. this type of data has to be collected on a regular basis in order that disease patterns can be monitored and intervention outcomes evaluated.
5. data collected according to standardized criteria can be compared across cultures. This can be used to forward research in areas of attainment of global health goals and policies of social justice.

Self care
Traditionally oral health has been an aspect of total health that individuals have been aware of as it affects both their survival needs in terms of eating food and their social needs in terms of communicating both verbally and non-verbally. Care of oral health has taken two forms: hygiene practices and relief of pain. In most cultures some form of oral hygiene occurs. For example, rinsing the mouth with water and rubbing the teeth with fingers. Using a chewed wooden stick to clean away food debris. Using toothpicks, oral hygiene aids such as toothbrush, dental floss, wooden interdental sticks are advocated as methods of efficient plaque removal. As plaque removal is seen as the major factor contributing to oral health, and oral care programmes, self care is the single dominant feature of any oral health care intervention. (141) Self care is also an important factor in fluoride programmes. Fluoride can be administered by self in various forms (see Chapter 4, p. ). Self care in terms of diet programmes is also a provider of oral health care. Ultimately the choice of what to eat is an individual decision.
The provider as self is relatively limited to promotional and preventive practice. However extraction of teeth, scaling of teeth (therapeutic practice) has and always will be undertaken in some instances by the individual. In order to monitor oral health, the individual themselves, once educated to an awareness of what is healthy is the most effective provider of this activity.

The family, especially parents who have the role of nourishing the child, providing support for other family members, are also providers of oral care. Quite often oral hygiene practices are performed on family members. Parents older siblings, grandparents cleaning childrens' teeth, advising on diet, applying topical fluorides. In some instances they could remove calculus and extract mobile teeth. In different cultural and socio-economic settings this takes place. An analysis of what hygiene practices it is possible for family members to perform will allow further development of oral care programmes having less dependence on the formal organized oral care system.

As the purpose of the activity of oral care is to promote and prevent deterioration of oral health and to maintain oral health after restoration and rehabilitation, preventive and promotional practices are best provided by the individuals themselves. It is only therapeutic practice which needs a specially trained provider. Preventive and promotional practice can be guided by trained personnel.

6.3.3.2 Providers of the Activity

Oral health care, other than by self or family, traditionally in western countries was first provided by barber/surgeons and later by dentists who were trained in an institution or in an apprenticeship. Other early practitioners have been described as druggists, chemists, apothecaries calling themselves dentists, those calling themselves dentists who had received no training were cuppers (bleeding) and corn operators (chiropodists). Providers of oral care have been outlined (see Section 6.2.2).

Oral care personnel can be described according to the following parameters:

i. functional type
ii. training and education
iii. length of stay within the system
iv. legal restrictions as to operating parameters
v. demographic characteristics, e.g. age, sex, ethnicity, geographical
vi. attitudes to oral care on an individual basis, or by representative organizational groups
vii. practice patterns for each type:
    - type of practice, e.g. solo, group, institutional, specialist;
    - distribution of practice location;
    - types of services provided;
    - attitudes to practice patterns;
    - standard working conditions;
    - membership of government or third party service programmes;
    - workload.

The providers of oral care (see Section 6.2.2 II) differ in the above characteristics according to the community in which they operate and have developed according to the needs and demands of that community. A description of the providers operating in the Australian communities of New South Wales follows as an example.

Dentists - the professionals* providing oral care

Dental operations were performed by surgeons of the Fleet and the settlement in the period up to 1818 when the first "dentists" arrived in Sydney. By 1901 the Faculty of Medicine of the University of Sydney was offering a Licence in Dentistry. In New South Wales the Dental Act of 1900 required a person to be registered if they wished to practise dentistry. Requirements were a recognized university degree or a 4 year apprenticeship, followed by a Dental Board examination or 2 years' practise prior to the Act. In 1892 the Dental Association of New South Wales had formed, the main objective being to obtain a Dental Act and it laid the foundations for an organized dental profession. By 1907 the first Australian Dental Congress had been held. In 1903 the first dental journal was published in New South Wales. (245a)

*Professional - "A university of dental college graduate who is registered to practise independently and may have in addition special training and experience in a recognized branch of dentistry." (27a)
The government in New South Wales, in 1979, registered 2765 dentists of whom 2136 were estimated to be active. In Australia, dentists are educated for 5 years by the Faculty of Dentistry in the respective State universities. Their course covers the basic sciences, preclinical subjects, clinical and community health. Opportunity is also provided for postgraduate training in specialist areas leading to higher qualifications, some of which allow specialist registration if one's practice is so limited. Overseas qualified graduates are allowed to register to practise without further examination if their qualification is from New Zealand, the United Kingdom or Ireland but those from other countries may be required to pass a qualifying examination depending on specifications for different states in Australia. Operating parameters are also defined within the respective Dental Acts, dentists being restricted to the area of the mouth, jaws and fact but procedures which can be performed are not defined. (107b)

Demographic characteristics of dentists in Australia are such that the majority are male (over 90 per cent) (39a), age distribution is such that in 1980 over 60 per cent of the total were less than 40 years and 9.3 per cent were over 60 years of age. (37) Just over 50 per cent of dentists on the Dental Register (1980) had qualified in Australia, the majority of overseas qualified people being from the United Kingdom (25 per cent), New Zealand (14 per cent), Singapore/Malaysia (8 per cent), South Africa (11 per cent). (37) The distribution of overseas qualifications reflects directly the policy followed by the government in registration, as some countries' qualifications are automatically recognized, others must pass qualifying examinations. This will also reflect the languages spoken both to the patients and within the dental educational system. There is no language restriction; however any overseas graduate applying for registration and sitting for the nationally conducted examinations must pass an English language examination. With respect to ethnicity of dentists, there are no restrictions except those informal ones which make it difficult for certain groups if they do not promote their cultural group to undertake studying to be a dentist. For example, in Australia it has proved very difficult for Aboriginal people to reach university. However in Victoria one Aboriginal is in the undergraduate course. As Australia is a multi-ethnic society, one finds this also represented in those who graduate from dental schools.
When one looks at the supply of dentists over a period of time, the following factors have been described by Davies (103) as being relevant:

a) graduation  
b) net immigration  
c) total additions  
d) less deaths  
e) less retirements and withdrawals (i.e. active total)  
f) net additions  
g) dentists at the beginning of the period  
h) dentists at the end of the period

By evaluating these totals for specific periods, one can gain an idea of movement in and out of the workforce in terms of overall numbers. One must also analyse destination and mobility of workforce. However in order to review where and when services are actually provided by these people, one must know the geographical location of their place of work; time spent in various procedures (e.g. operation time, administration time, number of days worked per year, type of practice, number and type of auxiliary employed, number of patient appointments). These variables can be measured by conducting surveys of sample populations of providers, e.g. from studies such as those which have been carried out by the Australian Dental Association and the World Health Organization. (35a, 459c) One can also show where graduates of each dental school actually practise and for what length of time. Homan (197b) has reported that during 1970-1973, 27 per cent of Queensland graduates never practised in Queensland after graduation. From studies in New South Wales, a description of the providers' service time can be made, for example for dentists in New South Wales surveyed the average number of hours at the chairside was 35 out of 41 hours worked per week. (35a, 339)

