Socio-Economic Differentials in the Utilisation of Dental Services by an Insured Population in Australia

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SUMMARY

The overall aim of this study was to investigate the feasibility of using insurance claim records to profile patterns and cost of utilisation of dental services by socio-economic status (SES) for an insured population. The study sample consisted of 133,467 New South Wales members of the Government Employees Health Fund (GEHF) who were 18 years and over, during the study period, 1.1.92-31.12.95. These members were stratified into five socio-economic status groups based on the postcodes from the claim forms. Each member’s residential postcode was assigned a score using the “Index of Relative Socio-Economic Disadvantage (SEIFA)”.

There were a total of 75,501 members (referred to as patients in this study), aged 18 years and over from New South Wales who utilised private general dental practice services and made a claim during the study period. More patients (26 per cent) were from the highest SES group and the least (14 per cent) from the lowest SES group.

The mean number of dental visits for all patients per calendar year to a dentist in a private clinic was 2.4. Relative utilisation ratios, adjusted for gender, age, length of membership and geographical location indicated that the lowest SES group had shown significantly more visits (2.52) than the highest SES group, the reference group (2.45). The 3rd SES group has shown the least mean number of services per visit (2.43). By type of service, the highest rate of services for all the SES groups was the restorative services (35 per cent) followed by diagnostic services, which was 26-27 per cent. The highest SES group utilised the highest rate of diagnostic, preventive and endodontic services. The lowest SES group utilised the highest rate of oral surgery services.
The mean number of services per patient visit was 2.45, the highest SES group has shown the highest (2.52) and the 3\textsuperscript{rd} SES group has shown the least mean number of services per patient year (2.36) for the unadjusted data. The lowest and 4\textsuperscript{th} SES group has shown significantly more mean number of services per patient visit than the highest SES group, when adjusted. Restorative services demonstrated the highest mean number of services for all SES groups (35 per cent), followed by diagnostic services (27 per cent). The lowest SES group showed higher oral surgery services (0.09) than the average mean number of services for the whole study population (0.07), while the highest SES group showed less (0.06).

The mean number of services per patient year was 5.9, the highest SES group has shown the highest (6.2) and the 3\textsuperscript{rd} SES group has shown the least mean number of services per patient year (5.5) for the unadjusted data. Only the lowest SES group has shown significantly more mean number of services than the highest SES group, when adjusted for other factors.

The mean cost per item of service was A$62.4 with large standard deviation of 110.9 and median cost per item of service for all patients was A$36.7 with an interquartile range of A$25.1 to A$61.5. The median cost per item of service for the middle SES group patients and the lowest SES group was the highest (A$37) and almost the same cost per item of service were shown for the other SES groups.

The mean cost per visit was A$153.8 with a standard deviation of 244.3. The median cost of services received at a visit for all SES groups was A$93.5 with an interquartile range of A$63 to A$149.9. The median cost of services at a visit for the lowest SES group was A$92.6. By socio-economic status, the median cost of services showed a
trend of increasing cost per visit with the highest SES groups having highest median cost of services per visit. When adjusted for gender, age, length of membership and geographical location, the mean cost per visit was least for the lowest SES group and the highest for the highest SES group. The estimated ratio of means indicated that the cost per visit of the lowest, 3rd and 4th SES groups were significantly lower than the highest SES group.

The mean cost of services per patient year was A$384.8 with a standard deviation of 608.0. The median cost of services for a patient per calendar year for all socio-economic levels was A$183.3 with interquartile range of A$94.1 - A$409.1. The 4th and highest SES groups had the highest cost per patient. The annual median cost of services per patient-year for the lowest SES group was A$185.9. The cost of services per patient year for the lowest SES group was the least and A$32 less than those from the highest SES group that showed the highest (A$396.9).

It was concluded that the lowest SES group utilised significantly more dental services and made dental visits than the highest SES group and showed a different pattern of service-mix. The pattern and distribution of dental services overall broadly resembled international and Australian utilisation patterns, which are characterised by a dominance of restorative, preventive and diagnostic services. In this study higher social class patients favour restorative and preventive visits, whereas low SES groups were more likely to receive emergency services, and extraction. Consequently, the highest SES group received more costly care while the lowest SES group received low cost care.
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DEDICATION

This thesis is dedicated to

My father U Kyaw MYA
who loved to learn throughout his whole life,

My mother Daw Nwe Nwe WIN
who always encourages her children to study

and

All my teachers
who shared their learning and experiences.
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29 Mean number of services per patient year of the GEHF members who utilised general dental practice services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA) and service category.

30 Mean number of services per patient year of the GEHF members who utilised general dental practice services and made a claim during 1992-1995 by service category and socio-economic status (SES, SEIFA).

31 Mean number of services per patient year of the GEHF members who utilised general dental practice services and made a claim during 1992-1995 by service category and socio-economic status (SES, SEIFA).

32 Cost per item of services (Mean & Median) of the GEHF members who utilised private general dental practice services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA). Cost adjusted to the 1995 Australian dollar value.

33 Cost of services per visit year (Mean & Median) of the GEHF members who utilised private general dental practice services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA). Cost adjusted to the 1995 Australian dollar value.

34 Relative cost ratios of mean services (adjusted and unadjusted) of the GEHF members who utilised private general dental services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA). Cost adjusted to the 1995 Australian dollar value.
35 Cost of services per patient year of the GEHF members who utilised private general dental practice services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA).
Cost adjusted to the 1995 Australian dollar value

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36 Relative cost ratios of services per patient year (unadjusted and adjusted) by the GEHF members who utilised private general dental practice services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA).
Cost adjusted to the 1995 Australian dollar value

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1 INTRODUCTION

1.1 SOCIO-ECONOMIC STATUS, UTILISATION OF DENTAL SERVICES AND DENTAL INSURANCE

There is a significant social inequality in access to dental care in Australia [AIHW 1993b,c; Barnard 1993; Davies 1993]. The lower socio-economic groups have less private dental insurance and less utilisation of dental services [ABS 1989, 1994; Barnard 1993; Slade 1993].