The geographical distribution of dentists reflects the distribution of the general population. For example, in Australia over half the population lives in the 5 mainland capital cities and more than 85 per cent of the Australian population is classified as urban dwellers. (459b) The majority of dentists work in the metropolitan areas rather than rural areas. (459c) There appears to have been a change in Australia of location of dentists from city areas to increased numbers working in suburban areas. The proportion working in the country has remained
relatively static. (35a) However non-metropolitan practitioners had fewer years in general practice than their urban counterparts, shown in a survey of practitioners in New South Wales. (459c) Many factors affect the location of dental practices. These include the size of the population, the age of the population, the type of oral disease, the number of other dentists in the area, access for patients, earning potential of the community. (459c) However, other factors which apply to the dentist's personal life, including facilities for education, continuing dental proximity to specialist referral services, living standards of the area (e.g. whether the general population can afford oral care, both financially and in time) what the demand for oral care is, access to urban services and amenities, e.g. facilities for educating one's own family. Some of these factors are more decisive in urban/rural distribution.

In a multi-country study of provider characteristics (459c) there is minimal analysis reported for Australia regarding factors influencing the selection of a place to set up practice. However in the data for Germany (459c) the position of practice is mainly influenced by socio-economic characteristics and infrastructural conditions. Second place is by factors related to private preferences of lifestyle and third place relates to professional considerations.

Characteristics of dental providers surveyed in the above-reported study for a selected sample of general practitioners in Sydney provided the following information in reply to a questionnaire. (459c) Firstly 47 per cent of urban and 37 per cent of rural practices had more than one dental practitioner and 97 per cent utilised dental auxiliaries. There was a total of 3.8 persons working in the average dental practice (1.3 general practitioners). When given a list of 28 common procedures, over 50 per cent of these were performed by the dentist alone. When asked questions regarding busyness, 40 per cent had seen all patients and not felt rushed or overworked. Over 15 per cent had time for more patients. Over 40 per cent had a recall system. In describing activities which related to professionalization and education, over 80 per cent were members of a dental association and they attended over 5 professional meetings per year and spent over 5 hours per month in professional reading and approximately 4 days per year in continuing education courses. Approximately 60 per cent worked solely in their present clinical position, but many had other positions (average 1.3).
Attitudes to oral care by providers of services have a direct influence on the type of care provided. (93) These attitudes will reflect the oral care education system which the dentist qualified in, but will also represent the prevailing attitudes of the profession, and the method of payment for item of service which is currently being used, as well as what is perceived by the dentist as the attitude of the patient to oral care. (93)

In the World Health Organization's International Collaborative Study of Dental Manpower Systems study (459c) attitudes towards dentistry and dental care were assessed by questionnaire by indicating the extent to which various statements about patients and providers were true. In summary, for the Sydney sample, the majority of dentists felt that most people fear pain, a smaller proportion felt that all patients fear the dentist, don't come soon enough or don't follow advice on oral hygiene. Over 40 per cent of dentist felt that technical skill, ability to handle people and having up-to-date information was absolutely necessary to make a good dentist. Over 20 per cent felt that a pleasing personality and modern equipment was necessary and over 10 per cent felt that artistic ability, and business sense was also necessary.

When asked about 6 conditions which were necessary to ensure high quality care, the following percentage of the group answered it was absolutely necessary: maximum autonomy 35 per cent, systematic and complete records 45 per cent, opportunity to consult with other dentists 23 per cent, fee for service 23 per cent.

To indicate behaviour patterns followed by dentists, a series of 10 items were asked. The proportions indicating that the behaviours in question were, in their opinion, almost always true of dentists.

The questions for the Sydney metropolitan and non-metropolitan areas were as follows:
<table>
<thead>
<tr>
<th></th>
<th>Metropolitan (%)</th>
<th>Non-Metropolitan (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take an interest in their patients</td>
<td>68</td>
<td>64</td>
</tr>
<tr>
<td>Forget patient when work complete</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Explain patient's problem to patient</td>
<td>37</td>
<td>44</td>
</tr>
<tr>
<td>Act competently and know what they are doing</td>
<td>78</td>
<td>87</td>
</tr>
<tr>
<td>Recommend more work than needed</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>More concerned with cure than prevention</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>Available when patients need them</td>
<td>59</td>
<td>56</td>
</tr>
<tr>
<td>Not concerned about pain they cause patient</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Practise in areas where there is a need</td>
<td>33</td>
<td>17</td>
</tr>
<tr>
<td>Choose the patients they want</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

A series of items concerning the use of auxiliaries was asked and there was general agreement that auxiliaries increase the productivity of a practice and frees the dentist to perform other professional duties but over 35 per cent of the sample were uncomfortable to be held accountable for the performance of auxiliaries.

In order to assess attitudes to third party payment of oral care certain statements were selected and providers were asked to answer whether they thought they were true. The majority of dentists felt that third party payment increased available care to low income groups and over one third thought that third party payment interfered with setting of fees and created too much paper work, but that it helped expand dental practice. Twenty per cent thought that third parties interfered with the freedom of the dentist.

When asked a series of 10 questions about the delivery system, there was a large majority who felt dentists in private practice work more hours than in the public system, public pro-rammes have as much administrative work as private programmes and that public programmes lack incentives for dentists. Over 45 per cent felt that private care was more preventive than public care. One third thought that private practitioners have poorer working conditions than public practitioners and that public programmes force practitioners to see too many patients. One quarter of dentists surveyed thought that care was available to all groups in the community.
When asked questions on perception of potential for themselves in their career, almost 50 per cent were doing what interested them and were satisfied with their work and professional status and ability to increase their earnings or change their kind of dental practice.

When asked questions on the perception of changes needed in the system, most felt that there was a need to reduce working times for obtaining dental appointments. Salaries of dentists also needed to be increased and that there was a need for the increased use of auxiliaries, especially the dental hygienist. There should be more dentists in rural areas and in public hospitals, and there is a need for dental care insurance.

To estimate patterns for workload, average proportion of time spent on various types of procedures was assessed. This showed a significant difference in metropolitan and non-metropolitan areas only in time spent on full dentures - there being three times as much by non-metropolitan dentists, and this time was taken from operative treatment. The majority of time was being spent in operative dentistry, oral surgery and extractions being the next most with crown and bridge and endodontics, partial dentures and periodontics, each one taking up less than 6 per cent of working time.

The use of data such as that collected by the World Health Organization/United States Public Health Service International Collaborative Study for Sydney (459c) to provide an assessment of the characteristics of dentists as providers of care, allows a more thorough assessment of the oral care system for planning purposes. However when analysing the oral care workforce, it is also just as important to analyse the other personnel involved in the delivery of oral care and how the personnel work together to provide the total intervention service which we define as oral care.

**School Dental Therapists - Operating Auxiliary**

Data from Australia will be used as an example of system provider description.

In 1972 the Federal Australian Labour government introduced the Australian School Dental Scheme on a Federal basis and the service providers were to be the school dental officers and the school dental
The new concept to be promoted by the Federal government was the operating auxiliary; not new to Australian state governments, the operating auxiliary had already been utilised in South Australia since 1967 and Tasmania since 1966. The operating auxiliaries had first been introduced in New Zealand in 1920. (27a, 47a)

The duties of the therapists have been outlined in legislation such that they are trained at a level second only to the dentist in terms of the tasks which they perform. These can be described as -.0 to -.7 on the Status Intervention Index. (45b, see section 6.1) These include the placement of restorations and extraction of teeth. (107b) In 1980 in Australia there were nine training schools offering a 2 year certificate course. In 1980, 1208 school dental therapists were estimated as being in active employment in Australia. (37a) The courses consist of basic clinical sciences and a practical clinical programme. (37a)

Western Australia also trains dental therapists in a 2-year full time associate diploma course. (37a, 184a) In contrast to the school dental therapist who is restricted to working within the school dental service, the graduate of this course is available to the whole of the oral care service, both private practice and government service, for the treatment of adults as well as children. (184a)

Figures are available from Commonwealth government records of the school dental scheme of the length of stay of the school dental therapist within the system. (347a) In 1979, 6 per cent of the workforce resigned in contrast to the 12-15 per cent estimated at the start of the scheme. (37c) Factors influencing this length of stay include career opportunities provided within the structure of the system, geographical location of practice, other personnel working within the local environment. Within Australia, the school dental therapists are female. In Western Australia the sex is limited by law to female only, but the other states, although not officially limiting selection to females, do not actively encourage males to enrol for the courses. In some cases where males have applied, they have been actively discouraged during selection interviews. (106b)

The Dental Acts for each state define the operating parameters of the school dental therapists to working only on school children within the school dental service and to using specified operating
procedures which are restricted by the terms of the various Dental Acts. (184)

The distribution of school dental therapists is determined by state government policy as to location of school dental clinics. In some cases they operate from mobile dental clinics. Most state governments have a policy to place school dental clinics in places where other oral care services for children are unavailable. (465) In 1979–1980, 37 per cent of primary school children in New South Wales were estimated to be covered by the school dental scheme. (465)

At 30 June 1980, 572 static and 242 mobile dental clinics were operating in Australia, with a further 110 clinics approved. Facilities to enable operation of mobile clinics at 190 locations were established during the year. (37c)

School clinics can have differing numbers of operating personnel ranging from one school dental therapist to eight dental therapists and one dental officer. (347a) This will vary according to the location of the clinic, the number of children to be covered by the service, and the availability of therapists and dentists. Different states have policies of ratios needed of school dental therapists : dental officer : school age population. These have been developed to take account of disease prevalence, the number of children using fluoridated water supplies and whether the general school population is dispersed in small population groups. (347a) The ratio of school dental therapists to population is also affected by the policy of type of services provided by the school dental scheme, and hence, the workload; for example, are preventive services provided, and, if so, what type and are they on a group or individual basis? At what state in the caries penetration process are the teeth restored? Policy decisions in this latter aspect have significantly altered the number of prescribed restorations and hence the workload of the school dental service in the New Zealand School Dental Service (93a) and the Danish School Dental Scheme. (176a) Apart from being affected by policy decisions from a central authority, workload can also be affected by local dental officers' policy towards the type of services provided by school dental therapists. Given that both preventive and restorative services are needed, school dental therapists may be directed to allocate their time for specific service mix. (27a)
School dental therapists working within the school system have specified operating hours and weeks in the year and these vary from state to state, according to standard working conditions of the government service.

Dental Hygienist - Operating Auxiliaries
(Data from Australia will be used as an example for system provider description)

In 1975 a dental hygienist course commenced in South Australia. Prior to this, the only courses for dental hygienists in Australia were those trained in programmes of the Armed Services. The dental hygienist can treat a patient of any age, but is restricted to procedures which are usually classified (184a) as applying topical preventive techniques, cleaning and scaling the teeth as well as health education. That is from -.0 to -.3 on the Status Intervention Index. (45b, see section 6.1.1) Courses are given in basic and applied dental sciences, preventive and clinical dental practice. (37a)

Only in South Australia are dental hygienists registered. They are only legally allowed to practise in South Australia and in the Australian Capital Territory. (37a) Hygienists qualified in usually the United Kingdom or the United States of America work in the oral care system in private practice (37a) in all states of Australia, but no reports are available describing their workforce patterns or numbers. However their usual pattern of practice is either to work as a salaried employee or on a commission basis, i.e. a certain percentage of the fee charged being retained by the dentist in whose practice the work is carried out. Almost all hygienists would practise on prescription from a dentist.

From practice patterns in other countries, e.g. the United Kingdom and the United States of America, it would seem that dental hygienists could be utilized by dentists in Australia. For various political reasons workforce supply problems and professional assessment of need there has not been widespread utilization of hygienists, nor the setting up of many training programmes (184a) nor the legalization of practice in states other than South Australia and the Australian Capital Territory.
Dental Technician

I. Dental Technician - Non operating auxiliary (Laboratory)

In order to provide the technical services needed for tooth restoration (direct insertion), dento-alveolar tissue replacement and dento-facial tissue replacement (−0.5 to −1 on the Beach Status Intervention Scale) \( (45b, \text{ see section 6.1.1}) \), personnel have been trained up until recently on an apprenticeship system. \( (184b) \) Originally trained by the dentist and previously trained technicians spent a specified number of years under supervision. This period varied until regulated by industrial activity and government regulation. \( (37b) \) In Australia the courses are now all of 4 years' duration and vary in the amount of full time training and formal training, block release training and indentureship. All courses are certificated and have a committee which advises on curriculum and entry qualifications. \( (37b) \) There are specialised in-service training courses also provided in advanced techniques after graduation. In 1979 there were 884 registered technicians in New South Wales (including apprentices), 479 in Victoria. \( (37c) \) The dental technician is limited to the manufacture of a device for insertion into the mouth on the prescription of a dentist. \( (184b) \) Dental technicians work in government clinics, in dental practices and in dental laboratories.

II. Dental Technician - Operating auxiliary

Another oral care person who up until recently dealt in direct relationship with the public illegally, without a special training course or special government regulation is the denturist. \( (184b) \) The main task this person performed, was to fit, insert, construct, repair or renew artificial dentures. They were not recognised by the government or the dental profession and they had no training except for that which they acquired by trial and error or apprenticeship to another similar person. They did not work under any direction or supervision of a dentist. In Australia first Tasmania, then Victoria and finally New South Wales in 1980 passed laws which recognized these persons and they were registered and licenced by special examination. All three states have commenced formal training courses and limited the registers' numbers until those completing the courses have completed them. In 1980 Tasmania had 62, Victoria 121 and New South Wales 295 denturists on their registers. \( (37a) \) Most of these personnel deal directly with the public and do not work in conjunction with other trained oral care personnel, but work in isolated practices. \( (184b) \) There are very few reports
available giving descriptions of these personnel and their practice patterns.