Traditionally, oral health care services have been provided in Australia, predominantly through the private sector [with approximately 80 per cent of dentists in private practice], on a fee-for-service basis. Four out of every five visits made annually by the Australian dentate population in 1995-1996 were to a private dental practitioner [AIHW 1998b]. Public subsidy towards dental costs is limited. Only school children, armed forces personnel, war veterans, indigent population and certain disadvantaged adults are eligible for free government (public) dental services. In 1993-1994, 88% of total dental costs (A$1,831million) were met privately either through out of pocket payments by individuals (59 per cent) or through private health insurance arrangements paid out in rebates (29 per cent). Only 11 per cent of total dental costs were spent in the government sector, and the remaining one per cent came from other sources. Dental expenditures were 5 per cent of health expenditures and 0.4 per cent of Gross Domestic Product [AIHW 1996b].

Dental insurance is mostly marketed by non-profit health benefit organisations [Spencer & Lewis 1988]. Some 40 per cent of the population in both Australia
overall, and in the state of New South Wales, had private dental insurance during 1994 [Carter et al 1994]. In 1994-1995 dental benefits accounted for 52 per cent of all health ancillary benefits of health insurance funds [PHIAC 1995].

Cost of dental services is the most frequently cited barrier to receiving dental care [Davies & Schwarz 1994; Douglas & Cole 1979; Grembowski et al 1988]. Private dental insurance arrangements reduce barriers to dental care [Evashwick et al 1982; Gambucci et al 1986; Kiyak & Miller 1982]. In Australia, nearly a quarter of a random sample of persons aged five years and over reported in 1996 that they had avoided or delayed visiting a dental professional in the last twelve months because of cost. About 19 per cent of the same sample said that the cost had prevented them from having dental treatment which was recommended or which they wanted [AIHW 1998c]. The cost of dental services is especially relevant to socio-economic status due to the limited access of care for those lower SES groups who are unable to afford dental services in the private sector.

It is important to know whether there are differences in dental service utilisation by socio-economic status when there is reduction of cost barrier for insured persons. Although about one-third of dental expenditures are from health funds, there has been no study profiling the cost of dental service provision from insurance claims data. There have been no documented studies, which show the correlations between socio-economic gradients and dental service utilisation in an insured population, in Australia. This study fulfils this need by monitoring utilisation of dental services for an insured population. This will have potentially significant implications for health fund premiums, membership and viability, and dental service provision in Australia.
1.2 AIM AND OBJECTIVES OF THE THESIS

The overall aim of this study was to investigate the feasibility of using insurance claim records to profile patterns of utilisation of dental services by an insured population.

The objectives of the thesis were:

1. To review the literature on the utilisation of dental services and dental insurance in Australia and internationally.

2. To determine whether there are socio-economic differentials in utilisation of dental services among New South Wales members of the Government Employees Health Fund who were eighteen years and over and used private general dental practice, in relation to the following variables:
   
   (1) annual number of visits;
   
   (2) number of services received per year;
   
   (3) number and types of services received at a visit;
   
   (4) cost per item of service;
   
   (5) cost of dental services received per visit; and
   
   (6) cost of services received per year, using fees charged by dentists and recorded on the claims data submitted by these members for rebates.
2 LITERATURE REVIEW

2.1 DEFINITIONS

A number of definitions related to utilisation of dental services are cited in the literature [Burt & Eklund 1992; Chen 1995; Jeffers et al 1971; Penchansky & Thomas 1981; Petersen & Holst 1995; Pine 1997]. The following are the definitions most used by epidemiologists.

**Need** describes states of the client that create a requirement for care. Need does not always lead to use of services and use of services does not always result from need. But the existence of disease and normative need does create a potential for the use of services [Donobedian 1973; Spencer 1984].

**Perceived need**, also referred to as **subjective need** or **felt need** is need as determined by a patient or public. It is an individual’s own assessment (patient’s subjective experience) of his or her requirement for health care [Bradshaw 1972; Burt & Eklund 1992].

**Perceived dental need** is defined as the patient’s subjective experience that dental care is required [Dworkin et al 1978].

**Demand for dental care** or **expressed need** is the expression by a patient or the public of a desire to receive dental care to attend to their perceived needs. It is considered a measure of a patient’s initiation or request for care [Jeffers et al 1971].
Normative need refers to the need for a service or services as determined by a professional or other expert [Bradshaw 1972]. Normative need may vary between groups of professionals and change over time [Clayton 1983; Hawe et al 1990].

Comparative need is assessed by comparing the health care received by different people with similar characteristics [Bradshaw 1972]. It often simply reflects differences in normative need between geographical areas [Clayton 1983].

Need for dental care is defined as that quantity of dental treatment which expert opinion judges ought to be consumed over a certain time period for people to achieve the status of being dentally healthy [Spencer 1980].

Dental need may be assessed in terms of numbers of people, numbers of procedures, hours of manpower required or costs. In addition need may be based on assessments of untreated disease, the presence of discomfort, or the disability that arises out of disease [Locker 1989].

The dental need for an individual or population was expressed by the professional as follows [Burt & Eklund 1992]:

(1) individual items of care required, such as those entered on a patient's chart;
(2) total professional time needed for treatment;
(3) the numbers of professionals needed for a particular time; or
(4) the total cost of such care.
Potential demand or latent demand means an unqualified desire for care that is not being met for some reason, usually a problem with access [Bradshaw 1972].

Culture may be defined as a shared and organised body of customs, skills, ideas, and values, which is transmitted socially from one generation to another [Dunning 1986].

Social indicators are needed to find pathways through the maze of society’s interconnections. They delineate social status, define social problems and trace social trends, which by social engineering may hopefully be guided towards social goals formulated by social planning [Fanchette 1974].

Social indicators are directly measurable variables used as measures of the wellbeing of individuals in a community, which are not directly measurable. For example, population age distribution, income levels, educational attainment, house or car ownership, life expectancy [Hawe et al 1990].

The most common socio-economic indicators are income, education and occupation or a combination of these variables [Gift 1984]. Age, race and gender are other socio-economic factors [Ettinger & Beck 1982; Gluck 1993].

Income consists of receipts as money or in-kind, that are received or accrued regularly and are of a recurring nature. Income may accrue from a wide range of sources both from outside and within the household itself [ABS 1995a].
Cash income is received for contributing the factors of production (labour, capital assets and knowledge) to the national economy. Transfer income can be received as benefits from government (e.g. government pensions and benefits), from other households (e.g. gifts, child support), and from other private organisations [ABS 1995a].

Non-cash income similarly covers income-in-kind in the previous sources mentioned. It includes non-cash benefits directed to pensioners and beneficiaries and directed to the broader population groups in the form of government expenditure on services such as health, housing, welfare etc. Non-cash income also includes the value of the production of goods and services provided by the household to it [ABS 1995a].