In Australia, surveys have been carried out to determine the characteristics of dental technician practices as related to the practices of dentists. Barnard (35a) concludes that the number of dental technicians directly employed by private practice has decreased from 1961 to 1971. Partnerships still employ the greatest number of dental technicians and this is influenced by the number of dentists actually employed in the practice. There was also a tendency for those dentists who had been in practice for a longer period to employ more dental technicians. Those in the country and in industrial areas (25 technicians per 100 dentists) also employ more than those in the city or residential areas (10 technicians per 100 dentists). Barnard (37a) also estimates that the number of dental technicians in Australia is 2270 (in 1979), with 516 being employed by government and 20 employed in other clinics.

The Dental Surgery Assistant (DSA) - Non operating auxiliary

The dental surgery assistant is a non operating auxiliary restricted to duties such as preparing restorative and impression materials, sterilizing, record keeping and receiving patients and serving as an assistant to the dentist or to the operating auxiliary. Occasionally the assistant may be within the operating category when trained to perform such initial oral procedures as placing restorations, fitting matrix bands and taking radiographs. The DSA also often performs dental health education at the chairside. (27a, 184a)

The DSA operates as an assistant to other personnel performing activities included in the range -0 to -1 (Status Intervention Index). (456) In most cases this auxiliary has had little or no formal training (39a), skills being learned on the job from the operators and other DSA's. In Australia there are certificates awarded for success in specific examinations and for successful completion of limited formal courses. There is also a national certificate of proficiency awarded. The courses are all part-time and involve attendance at technical colleges (or by correspondence course) where lectures are given in clinical subjects, as well as some pre-clinical subjects, e.g. anatomy, physiology. (37) No reports are available on the use of operating dental surgery assistants in Australia (184a) and to date
no action has been taken to formally introduce such a category. However DSA's can obtain a radiography certificate which allows them to take radiographs under the supervision of a dentist. (37) Even though legally in Australia there is no recognition of operating dental surgery assistants, one may find the tasks prescribed under this title being carried out by DSA's. In fact, much investigation internationally has been carried out into the changes that can occur to the productivity of dental practice with the use of formally trained DSA's and operating DSA's (commonly called Expanded Function Dental Auxiliaries [EFDA or EDSA]). (9a, 116a) The general conclusions have been that productivity of the practice increases at a specific cost saving. The quality of work performed by the EDSA is equal to that of the dentist, and patient acceptance is linked to dentist acceptance.

Reports (37, 39a) available on the characteristics of DSA's in Australia give numbers of DSA's per state or government institution, number of DSA's per dentist and salary award rates by years of employment age and type of certification*.

According to dental practice reports for Australia (35a) the number of DSA's used per practice has increased since 1971 but with the increase in partnerships and group practices, this increase has been slight as the solo dental practitioner and dental specialist employ the greatest number per dentist. Younger dentists also employ a greater number of DSA's.

* A survey conducted in the United Kingdom for the Dental Surgery Assistants Association asked questions concerning conditions of employment, actual duties performed, educational requirements for selection, formal and informal training background and past dental employment experience. Published results are not yet available, however the survey shows that educational requirements for selection are minimal and the range of duties performed is very large and quite a few involved are operating. The majority surveyed had little or no formal training.

The formal training programmes for DSA's which are available in Australia are on a sessional basis and are conducted in technical colleges and dental hospitals. (37) These institutions have a curriculum committee consisting of representatives of the Australian Dental Association. The Armed Forces conduct full-time courses within their own health training systems.
Other non operating oral care auxiliaries

Other functions often performed by DSA's and sometimes by other specific auxiliaries are receptionist-secretarial duties and health education. As pointed out by Barnard (35a) it is very difficult to separate out a specific person as a receptionist/secretary from the DSA in some practices. Figures for dental practices for 1974-1975 state that there is a mean of 0.8 receptionists per practice. There are no formal training courses in Australia for the receptionist/secretary. However, within the formal DSA training courses, lectures and practical sessions are allocated for training in this function. (35a)

Oral health education is a task often performed by DSA's but in government services oral health education programmes are provided by specific dental health educators, as is the case with the Dental Health Education and Research Foundation of the University of Sydney. (280a) The Dental Health Education and Research Foundation trains oral health educators who, after completing the course, are used by both government health authorities and by the Dental Health Education and Research Foundation for oral health education instruction to school and community groups. (280a) There are very few personnel employed solely as oral health educators in Australia. Sometimes trained dental therapists will work as oral health educators for commercial organizations (e.g. Colgate, Victorian Milk Board). The need for oral health educators within the Australian environment has been reported. (250a)

Oral health educators do exist as separate entities in some countries, for example, the United Kingdom and the United States of America (280a) but there has been no reported formal position for this member of the oral care team in Australia. Formal recognition of the function of oral health education occurs in government departments of health (280a) and the Australian Dental Association. (146)

Health Care Personnel

I. Operating

Other members of the health professions provide health care at both the -0 and -1 ends of the Status Intervention Scale. (45b) Medical practitioners may give oral care advice and also provide therapeutic treatment, usually by dento-alveolar and dental-facial tissue removal. The general medical practitioner would give advice
concerning diet, eruption of teeth, oral mucosal diseases, and oral tissue abnormalities. Thence they can act in promotional, preventive and therapeutic practice. Specialist medical practitioners may also provide therapeutic services in clinics and hospitals. Treatment of conditions such as cleft palate are carried out by a team of operators including medical and oral care personnel. Medical practitioners and specialist anaesthetists are used by dentists to provide anaesthetic services for oral care. There are no reports available for Australia on numbers of medical practitioners actually performing oral care services, but analysis of hospital records may provide some data on dento-facial tissue removal. There is an area of controversy which arises between specialist medical practitioners and specialist (oral surgery) dental practitioners and the use of these personnel to perform oral care at the -1 end of the Status Intervention Scale. In contrast to the United Kingdom, Australia does not have many resident dental and/or oral surgeons in the public hospital system and there is no real career ladder within the government hospital services for dentists. Hence, medical practitioners will be used to perform certain oral care tasks. Other countries, e.g. China and the U.S.S.R., have a more defined organizational structure for providers of oral care at this level.

The other medical person operating in the field of oral care is the trained nurse. They operate at the -.0, -.1 and -.7 to -1 part of the Status Intervention Scale. Within the hospital, the dental clinic, the community clinic and the dental department of hospitals and the private practice, the trained nurse performs treatment procedures delegated by the dentist or doctor. The formal education of the nurse usually includes lectures on oral care procedures and further informal education is given by dentists or medical practitioners at the workplace.

II. Non operating

Health care personnel who are part of the oral care system include nurses, pharmacists, health educators, health administrators. The functions they perform as part of the larger general health care system involve tasks which are also part of the oral care system. Their training and education, their understanding of, and attitudes to, oral care will directly influence the effectiveness of the oral care system both by their performance and the resources they can allocate to carry out the purpose of the activity. For example, the health administrator
may be responsible for budgets for oral care programmes. The knowledge and training of the pharmacist will influence the advice given to enquiries made by the public regarding medicaments or oral hygiene and oral hygiene aids. The emphasis placed on a dentally acceptable diet or fluoride supplement by a mother-care nurse or health educator may influence the oral care preventive regimes practised by pregnant and nursing mothers.

Other non-health personnel involved in the oral care system

In the same way as health care personnel providing oral care affects the system, other non-health personnel who are also performing within the oral care system will be able to change the output of the system. The main area in which they can perhaps be described is with respect to their training and knowledge of oral care, as well as their attitudes to oral care. Some of these personnel (see previous list, p.195) e.g. water fluoridation technicians, have formal training courses. Others, e.g. teachers, administrators, have specific lectures within their formal courses which relate to the oral care system. Some groups, e.g. parents and guardians, community leaders, receive training and education as part of specific oral health care promotion and preventive programmes.

Other groups, e.g. politicians, commercial company representatives, members of the media, are involved in policy making and health promotion and these decisions may affect very large groups of people. For example the promotion of fluoride toothpaste commercially can help to change attitudes to oral health and oral care, affecting availability of oral care resources (providers and environments) as well as changing practice patterns within specific environments. There is no formal or coordinated education programme for these groups. The Australian Dental Association has informal techniques for educating these personnel but no reports are available for Australia which outline formal attempts at education. Except for publication of policy statements and press releases (14c), plus gratis copies of the Australian Dental Association Newsletter, the Australian Dental Journal and other publications being sent to relevant political and administrative personnel, there appears to be no formalised education programme. However through the auspices of the dental associations, oral care educational and training institutions, government health departments, formal and informal lobbying takes place but no central planning.
6.3.3.3 The Environmental Form

Environment can be used to describe organizational settings within which specific oral care activities are provided to consumers. Beach (45a) has described these environments as part of a range where status, the need for intervention and the use of specific oral care technology can be placed on a scale of need for organization of the technology. Where technique is provided by more than one operator using complicated technology and training, the environment needs greater organization. An example would be dento-facial tissue removal on an individual which is provided by a highly educated team of operating oral care personnel within a clinic or hospital, using instruments and machines (high technology). In contrast, giving a health promotion lecture to a community group requires less of an organized environment in order that the purpose of the activity is achieved.

Using this environmental description, one can specify in which environments the promotional, preventive and therapeutic practices are carried out and which providers and consumers are actors and in which environment. One can then look at factors which affect this system description and on which performers these factors are influential.

Promotional and preventive practice are performed by providers throughout the system but are the principal components of the workload of operating and non-operating oral care auxiliaries. They are also the principal components of workload time spent on oral care by non-operating health care personnel and other non-health care personnel. These activities are principally performed outside the dental surgery of general practice, clinics, hospitals, but often within offices of medical practitioners and clinics and hospitals of the general health care system, as well as within schools. The wider environment of the open community receives principally promotional practice.

Therapeutic services are provided principally by oral care professionals and auxiliary personnel and are performed within general dental surgeries, dental clinics, dental hospitals, dental departments in general hospitals, and general hospitals.
Barmes (26a) has also described an oral care system description model. His description, besides using the concept of practice type (type of service) and provider (workforce type) has introduced parameters of payment, targeting (in terms of need and demand for care) and type of provider employment. (See Table 8). As Barmes points out, other axes could be added to the five, but that there are theoretically 243 ways of combining all 15 factors in this table to describe the system. This model fits an evaluation criteria developed for scoring health service systems described using the following philosophies. (234)

a) health as a societal value
b) collectivism versus individualism
c) distributional responsibility.

Also the 5 axes were selected for research purposes in order that some information can be provided on "how can inadequate oral health resources and knowledge be harnessed to the best advantage in developing optional oral health delivery services." (459)

Looking at the New South Wales (Australia) system within this model, and using the 5 axes stated, this has been portrayed in Table 9). (459)

For the oral care system of New South Wales, there are aspects which do not completely fit this model, as this was proposed in 1975 and the delivery system has developed and changed since that time. For example, the government school dental service, introduced in 1973, is in direct payment, preventive-curative type of service, auxiliary manpower employed by government.

Third parties involved in the financing of dental services in Australia (37) involve government, non-profit health insurance, commercial insurance, employers, employee groups and other groups. Payment may be direct to the dentist (in private practice) or the patient may receive rebates on payment made. Dentists may also provide services at an agreed reduced fee scale. By October 1980 (37), 54 health insurance funds were offering dental benefits and 47 per cent of the Australian population was covered. However all funds have different premiums, benefits, and periods of cover.
Table 8. ORAL CARE SYSTEM DESCRIPTION.\textsuperscript{a}

<table>
<thead>
<tr>
<th>Axes of Difference Qualifying comments</th>
<th>Payment</th>
<th>Type of Service</th>
<th>Targeting</th>
<th>Workforce Employment</th>
<th>Workforce Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predominantly</td>
<td>Direct</td>
<td>Curative</td>
<td>Demand</td>
<td>Private</td>
<td>Professional</td>
</tr>
<tr>
<td>Selectively</td>
<td>Direct-Indirect</td>
<td>Curative</td>
<td>Demand-Need</td>
<td>Private-Public</td>
<td>Professional-Auxilliary</td>
</tr>
<tr>
<td>Predominantly</td>
<td>Indirect</td>
<td>Preventive</td>
<td>Need</td>
<td>Public</td>
<td>Auxilliary</td>
</tr>
</tbody>
</table>


Table 9. ORAL CARE SYSTEM DESCRIPTION - AUSTRALIA.\textsuperscript{a}

<table>
<thead>
<tr>
<th>Axes of Difference</th>
<th>Payment</th>
<th>Type of Service</th>
<th>Targeting</th>
<th>Workforce Employment</th>
<th>Workforce Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>Curative</td>
<td>Demand</td>
<td></td>
<td>Private</td>
<td>Professional</td>
</tr>
</tbody>
</table>

Other government dental services don't exactly fit this model as payment may sometimes not be direct, but indirect. However the targeting is still towards demand, the workforce employed is public and principally professional, Armed Forces using more auxiliaries. (37a)

Some services provided in New South Wales are combinations of different types of workforce. For example, old age pensioners living in areas where there are no available public professionals go to a private professional who is paid by the government for items of service at an agreed fee scale. (37)

As Australia is a Federation of States, two governments - the Federal and State governments - are involved in payment of services and the employment of manpower. In principle the government involved is the State government. The allocation of financial resources between State and Federal governments is determined by political policy-making and can change with a change of government and change of government policy. For example, the Australian School Dental Scheme (15) was originally mainly financed by the Federal government, but government policy changes have altered and it is now principally financed by State governments in 1982. (465)

Most of the services provided by the governments are curative (therapeutic). However the major preventive service provided in Australia is fluoridation of the public water supplies (37). In June 1979, 67 per cent of the population received fluoridated water (81 per cent in New South Wales). Fluoridation is financed by both State and Local government bodies and is operated by water engineers and technicians of State Public Works Departments, or local councils and/or water authorities.

There are many programmes throughout Australia primarily under State or institutional jurisdiction which provide oral care to special population groups. (459a) Most of the care provided is by public employees and is of therapeutic (curative) purpose, but often there is a preventive component. The funding is usually indirect through governments.

One activity which is an integral part of the oral care system is teaching and research. This activity can cover the promotional,
preventive and therapeutic aspects of oral care. It is also part of the educational system.