A delivery system is a collective expression that incorporates the various means by which health care is provided to patients [Burt & Eklund 1992]. The principal components are:

1. the structure of the system, meaning the organisational arrangements by which patients and providers get together;
2. how the care is paid for; and
3. the supply of various types of health care personnel

[Burt & Eklund 1992]

An oral health system is fundamentally defined by the existence of specially trained dental professionals, working in various roles and settings and for various sections of the community. Policy, organisation, payment mechanisms and outcomes can describe oral health care systems. They are characterised by the following parameters: who
provides; what services or functions; for whom; in what locations; with what resources; by what payment mechanisms; and with what effects [Anderson et al 1998a].

**Availability** is the relationship of the volume and type of existing services (and resources) to the clients’ volume and type of needs. **Availability of dental care** means that there are dental services to be used if one chooses to use them [Arnjolt et al 1985].

**Accessibility** is the relationship between the location of supply and the location of clients, taking account of client transportation resources and travel time, distance and cost. It refers to the necessary qualification that must be possessed by the providers and the potential user before utilisation can be undertaken [Arnjolt et al 1985].

**Utilisation** is the actual attendance by members of the public at dental treatment facilities to receive dental care. Utilisation is expressed as the proportion of a population who attended a dentist within a given time, usually a year or as the average number of visits per person made over a year. The latter measure usually uses the whole population as denominator, so it is weighted by people who did not visit a dentist at all over the time in question [Burt & Eklund 1992].

**Dental visits** are the number of dental consultations per annum. Dental consultations include consultations with all dental professionals (eg. dentists, orthodontists, dental therapists, school dental nurse and dental technicians) about teeth, dentures or gums [Chen et al 1997].
Third-party payment is defined as payment for services by some agency rather than directly by the beneficiary of those services. For dental services, the dentist and the patient are the first and second parties and the administrator of the finances is the third party [USPHS 1975].

Health insurance is cover provided by private health insurance or other organisations to reimburse all or part of the cost of hospital or ancillary health services [ABS 1994c].

Consumer price index: A measure of change over time in the retail price of a constant basket of consumer goods and services. The choice of goods and services is representative of consumption patterns of resident employee households in Australian metropolitan areas. Indexed to 1900=100 [ABS 1995a].

Real cost: Cost expressed in terms which have been adjusted for inflation (for example 1994-95 dollars). This enables comparisons to be made between expenditure in different years. [AIHW 1996b]
2.2 UTILISATION OF DENTAL SERVICES

Utilisation of dental services is expressed in several ways in the literature. The most common measure of utilisation is the average annual number of dental visits per person. This measure usually uses the whole population as denominator, so it is weighted by people who did not visit the dentist at all over the time in question. [Burt & Eklund 1992].

The proportion of persons visiting a dentist within a given time, usually a year, is another frequently used measure. Some public health researchers described the utilisation of dental services by visits and regularity of care. Utilisation of services is often considered as the types of services received by the individuals at visits. [Burt & Eklund 1992; Giff 1984; Petersen & Holst 1995].

However, Yule and Parkin [1985], stated that the number of visits is a common but inadequate measure of demand for dental service utilisation. They indicated the fundamental problems in using visits to measure the quantity of services demanded. These are: (1) failure to distinguish between patient- and dentist-initiated visits; and (2) failure to consider the volume or mix of services delivered per visit.

Decision to seek care is primarily a voluntary choice based on the individual’s perception of his or her need relative to the perceived availability, acceptability and accessibility of resources for providing care [Dworkin et al 1978]. Whether the individual finally presents for treatment will depend on anxiety, fear of the dentist, financial and psychological factors [Slack 1981]. When deciding to visit a dental professional, individuals assess the possible benefits against the potential costs or
disadvantages in terms of money, time, pain, and inconvenience of travel. Basically, individual dental visits may be explained as results of the interaction between material living conditions, socio-economic status and the structure and function of the dental care delivery systems [Petersen & Holst 1995].

2.2.1 Models for utilisation of dental services

There are many theories and models for utilisation of dental services [Kiyak 1993; Petersen & Holst 1995; Søgaard 1993].

Kasl and Cobb [1966] proposed the explanatory models, which focused on perception of illness and appropriate action to seek help. The circumstances that will lead individuals to perceive a symptom as a threat are shown in Illness behaviour [Figure 1].

Only part of the people with need for dental care perceive that they need attention. The discrepancy between need and demand is referred to as the ‘Clinical Iceberg’ [Last 1963]. The National Oral Health Survey of Australia data has shown that the dental needs of the community as defined by examiners were greater than those perceived by persons in the survey. Needs for extraction were similar, but for restorative, orthodontic and periodontal needs, the patient estimates were low [Barnard 1993].
Figure 1: Illness behaviour

Source: Kasl and Cobb 1966
Health behaviour is the combination of circumstances that will lead the individuals to value a visit to a health professional as a way of reducing that threat [Figure 2]. Kasl and Cobb [1966] defined health behaviour as any activity undertaken by individuals who see themselves as healthy for the purpose of preventing disease or detecting it at an asymptomatic stage. A wide range of factors influences the way individuals define the value of visiting a professional. Social and cultural factors influence both the definition of symptoms as a threat and the value attached to a particular action. Age, gender, marital status, racial group, and ethnic group, all may influence the perception of symptoms as a problem [Kasl & Cobb 1966].

Figure 2 : Health behaviour
Source : Kasl and Cobb 1966
In the Rosenstock's model, utilisation of health services is explained by a cue or stimulus occurring to 'trigger' the individuals' response. Individuals are more likely to visit a dentist: if they:

(1) Perceive an actual or future oral problem;
(2) Feel "at risk" or susceptible to oral disease;
(3) Have positive attitudes towards oral health; and
(4) Have positive experiences in their utilisation of dental services [Rosenstock 1967].

Attitude towards oral health depends on financial status, value of teeth, presence or absence of dental symptoms, perception of need, preventive knowledge & behaviour. Regularity of dental visits is not related to actual occurrence of oral disease [Rosenstock 1967].

A reciprocal action regarding attitudes and behaviour is also explained in the theory of cognitive dissonance [Festinger 1957]. Attitudes can be developed through behavioural change. Social class differences in attitudes toward teeth and the dental services available may be explained by difference experiences with dental treatment, dentists and the dental care delivery system. In this theory, attitudes toward teeth and the perception of teeth and dental care are considered to influence dental visits only secondarily [Festinger 1957].

These basic psychosocial models have been modified or adjusted over the years. Seeking a dentist, which is a perceived value of action may be something that individuals learn from membership in a social group. Different social groups have
different norms and values concerning recognition of symptoms and appropriate action [Petersen & Holst 1995].

Individuals share experiences and seek advice on their symptoms and health problems from friends, relatives or family. That ‘lay referral’ system varies among social groups. The more extensive the social networks persons are involved in, the higher the probability is that they will utilise dental services and have better oral health status [Petersen & Nortov 1994; Rickardson & Hanson 1989].

The ‘social triggers’ that might precipitate to visit a health practitioner, suggested by Zola [1973], are:

* Perceived interference with vocational or physical activity;
* Perceived interference with social or personal relations;
* An interpersonal crisis (lifestyle changes);
* A sudden change in ‘normal’ symptoms (symptom reassessment); or
* Pressure from others.

The conceptual model indicated by Slater and Shuval [1976] is outlined in Figure 3. It shows the factors associated with the utilisation of dental care and level of dental health. The factors are divided in four groups: antecedents; actual system; perceived system and perception. Antecedents group consists of; socio-demographics; past general health action; perception of health; past dental health action and socio-economic status. Availability and reported access of actual system is another factor. Availability and accessibility are also under perceived system group.
Figure 3: Factors associated with the level of dental health and utilisation of dental services

Source: Slater and Shuval 1976

I. Antecedents:
   a. Sociodemographics, e.g. age
      sex
      area
   b. Past general health action
   c. Perception of health
   d. Past dental health action, e.g. exposure to system
   d. Past dental health action, e.g. time
   e. Socioeconomics, e.g. number of siblings
      seniority among siblings
      educational aspirations

II. Perception:
   a. Proportion of conditions perceived
   b. Reason for last visit:
   c. Who decided to have last visit
   d. Perceived lack of severity in not going
   e. Perceived need

III. Actual System:
   a. Availability
   b. Reported access

IV. Perceived system:
   a. Availability
   b. Accessibility

V. UTILIZATION

VI. DENTAL HEALTH STATUS
The **interaction models** address individual factors, especially characteristics of an individual's social environment and society. Individuals acquire habits that are an acceptable part of the lifestyle of subgroups or classes with which they identify [Petersen & Holst 1995]. There are variations in dental health behaviours in terms of an individual's subjective social class perception. Individuals acquire habits that are an acceptable part of the lifestyle of subgroups or classes with which they identify; simultaneously or subsequently, they develop attitudes that are consistent with this behaviour [Douglas 1971; Rayner 1979]

An **interaction model** used by Antoft [1983] focused on: **psychosocial factors** that indirectly influence the general process of socialisation during childhood; the socialisation process specific to health and dental care; norms and values in the child’s environment with regard to teeth; experience with the dental health care system; and the **socio-economic conditions** of the child’s family.

A **sociological model** (Figure 4) constructed by Petersen was based on **interaction models** and **conflict sociology** [Petersen 1990]. In conflict sociology, material living conditions are the main determinants of behaviour as these conditions make certain resources available to an individual. Occupation that is basic to an individual’s lifestyle is of fundamental importance.
The economic models are developed mainly to explain how price and income influence the demand for health services. Holst [1982] has described how third-party payment systems can be assumed to influence the output, and examined the relationship between three major groups of structural determinants: objectives; organisation; and financing [Sogaard 1993].

Kiyak [1993] discussed a person-environment model of oral health. This model suggests that dental behaviours are a function of patient characteristics (such as age, gender, culture, perceived dental needs and dental beliefs) as well as characteristics of the dental delivery system (such as cost, availability of third party payment systems and the accessibility of dentists who are viewed by patients as understanding and sympathetic to their needs) {Table 1}.

| Table 1: Relevant characteristics of person and environment. |
| Source: Kiyak [1993]. |

<table>
<thead>
<tr>
<th>Person characteristic</th>
<th>Environmental characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demographics</td>
<td>1. Community water fluoridation</td>
</tr>
<tr>
<td>2. Financial resources</td>
<td>2. Dental insurance beliefs</td>
</tr>
<tr>
<td>3. Oral health beliefs</td>
<td>3. Accessibility of dentists</td>
</tr>
<tr>
<td>4. Perceived importance of oral health</td>
<td>4. Dentists’ values and beliefs</td>
</tr>
<tr>
<td>5. Perceived need for dental care</td>
<td>5. Societal norms re: oral health</td>
</tr>
<tr>
<td>6. Objective need for dental care</td>
<td></td>
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</table>


A typical utilisation model includes need for care, predisposing factors such as age, gender, social class, education, and attitudes; and enabling factors such as family factors (income, insurance coverage), and community factors affecting access to services (urban and rural, distance and travel time to dentists and waiting time for services) [Petersen & Holst 1995].

Public health researchers have attempted to study the demand for dental care from an economic perspective and noticed the role of insurance, after 1970s. Beazoglou et al [1993] have used the model of dental care demand, that incorporating: economic factors; (out-of-pocket or net dental prices, per capita income, and non-dental prices) as well as dietary factors; (refined sugar consumption, non-caloric sweeteners, and exposure to fluoridated water), which is combined with a simple model of dental care supply within an equilibrium framework.

The National Institute of Dental Research in America recently developed a microsimulation model of dental health and utilisation (Figure 5). This model focuses on individual decision-makers. Individual decisions are critical to understanding between disease, need for care and demand for care. Dental caries, tooth loss, periodontal disease and other tooth-level outcomes are modelled for each of a person’s teeth. Interaction of these dental conditions with personal dental service use and risk factors is built into the model to generate utilisation rates and expenditure for various dental services. Variables that influence utilisation of dental services include dental insurance coverage, family income, sociodemographic variables and measures of dental diseases [Brown et al 1995].
[Brown et al 1995] stated the five processes explicitly taken into account for this model are:

(i) individual’s socioeconomic attributes;
(ii) price of dental services;
(iii) use of dental services;
(iv) risk factors that putatively influence oral health outcomes; and
(v) oral health outcomes themselves

Figure 5 : The NIDR Microsimulation model
Source : Brown et al 1995
The interplay of oral health status, need and demand for dental services is neither simple nor direct. It is assumed that utilisation of dental services is directly related to oral health [Gift 1984]. However, Petersen and Holst [1995] stated that regularity of dental visits is not related to actual occurrence of disease. Findings from the national survey in Japan [1993] agreed with them. Although 64 percent of the respondents had experienced trouble with their teeth or gums, only 26 percent had seen to a dentist during the previous year [Kawamura & Iwamoto 1999].