Research activities are performed in order to gain information to improve and evaluate the oral status, the factors influencing oral status, to understand the oral care system and the techniques it makes use of. (14c, 14d, 82, 131a, 208a) Research is provided by personnel within special research institutions, e.g. the Institute of Dental Research, the Australian Standards Laboratory. It also utilises personnel from within the oral health teaching institutions, other research and educational institutions, the government and private sector general practitioner, and government departments, e.g. the Health Departments. The primary consumers of the results of the research are the oral care personnel, but the ultimate consumer is the general public. Those people providing research activities include medical and dental professionals, other professionals (scientists, oral care auxiliaries), other auxiliaries (medical and science technicians), other ancillaries (clerical and administrative personnel). There has been no overall report for Australia on the number of people employed conducting research in the oral care system, but reports are available for specific research institutions. (208a) The research is performed in environmental settings ranging from the general community to specific areas within the community, e.g. geographic areas, special groups to the dental clinic, dental and general hospital and research laboratory. (209)

In order to teach personnel who will be part of the oral care system, a subsystem of teachers and teaching environments has been created. (433a) The performers in this activity are the consumers, i.e. the students and teachers. The consumers are drawn from the general population (41) but have been selected by formal methods of examination or interview. Requirements for selection are set by the various teaching institutions and are affected by workforce policies set by governments and the teaching institutions. (362a) In 1979 (37a) approximately 163 dentists were employed in universities or teaching institutions. However these institutions also employ other personnel who contribute to the teaching of oral care personnel. These range from other professional oral care auxiliaries, other auxiliaries, technicians, administrators, clerical, cleaning and maintenance staff. All are considered necessary to the successful carrying out of the
purpose of teaching oral care personnel. Some have specific training in producing teaching aids, e.g. audio-visual and photographic technicians and artists.

The environmental setting used for teaching also ranges from the general community to community settings (e.g. schools), general health care settings, general dental clinics, dental hospitals and research institutions. (47b, 89a) The organization of the system which teaches oral care personnel is complex as the materials needed for teaching purposes, as well as simulation materials of human tissue, also includes the general public. Consequently, arranging for the general public to be available and willing to be used for teaching purposes involves techniques of management, administration, psychology and sociology and utilises resources such as time, finance and personnel which could be part of the evaluation of the oral care system.

6.4 **Factors Influencing the System**

There are many factors affecting the oral care system acting on the system as a whole and/or acting on various components of the system, e.g. on the consumers, on the providers. These can be described under the following areas, as modified from Schaefer: (365)

a) political variables
b) broad government policies
c) social structure
d) economic variables
e) technological limitations
f) resource allocation
g) attitudes and perceptions

The oral care system can be analysed according to how the above factors have influenced the various components or formal pattern of the system. That is, the purpose of the activity which the system encompasses, the consumers and providers within the system - the performers of the activity, and the environment within which this activity takes place. Not until these factors are documented can the description of the system be specific enough to allow evaluation of system effectiveness. To date there are few reports where this occurs. (66, 83)
The general public's expectations for quality of life and health is influenced by political factors and by the organizational method to be used to achieve their goals. (286) This is expressed in policies of the various political parties and interest groups. Included in these groups would be those primarily involved in the provision of health care. These expressed policies serve as a guideline for decision-making.* An example of this social control can be seen in the Australian situation.

Up until 1973 there was a small and limited government service in New South Wales for schoolchildren. (465) However with the Australian Labour Party becoming the Federal government, with a specific policy to provide free oral care services for all children, implementation of this programme was formalised on a national basis with appropriate allocation of resources to the different States. (15) The Australian Dental Association, despite opposition from some members, agreed to participate with the scheme but attempted to set guidelines for policies regarding implementation with respect to workforce parameters and the supervision and control of the service. (14c)

Another area where political factors have influenced government action is in the auxiliary personnel licensed and registered in the various states. For example, dental hygienists are not licensed to practise in New South Wales, but dental prosthetists are. (372) The legislation for dental prosthetists to practise was passed by the New South Wales government as it had been a long-established ALP policy, in direct opposition to the New South Wales Branch of the Australian Dental Association. On the other hand, legislation to licence dental hygienists has not been proceeded with by the New South Wales government as a result of representations of the Australian Dental Association (New South Wales Branch). (465)

* For example, the policy of the Australian Dental Association (14c) states that "dentistry is an essential health service and should be available to every section of the community, based primarily on private practice." The Australian Dental Association is opposed to any national dental health programme based solely on a salaried service. However there is a policy that government-sponsored dental services or financial assistance should be available for those unable to provide finance or obtain treatment. Priorities for government subsidy to groups have been set with pre- and primary school children to receive first priority.
At the macro level of a large geopolitical area and consistent with its social philosophy and social priorities, implicit and explicit constraints and inducements exist to facilitate the health care process, regulate the quantity and quality of personal health services used by the consumer and modify their discretionary powers. In each case society determines the form of social control exerted by the health care system. (234a)

The parameters of the social control mechanism may be considered on an active-passive continuum, depending on whether health resources are deliberately allocated by society. In an open health service system, control use is in a passive way and health is regarded as a commodity, and subject to some control by supply and demand. However as care services are provided collectively, there are active measures of control imposed both through organization and deployment of workforce or care providers and facilities (organizational settings) and through the amount, time and place of injection of capital into the health services system.

The structure of the society in Australia has meant that auxiliaries have been restricted to females, with males being actively discouraged. (106b) However in the Armed Forces where the majority of personnel are male, the same social forces are not present and some auxiliary personnel are male. The social structure will also help determine government political policies. (53, 87, 214, 244, 340a, 423)

Economic variables are an important factor affecting the oral care system (308), influencing the use of the system and its component subsystems by consumers. (204, 245, 340, 340a, 350, 459) The overhead costs of a dental practice, including the differential costs of various materials and services in the practice, e.g. salaries, play a part in the decision making of the dentists in their entrepreneurial role. (247, 340, 340a, 364) The economics of various oral care programmes will influence decisions made regarding their utilization, e.g. the economics of local government financing fluoridation of the local water supply. The costs of fluoridation per local ratepayer is less the greater the number participating. If the costs are relatively high in smaller communities, these costs may be too high relatively for these small communities. (465)
Economic considerations may be discounted against government policy. For example, the Australian Government implemented a policy of specific oral care for cleft palate patients with a government subsidy. This is an example of a provision of grant or subsidy to assist certain population groups in receiving some form of care.

Economic variables may also act on the dental trade industry and determine the survival of industries manufacturing in Australia and supplying the Australian market. Government policies can influence these variables also by placing duty restrictions on items in competition with local trade.

Technological limitations may act as an important factor influencing the system. Technology certainly has had an influence on the type of preventive and therapeutic practice, providing materials to the operator which has meant widespread use of certain techniques, (e.g. topical fluorides, composite resins, porcelain fused to gold crown and bridge restorations, high speed drills).

Resource allocation is one of the major factors influencing the system. However resource allocation is markedly influenced by political variables and broad government policies. These will help determine allocation and priorities. For example political pressure for oral care for children meant that resources of government services were allocated to provide firstly a checkup service for children and, later, a school therapeutic and preventive service in New South Wales. Resources were found within the budgetary allocations of universities and tertiary education boards to finance further dental educational institutions for dentists and auxiliaries in New South Wales when broad government policy and political pressures were demanding more personnel for the oral care workforce.