Oral health status, needs and demand for dental services interact to create the requirements for dental services. It was observed in the United States of America that: high socio-economic groups with lesser oral diseases used services more than low socio-economic groups; and improvements in child oral health have been accompanied by increasing percentages of children making visits [Davies et al 1985; Waldman 1989a].
2.2.2 Variables affecting utilisation of dental services

A wide range of factors influences the way individuals define the value of visiting the dentist. Bauer and Pierson [1978] stated that thirty-seven independent variables have correlated with dental services utilisation. The most affecting variables are socio-demographic factors, such as age, sex, marital status, family size, social class, education, race and dentate status. Labour force participation, possibilities of leaving work, other influences from the work environment (such as work in three shifts and piece work) interact with prices and subsidies for dental treatment, and loss of income due to dental visits. [Petersen & Holst 1995].

An individual’s cultural background; health needs and beliefs; personality; and demographic characteristics; interact with characteristics of the dental care delivery system to determine if the person will seek dental care, how and what he/she will do. Availability and accessibility of dental services and use of recall systems for regular dental care determine the number of dental visits. Utilisation is at least partially dependent on a set of social and psychological variables characterising both potential patients and the providers who serve them. [Bauer & Pierson 1978; Giddon et al 1978; Gift 1984; HRA 1976, Kegeles 1961; Petersen & Holst 1995].

Utilisation of dental care is also associated with attitudes toward dentists, perceived number and types of services required, perceived severity of problems, frequency of mothers’ visits to a dentist, number of dental problems experienced during the past year, perceived treatability, dental anxiety and fear [Petersen & Holst 1995].

Other variables affecting utilisation of dental services include: perceived inevitability
of tooth loss; less positive attitudes toward preservation of teeth; previous personal experience with a dentist; and indicators of a lower quality of life (ie, weak social network or support, passive lifestyle in general); public knowledge about dental care procedures; dentist/patient relationship [Gift 1984; HRA 1976; Hay et al 1982; Petersen & Holst 1995; Yule & Parkin 1985].

Having a regular source of oral health care also is an important factor. Neither income or insurance is a powerful factor, whereas need, measured by an index of dental problems and having dentures are the strongest determinant of dental use among the elderly [Petersen & Holst 1995; Smith & Sheiham 1980].

Income was defined, by Health Resources Administration [HRA 1976], Public Health Service, US Department of Health, Education and Welfare, as an economic factor affecting utilisation of dental services and factors other than income was defined as non-economic factors.

Non-economic variables consists of:

(1) patient attributes (for example, fear, education, age)

(2) professional attributes (for example, communication and relation with dentist, dental manpower) and

(3) dietary factors (for example, fluoridation, refined sugar consumption, non-caloric sweeteners) [HRA 1976].

HRA [1976] indicated that most of the factors are patient or user attributed. Different levels of dental disease, socio-economic status, social taboos of individuals,
socialisation process of children, differing perception and responses to dental diseases, fear and anxiety, indifferent attitude toward dental care are some of the reasons that make differences in utilisation of dental services. Availability of transportation, scheduling problems, shortage of patient's time and previous personal experiences with dental treatment are other factors affecting usage of dental care.

Contrasting methods of organising and applying dental health services, localised areas of dental manpower shortage, poor communication between dentist and patient are professionally attributed factors [HRA 1976].

Utilisations of dental care are also affected by community-based determinants. Some of these are social structure of community, cultural factors, race and ethnicity, beliefs of ethnic groups, urbanisation, social network relation, community water fluoridation, desire and acceptance of dental programs and lack of public knowledge about improved dental techniques [HRA 1976].

The utilisation rates are dependent on factors such as: illness levels; the age and sex composition of the population studied; the presence or absence of treatment facilities; levels of education and family income; area and country of residence; and the perception of both the providers and the recipients of dental service.

McKinlay [1972] has classified the factors affecting utilisation of dental services into six different groups. These are:

1. Socio-demographic factors, such as age, sex and race;
2. Economic factors such as income and price of services;
(3) Socio-psychological factors such as motivation, perception and learning;

(4) Socio-cultural factors such as the values, beliefs and lifestyles of cultural or sub-cultural groups;

(5) Geographic factors such as the proximity of services and travelling time to health care facilities; and

(6) Organisational factors such as type of delivery system and population-practitioner ratios.

Anderson and Newman [1973] further classified these factors into three broad groups. They are:

(1) Predisposing factors, which represent a person’s propensity to use services: Age, gender, social class, education and attitudes;

(2) Enabling factors which include barriers or aids which limit or promote access to services: Incomes, insurance coverage, distance from the dental services, travel time to dentists and waiting time for services; and

(3) Factors related to objective and subjectively perceived needs for health care.

The relationship and sequence of different variables [Giddon et al 1978] are shown in Figure 6.
Figure 6: Variables affecting demand and utilisation of dental care resources

Source: Giddon et al 1978
In their study of American dental service utilisation between, 1964-1974, Newman and Larsen [1979] concluded that the data appear to indicate the family resource variable, particularly insurance coverage and family income are the most important variables affecting utilisation (Table 2).

Table 2 : Relative importance of Variables in Explaining Utilisation
Source : Newman and Larsen 1979

<table>
<thead>
<tr>
<th>Variable Groups</th>
<th>Relative Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predisposing</td>
<td></td>
</tr>
<tr>
<td>Demographic</td>
<td>Medium</td>
</tr>
<tr>
<td>Social Structure</td>
<td>Medium</td>
</tr>
<tr>
<td>Attitude-beliefs</td>
<td>*</td>
</tr>
<tr>
<td>Enabling</td>
<td></td>
</tr>
<tr>
<td>Family resources</td>
<td>High</td>
</tr>
<tr>
<td>Community resources</td>
<td>Low</td>
</tr>
<tr>
<td>Need</td>
<td></td>
</tr>
<tr>
<td>Perceived</td>
<td>Medium</td>
</tr>
<tr>
<td>Evaluated (Professional clinical evaluation)</td>
<td>*</td>
</tr>
</tbody>
</table>

* Variables not used in the analysis.

Newman and Larsen [1979] ranked the demographic variables (age and race in particular) and social structure (education and occupation) lower and assigned as relative importance of medium. Self-perceptions, that is the condition of the teeth and the actual need, were also ranked of medium importance. The relative importance of community resources as variables was judged to be low. A key community resource variable, the dentist population ratio, may well be a variable that would result in a change of importance from low to either medium or high [Striffler 1983].
Gift [1984] grouped those variables into four groups, which are demographic factors; attitudes towards dentist and dentistry; access to care; and health status.

In this thesis, variables are reviewed by dividing them into the following three groups:

1. Socio-demographic variables;
2. Socio-environmental and structural variables of dental care delivery system and access to care
3. Socio-psychological and Socio-cultural variables.
2.3 SOCIO-DEMOGRAPHIC VARIABLES AFFECTING UTILISATION OF DENTAL SERVICES

Socio-demographic variables that affect dental service utilisation most are age, sex, race and ethnicity, income, occupation, education and geographical factors.

2.3.1 Age

Demand and utilisation depend on disease susceptibility and previous care. Age is the important predictor for dental care utilisation. Dental service utilisation in different age group is associated with differences in: dental awareness; oral disease levels; the presence of teeth; and previous experience with dentists. The frequency of oral health care visits varied with age. [Barnard 1993; Chen et al 1997; Manga & Charette 1986].

In Australia, the differences in use of dental services by age have been repeatedly documented [Spencer & Lewis 1989; Barnard 1993; Brennan et al 1997; Spencer et al 1994a; Spencer et al 1994b; Carter et al 1994]. The studies indicated that individuals go to dentist mostly for restorative care rather than preventive care. The elderly persons are demanding and receiving complex and expensive dental health services at a proportionally greater rate than younger people [Barnard 1993; Gambucci et al 1986].

Traditionally, age-utilisation patterns fall in an inverted U-shaped curve, with the very young and the very old groups utilising services less than the adolescents and young adults and school-age children [Barnard 1993].
The peak ages for dental visits in industrialised countries have traditionally been the late teenage years and early adulthood especially during school age, with the gradual tailing-off with age. Persons in age groups between 8-34 are more likely to visit a dentist than other ages. The peak usage of dental services in the United States of America was by individuals between the ages of 6 years and 24 years. Service use has always been least in preschool, followed by persons 65 years or older [Burt & Eklund 1992; Douglas & Cole 1979; Gift 1984; Hayward et al 1989; Sjostrom et al 1998].

The results of the second International Collaborative Study (ICS II), which was undertaken from 1988-1992, have shown that children were the most frequent users of oral health services. They were less likely than adults to have made no visit at all and were more likely than adults to have made three or more visits during the year. Older adults are the least frequent users. They were the most likely to have made no visit at all and the least likely to have made three or more visits during the year. Adults aged 35-44 used services more frequently than older adults, but less frequently than children. [Chen & Andersen 1997].

Although there was virtually no change in gum disease, epidemiological studies showed that caries experience of 6-year-old and 12-year-old has been improved. The proportion of children with caries was lower in every age group with permanent teeth. [FDI 1986, 1998; Murray 1994, 1996; Spencer 1997; WHO 1986]. In Australia the average 12-year-old child had 9.3 permanent teeth with caries experience in 1954 [Barnard 1956]. It has been improved to 1.1 teeth in 1993. The caries free percentage was 55.8 in 1993 and only 1 percent in 1954 [Spencer 1997]. Distribution of caries
activity has shifted so that it is skewed towards adults. These changing patterns indicate lesser use of dental services in school age children.

The use of dental services increased in persons in all ages who visited a dentist during 1980s and early 1990s in industrialised countries such as the United States of America, Canada, United Kingdom, Scandinavia, Australia and New Zealand [Chen et al 1997; Petersen & Holst 1995].

In Australia, the percentage of 5-14-year-olds using dental services in the previous year has remained at a high level between 82 percent in 1979 and 81 per cent in 1992-93 [Brennan & Stewart 1993].

The data of ABS surveys 1979,1983 and National Oral Health Survey (1987-1988) in Australia, have shown a decrease in dental visits and regular dental attendance as age increases {Figure 7, 8} [AIHW 1998c; Barnard 1993].
Figure 7  :  Dental visits in previous twelve months by age group  
Source    :  Barnard 1993

Figure 8  :  Time since last dental visit by age group  
Source    :  AIHW 1998c; Barnard 1993
2.3.1.1 Utilisation of dental services among aged persons

Perceived need is the major determinant of dental care utilisation among elderly persons [Bordeur et al 1988; Kiyak 1987, 1989; Wilson & Branch 1986]. However, dental service use behaviour is determined by a combination of attitudinal and socioeconomic factors [Gluck 1993].

Gibson et al [1984] studied the access to dental care amongst the aged living in Sydney, Australia. Their results pointed to the underutilisation of dental services by large segments of the aged population, particularly by the poor, the physically disabled, the less educated and the very old. These groups were also less orientated toward prevention.

In highly industrialised countries, in the 1980s, lower rate of utilisation has been shown for older age groups compared with younger age groups. It is also lower among disadvantaged groups, one of which is the institutionalised elderly persons [Petersen & Holst 1995]. The age difference emerged also in immigrant groups. Young Korean-American immigrants used more prophylaxis public health services than their elderly, even when the cost barrier was removed by providing free or low-cost dental services for both groups [Kiyak 1993]

Factors that contribute to low use by the elderly are fear of treatment, lack of transportation, lack of mobility by the individual, lack of a regular dentist, illness, and some concerns about bothering a busy dentist [Gluck 1993].
More of the elderly are educated, more mobile, have higher income and have been exposed to fluoridation. Having more dental treatment leads to more retention of teeth. The proportion of the adult population having no natural teeth fell from 37 per cent in 1968 to 20 per cent in 1988, in England and Wales [Todd & Lader 1991].

From 1989 to 1994, there was an increase of 19 per cent in the total number of teeth present in Australia among persons aged 15 years and over. The greatest increases are observed among older adults. In these five years, there was a 62 per cent increase in the number of teeth in the 65 years and over population, an increase of around 12 per cent more teeth per year for this group [AIHW 1998b,c].