Resources were made available for dentures for pensioners in New South Wales from private dental practitioners when government policy and political pressure from the Australian Dental Association demanded that pensioners needed dentures and that the government should subsidise this service.
Political pressure helped to allocate resources for providing oral care to the Aboriginal population. This was specifically allocated to services set up and controlled by Aboriginals on direct representation by them and other figures to government. (336)

Attitudes and perceptions of oral health and oral care are key determinants in the definition of health problems (143) and their priorities, and hence influence the system in its organization and functioning. (See Chapter 3)

The medical concept of disease refers to disorders within the psycho-biological system that have been identified and classified by the medical sciences. In clinical medicine, the diseased person is one who has a behavioural, functional or structural lesion or derangement which can be diagnosed from historical, laboratory or clinical information (137a). Individuals are also active elements within social systems comprised of sub-systems. The individual is related to other elements of social sub-systems through systems of social associations that influence the perception and expression of psycho-biological disorders. (22a) This relationship is shown in Figure 18.

The recognition of disorders constitutes perceived morbidity, (72) which initiates the drive or internal tension motivating behaviour to adjust the disorders. (324) The major process of health, illness and care can be seen as adaptive and regulatory (128a) and the corresponding behaviour is directed either to the psycho-biological system through the seeking of treatment or towards altering the system of social connections, or towards combinations of these. The health care process may be represented as a series of interrelated stages, where the probabilities of moving from one stage to another are influenced by a set of factors. (324) This process is shown in Figures 19 and 20.

The process begins with perception of disorder resulting from discernible aetiological processes. If these perceptions and the factors interacting with them result in a decision to seek care from the health care system P2, then the interaction of client and provider determines the derived demands resulting in a treatment.
Figure 18. Model of relationship between the individual and social systems.

Figure 19. Model of stages in the health care process.


Figure 20. Model of analysis of medical care process.

6.5 Use of Oral Care Services

Use of services reflects one aspect of the functioning of health service systems; it provides information about effective demand for health services and the reaction of systems to that demand. (234a)

Perceptions underlying individual behaviour define in various ways the determinants of use. (234a) Various models have been defined to describe use of services. One such model, the behavioural model, (234a) has been used. It differentiates predisposing factors and enabling factors which act on perceived need transferring this to demand for care. A social model (234a) has been developed which modifies the behavioural model in terms of aggregate system parameters. (See Figure 17).

Predisposing factors are those characteristics of the individuals which existed prior to their perception of need but which either directly or indirectly determine the need or direct the behavioural response to it. For example they include demographic data (age, sex), social data (educational level), psychological data (attitudes, expectations, values). Enabling factors are those which make it possible for the individual to use health services. They change needs into demands. For example availability and accessibility factors - finance, time, geographic dispersal of facilities. System factors are constants for all people within particular populations. They include supply and distribution of workforce, modes of paying for care, structure of practice. Because of the elasticity of demand for oral care due to the perception of its elective nature, personal factors (e.g. income and education) have been found to be associated with use of services even where financial obstacles are removed or reduced. (234a)

Use of services is a complicated event determined by the interaction of biological, psychological and social forces that affect not only volume but also the type and quality of service consumed. Studies have been undertaken to establish whether aggregate use of oral care services and its determinants vary with the ways in which oral care resources are provided and organized. (234c, 459) Data is available from service records of actual use of oral care and also from surveys of status where treatments can be validated by dental restorations. However research into determinants of use has shown that this is a multivariate event and careful analysis is needed. (234c, 459)
Perception of need, biological or psychological, does not lead to use unless the need itself is of sufficient severity or concern to warrant action and unless the resources are perceived to be appropriate, available or accessible, at a cost that the consumer can afford or is willing to bear. However with oral care, as with other health services, once contact with the system is made the provider of the service can be an important factor in referral for further care. Also, as most oral diseases are of a chronic nature, a health care behaviour pattern of contact with the oral care services can be formed.

Use of services as described by the psycho-social models is directed towards the attainment of relief of disease, distress or dysfunction. It can also, especially with preventive services, have as its goal the preservation of, or a change in, the quality of health. Use of health services therefore has a discretionary component that is subject to the influence of consumer "income" where a "price" is involved.

Many studies are not being carried out to describe system use, either of the total system or parts thereof (40, 347a), within specific communities or nations (93) and also across cultures (234, 459).

By describing elements of the oral health care system in terms of F1 - the purpose of the activity, F2 - providers of the activity, and F3 - the environmental form, a pattern of system description has been set up to formally identify elements of the system. Factors affecting these elements have been briefly noted. However, before these factors can be fully described and measured, the above elements need clear understanding. Furthermore, a formal structured approach to the analysis of organizational effectiveness of these elements F1, F2 and F3 is needed. This requires specific policy analysis of these functional areas as they exist within each community. This will encompass both procedures and activities, i.e. services (e.g. oral health care) and structures (e.g. authority). One aspect of this analysis is currently being research across cultures to try to obtain some theoretical model to offer a general explanation in terms of oral health. (459) In this way it is hoped that the costs and benefits of intervention strategies may be determined.
DISCUSSION
I have discussed in the preceding chapters the application of planning as an administrative tool of rational decision making. I have shown how the application of this tool is of benefit to the health service system. (see Chapter 2) In the chapter following (Chapter 3) I have explored the concept of health and how society defines health. This was to show that until we formalize what we mean by health, any intervention by society will of necessity be valued in terms of our definition of health. In this respect the value of oral health was discussed. By setting the attainment of health in terms of social justice, the idea of intervention was introduced. Then I pointed out dissatisfaction with the form of intervention that is currently pursued by clearly showing in Chapter 4 the extent of oral diseases and conditions. Furthermore, by reporting studies that gave observations on aetiological and epidemiological factors of the major oral diseases and conditions, it has been shown that there are ample research findings which allow decisions to be made on intervention techniques. In Chapter 5 I have discussed the global indicators used to measure oral health status of diseases and conditions of significant prevalence in terms of community value to be of a problem to the public.

In this discussion I have pointed out the problems encountered by the scientific community in standardizing these indicators. Studies have been reported in which the refinement of these indices is occurring so that they are specific enough and simple enough that they will be used to evaluate intervention strategies.