Edentulousness has been declining for adults and elderly [WHO 1986]. The decline in edentulism is most rapid among the older age groups, for which edentulism is declining at around one and a half to two per cent per year in Australia. Edentulism has decreased from 67 per cent in 1979 [ABS 1980], to 50 per cent in 1987-88 [Barnard 1993], to 40 per cent in 1994 [Carter et al 1994], among those aged 65-years-old in Australia [Spencer et al 1994, Spencer 1997].

The traditional pattern of relatively low use of dental services by older aged persons was determined as due to lack of interest in dental health. Studies in America and Australia have shown that it is related to loss of teeth rather than interest [AIHW 1998c; Burt & Eklund 1992]. Locker et al [1987] indicated that one of the best predictors of a dental visit in the previous year by the elderly is the retention of one or more natural teeth. Dentate status, perceived need and recent symptom experiences
are the best predictors of utilisation in elderly persons (aged 60-89) [Holtzman et al 1990].

The changing pattern of caries experience, tooth loss and edentulism has a substantial influence on per capita demand for adults. Per capita demand among the dentate is approximately three times as high as that of contemporary edentulous adults. Therefore, changes in the prevalence of edentulism are linked to changes in demand and subsequently changes in utilisation of dental services. The increase in number of elderly and the shifts in social, educational and economic backgrounds of the newer generation of elderly have been also accompanied by changes in the numbers of individuals over age 65 who visit the dentist [Ettinger & Beck 1982; Gluck 1993].

The tailing off of service use with increasing age has changed in recent years. As the world population is aging, increases in utilisation are being found among the elderly. Increasing tooth retention, especially the decline in total tooth loss among the elderly coupled with the rapid increase in the number of older adults in the population leads to increasing use of dental services. If this trend continues, the inverse U-shaped curve will level out in next century [Burt & Eklund 1992].

Use of dental services has increased among adults in Australia. For example, among persons aged 65 years or more the percentages who visited in the previous 12 months increased from 22 per cent in 1979 [ABS 1980], to 41 per cent in 1993 [AIHW 1993c].

Other changes in the characteristics of elderly population are likely to reinforce this trend of increasing demand. The ‘new’ elderly identified by Ettinger and Beck [1982],
are better educated, have higher incomes and more positive attitudes towards the natural dentition and dental care than the ‘old’ elderly.

Among elderly persons, general health status, having dentures, physical limitations, fatalistic attitudes regarding ill health and disabilities, reduced fixed resources and problems with access to services seem to be the primary barriers to dental care.

Private dental insurance arrangements reduce barriers to dental care [Evashwick et al 1982; Kiyak & Miller 1982; Gambucci et al 1986]. However, a very small percentage of older adults have dental insurance. The National Oral Health Survey of Australia data in 1987-88, has shown that only 26 per cent of Australian elderly group had private dental insurance [Barnard 1993]. Although the presence of dental insurance has been shown to increase utilisation by 50-100 per cent in the USA, even with insurance, the elderly still have the lowest utilisation rates of any age group, approaching those of younger persons without insurance [Barenthin 1976; Glasser & Hoffman 1981].
2.3.2 Sex

Many studies have shown that more women visited the dentist than men, both in terms of annual proportion and number of visits per year [Andersen et al 1975; Antoft 1983; Barnard 1993; Chen & Andersen 1997; Eriksen & Hakansson 1982; Jackson et al 1973; Newman & Anderson 1972; Ritchie et al 1981; Shuval 1970]. However, differences between the sexes in dental health services appear to be decreasing [Gift 1984].

The results of the second International Collaborative Study (ICS II), which was undertaken from 1988-1992, have shown that for the adults aged 35-44, women were generally more likely than men to have made an oral health care visit in the previous year. The difference between the sexes was not as pronounced among children and was not found in older adults. [Chen & Andersen 1997].

Researchers have identified many reasons and expressed different views concerning the gender differences in utilisation of dental services. Variations in informal understandings about the way in which men and women are expected to cope with physical discomfort, to respond to health survey interviews and to interact with medical practitioners, were the factors indicated by Nathanson [1977].

Some other reviewers have stated that women's social obligation give them a greater opportunity for seeking care. Attending dental clinics for their children give the mothers a chance to have treatment themselves [Berkanovic 1974; Geertson & Gray 1970; Mechanic 1978]. Reisine [1987] stated that men tended to have higher number of visits due to higher need and women visit more regardless of need.
Nathanson [1977] reviewed the literature and noted that women are more likely than men to carry out a range of preventive measures including dental attendance. Women are much more likely to claim to brush their teeth frequently and tend more often to visit the dentist for preventive reasons. However, no significant differences were found between men and women in either age group in the proportion making preventive visits in the previous year at any sites, in the ICS II study [Chen & Andersen 1997].

Although there was also no significant difference in dental service utilisation by sex of Malaysian dental students, Jaafar and Razak [1988] found that the behaviour of women was more preventively orientated than men. Dental attendance behaviour was also more inclined towards rehabilitation compared with that of men.

Barnard [1993] analysed the National Oral Health Survey of Australia data and concluded that although differences between males and females were not marked, more females utilised dental services. More females brushed their teeth, had used fluoride tablets, were edentulous, possessed dentures, had orthodontic treatment, extractions and fillings. Females had less periodontal, restorative or extraction need.

Gender difference is more prominent in younger adults than the elderly. Utilisation of young females in the USA was 10-25 per cent more than males, while there was no significant difference in elderly persons [Klyak 1993]. In Australia, there has been less difference in children by gender [Barnard 1993].
Although this universal trend, more women visiting the dentist than men, was constant in all countries all over the world for dentate women [Burt & Eklund 1992], survey data indicate that in highly industrialised countries, the differences in dental visit habits according to gender are levelling out. With more females in the workforce and the acquisition of values more similar to each other (males and females) may account for this levelling. However, in areas where there were a relatively low number of dental visits, utilisation of dental services is still seen higher in females than in males [Andersen et al 1975, 1976; Douglass & Cole 1979; Petersen & Holst 1995].
2.3.3 Race and ethnicity

Race and ethnicity represent cultural and lifestyle orientations reflected by different knowledge, attitudes and behaviours. **Race and ethnicity are inextricably related to wealth, poverty, income, education, cultural value and residential location** [Gift 1993]. Minority populations have experiences of health and disease, which are different to those of majorities because of their culture and ethnicity. Ethnic status may indicate a particular dietary pattern as well as other genetic or **social risk factors**. A disproportionate concentration of racial and ethnic minorities living in industrialised countries is at the lower end of the socio-economic scale, particularly as measured by education and income [Andersen et al 1986]. The unmet need is greater and the use of services less frequent among minorities in all types of delivery systems [Blaxter 1983].