By analysing patterns of oral care using global epidemiology (362, 189a) and reports of global scientific workshops (71b, 453, 457, 462a) it has been concluded that "intervention is cost effective". (362) In Chapter 4 I have shown that although the aetiology of the major oral health diseases and conditions are relatively well understood, epidemiological patterns show that behavioural, social and economic factors correlate with intervention strategy goals not being achieved. In Chapter 6 I have set out a formal pattern for a description of the oral health care system. The processor of the intervention strategies. In this chapter, although it is well documented as to the actual elements of the system, there is a deficiency in documentation concerning the actual structure of the
of the system. That is literature is not readily available which formally sets out the power and authority of the various system elements and how these factors and the policies they implement determine the success or failure of known intervention strategies. I pointed out, in Chapter 2, the benefits that planning can provide as a tool in this area of evaluation by rationalizing decision making. If a formal plan is enunciated, implemented and evaluated: policy making and its concomitant ramification of organization/non-organization, functioning/non-functioning of an oral health care system can be opened to a critical analysis. Only in this way can the benefits and costs involved in determining the aetiology and other sociological, economic factors relevant to an absence of oral health be distributed to the individual and the community so that social justice will prevail. Intervention strategies are the means by which we can alter the balance of oral health. Using the tool of formal planning and the many techniques currently available (see Chapter 2) we can tip the balance so that intervention can be successful and that the level of intervention will be appropriate to the oral health status of each individual. Also, the intervention will be appropriate to the needs and resources of the community defining their own position on the value of oral health. However this community will be able to formally compare their status and intervention needs relative to the global community and so assess under a standardized scientific value whether their value of oral health is ideal or acceptable. This relationship of formal evaluation may be described (see Figure 21) illustrating the interrelationships in which society will participate.

When one asks the question "Oral health - who cares?!" one is essentially asking the question "what are we evaluating and who should do the evaluation?". In other words, one is making a measurement, determining the present status of the system, and relating that status to an appropriate standard. When the present status does not meet present designated criteria, one must try to explain why discrepancies exist and recommend a course of action. (285)

This thesis has been offered as a discussion on the premise that society has a wealth of information available to it concerning oral health status and factors affecting status. This includes a formal knowledge of the elements of intervention. Globally we have developed criteria that describe a specific standard of oral health. The
The statement of objectives should be the starting point of the cycle.

The term "service personnel" applies to any "performer"-i.e., faculty member, practitioner or anyone else who performs an activity, procedure, service or task, sometimes the patient or a family member or others in society may be a performer.

The term "recipient" refers to any student, patient, or anyone else who is on the receiving end of the activities, procedures, services, or tasks. An individual may be a "performer" under one set of circumstances and a "recipient" under other sets of circumstances.

Figure 21. Evaluation model for oral care systems.

Australian Government has advised the global society that it will participate in attaining specific goals in oral health. (85a) It has not modified the global goals so they are appropriate to their own particular community values. It has not accepted its obligation in terms of social justice to implement the goals it is a signatory to. The discrepancy exists between known scientific method and application of this scientific method on a just basis. The course of action recommended is formal planning by the Australian Government using all the components of the oral health care system, as well as those systems which relate to intervention in oral health.

The WHO goals of oral health for all by the year 2000 incorporates the concept of social justice - that is, that the goal should be pursued for all members of the community. The Australian Government in correspondence with the Australian Dental Association (321a, 280b) does not seem to have incorporated this idea of social justice when it states that it is merely looking at the goals in terms of a mean figure for the Australian community. Conclusions made from studies that have included oral health status, use of services and supply of services (234c, 93, 459) have shown that there is no equilibrium between need, use and supply. Of oral health care, the hypothesis of this thesis is that this is just the area where the tool of planning will best serve the community. It allows rational choices between alternative programmes. Until planning is used in the field of oral care, the goals of oral health for all will not be achieved with any basis of social justice. Ample evidence has been presented in Chapter 4 that oral diseases and conditions are more prevalent amongst certain groups within the community. Planning promotional, preventive and therapeutic oral health care programmes for those who need oral care requires promotion by national governments so that scarce resources may be effectively directed. The Australian Government (14e) states that the "development and operation of dental care programmes are matters for individual states. It is the states who determine their own priority in health." However, as the national government has been a signatory to the WHO document and professes to be working towards the goals as enunciated, it has an obligation to proffer leadership in promotion of attainment of these goals. It also has responsibility for direction and administration of many facets of the oral care system (280b, 321a, 75a) as well as its allocation of funds to this system. As part of the total goal of health for all by the year
2000 (280b, 321a) each country needs to develop a national plan with measurable goals for oral health within the national health plan. These goals will relate to disease prevalence, workforce availability and economic resources.

As shown in Chapters 5 and 6 measurable indicators are available to assess these factors. Using them, specific plans can be formally proclaimed, implemented, monitored and evaluated. By using the tool of planning one can demonstrate the pursuit of social justice.
CONCLUSION
The complexity of the oral health care system has been defined and the lack of formalised information concerning its description and functioning has been reported. The range of conditions which comprise oral health status, together with the aetiological factors of the major oral diseases and conditions, as well as the patterns of these diseases and conditions as shown epidemiologically, has been discussed. Concepts of planning and systems analysis have been presented with their application to the health field. These observations are meant to add to, and give some background to strengthen the principle that "every effort must be made to establish a central and state government policy committee to be responsible for monitoring the oral health situation every 5 years and for ongoing, data based, co-ordinated planning for specific goals. (30) This will ensure that the national policy goal of health for all by the year 2000 will be attained in a manner in which the strategy can be evaluated by setting plans of action which conserve resources by detailed data based programming, budgeting, and implementation. (103, 322) Social justice can prevail.

The Australian Dental Association (14a) has submitted proposals to the federal government since 1949, recommending that a division of public dental health be set up federally to administer national oral health affairs. Even though a committee was established in 1973 to advise the government concerning the Australian School Dental Scheme, there is still no section within the Australian Department of Health which has the responsibility for monitoring oral health every 5 years and pursuing ongoing data based co-ordinated planning for specific goals. (75a) The committee, The Australian Dental Services Advisory Council (ADSAC), established in 1973, comprising officers from the Commonwealth, State and Territorial health authorities and the Australian Dental Association has two standing committees: (i) Field Operations and Training Committee, and (ii) Evaluation and Review Committee. As well as advising the Minister for Health on matters relating to the development and operation of the Australian School Dental Scheme, it advised on other matters referred to the Council by the Minister or the Director-General of Health. (75a)
Using the concept that public health is the people's health, concerned with the aggregate health of group, community, state or nation, and that it is directed towards the improvement and protection of the health of human communities, it can be said that planned activities (F1) (intervention programmes) that attempt to modify the environment favourably (F3) and to modify the interactions of human beings (F2) with the environment (F3) fulfill the public health mission. Effective integrated planning which affects whole populations and adjusts for all major factors in the oral health or disease equation is preferable to workforce planning in isolation, preventive planning in isolation, services planning in isolation and a market controlled supply and demand situation. (28) In Australia, there is no effective integrated planning for oral health. (30, 75a, 85a)

Evaluation is the cardinal process by which we control or manage situations. This evaluation is in terms of efficiency, effectiveness and value to the community. Epidemiological and technological information has to be reconciled with information on community values and on community conditions to enable the generation of alternative strategies. Planning is the phase in which such alternatives are generated, a decision can then be taken by appropriate persons using the information generated. This decision can also then be evaluated following phases of programmed implementation. Hence our knowledge, energies and social structures can be systematically meshed to achieve pre-determined goals. Social justice will prevail.

If oral health for all is to be achieved, oral health care appropriate to the needs has to be implemented. Society has an obligation therefore to use the tool of planning to facilitate implementation. (see Chapter 2). The Australian government has not yet accepted that it must initiate national planning strategies in order to promote the oral health care goals enunciated by W.H.O. (30) and to which it is a signatory (85a) and which comply with our ideals of social justice.
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