Race and ethnicity are highly correlated with measures of oral health, oral hygiene behaviours, overall use of dental services and receipt of symptomatic dental care in the United States of America. Much of the effect of race and ethnicity on oral health is indirect [Davies et al 1987]. The most consistent finding in the United States of America and the United Kingdom is that a larger proportion of whites than non-whites uses dental services with respect to both amount of expenditure and number of visits and continuity of utilisation [Burt & Eklund 1992; Davis 1980; Gift 1993; Hayward et al 1989; Kiyak 1993; Newman & Anderson 1972; Petersen & Holst 1995; Striffler et al 1983]. Hispanic ethnicity in the United States of America is highly correlated with language barriers, low income and education, as well as lack of insurance and a regular source of health care [Andersen et al 1986].
Davis [1980] analysed the dental services use for the period of 1957-60 and 1968-70 in the United States of America. Although the rate of visiting among non-whites had increased from 17 per cent to 28 percent, it was still lower than whites which increased to 47 per cent in the latter period. Attendance was more than twice among whites than it was among blacks. Survey data has shown that low-income whites actually see a dentist more frequently than do high income blacks. This would indicate that the racial factor is over and above the impact of social class. Even when income, area of residence and education were taken into account, non-whites still have lower levels of utilisation of both medical and dental services [Davis 1980].

The similar pattern appeared to be happening among American elders. Findings indicated that reported dental care use among minority racial and ethnic group elders had not increased parallel with elders of all races and national origins. In 1957-59, 17 per cent of white elders versus 9 per cent of non-white elders had seen a dentist within the past year. By 1989 percentages had improved to 45 per cent of whites, but only 22 per cent of blacks and 40 per cent of Hispanics. However, elders with dental insurance regardless of race or national origin, had a greater chance of seeing a dentist in 1989 than elders without insurance [Jones et al 1994].

The data from the U.S. National Health Interview Survey indicated that black children were less likely to have visited a dentist than white children. Dental visits by Hispanic children were less frequent than by non-Hispanic children. Ethnic minority population groups use less dental services than other groups. A study has shown the racial differences to be more dramatic, with non-whites in the United States of America
making an average of one third to one half the number of dental visits made by whites [Kiyak 1993].

There have been very few studies comparing ethnic groups. In the United States of America, generally, Jews have the highest level of dental visiting, followed by Catholics and Protestant whites then Puerto Ricans and finally blacks [Suchman & Rothman 1969]. No differences were found in utilisation between Chinese and Caucasians in a household interview survey in the USA. However, Asians were motivated to maintain their teeth by concern for esthetics, social acceptance and pain [Kiyak 1981]. Even though they had a high level of need for periodontal treatment, few Asian people of the United Kingdom, aged over 55 years attended the dentist, preferring to wait until they had pain [Mattin & Smith 1991].

A study of ethnic minorities in England has shown that some groups such as Asians have more untreated decayed teeth than the white majority [Booth & Ashley 1989]. On the other hand, Afro-Caribbean children have similar numbers of decayed teeth as the white majority [Perkins 1981; Perkins & Sweetman 1986; Plamping et al 1985]. Studies conducted in the late 1960s and early 1970s found that children of Afro-Caribbean origin tend to have less caries experience than other ethnic groups [Beal 1973; Downer 1970; Valery & Goose 1971].

Paul & Bradnock [1986] and Beal [1990] studied the dental behaviour of ethnic groups in England. By the age of five years the majority of white children are regular attenders at the dentist. A lower proportion of Afro-Caribbean children and even fewer Asians children visit a dentist regularly. By the age of 14 the visiting pattern is much improved in the Afro-Caribbean group. There is a difference in the service from
which parents seek dental treatment for their children. The majority of white children are taken to a general dental practitioner whereas Asian children are more likely to go to a community dental service clinic. [Beal 1996].

Mikami et al [1999] assessed the knowledge and self-reported behaviour concerning the prevention of caries in Japanese children (aged 3-12) years, residing in London, United Kingdom, by asking parents to complete a structured questionnaire. Those respondents with children born in the UK were more likely to take their children to the dentist regularly and more likely to correctly identify the cause and prevention of dental caries. Whilst there were some similarities in levels of knowledge and reported behaviours, the parents of Japanese children were disadvantaged with respect to knowledge about the cause and prevention of dental caries and the use of UK primary dental care services.

Studies in the early 1970s have shown that, there were also differences in the style or pattern of dental service usage in England by ethnic minorities. Blacks were probably more likely to use public clinics and tend to receive emergency dental treatment and extractions rather than preventive and restorative treatments [Kravits & Schneider 1975; Milone et al 1973].

Findings of an American study have indicated the relation to different patterns in seeking preventive dental services, and a marked disparity in utilisation, early in life. Fear and anxiety about dental care, degree of orientation towards prevention and differences in exposure to preventive information varied with race [Strauss 1976].
Jaafar and Razak [1988] analysed the Malaysian urban adults' utilisation of dental services. They found most Malays and Indians attended dental clinic because of toothache, whereas most Chinese who attended clinic requested check-up and dentures. Racial groups may view the functions of dental services differently perhaps as a result of different value systems, beliefs, perceptions and attitudes. Williams and Gelbier [1988] made a survey among mothers originating from Pakistan and Bangladesh and found that low use of dental service was related to their perception of need and also to language barriers.

Peninska and Barnard [1997] found that the Aboriginal population suffers a higher incidence of dental disease than the community at large in Australia. In the Aboriginal community studied in 1980s, 78 per cent of the children had dental caries experience compared with only 44 per cent of Australian children of similar age groups [ACDH 1987]. The study of Australian pre-school children in Brisbane, in early 1990s has shown relatively poor oral health status of indigenous children compared to other population groups of similar ages in Australia and elsewhere [Seow et al 1996].

The poor oral health status was attributed to poor nutritional status in early childhood, together with cultural and environmental factors, particularly low socio-economic status [Schamshula et al 1980]. In 1994, only 69 per cent of Indigenous (Aboriginal and Torres Strait Islander) population had permanent access (access at least 3 days per week) to a dentist [ABS 1994c].

The Aboriginal people are exposed to high risk of oral diseases for several reasons: fluoride deficiency in the water; problem in the access to dental services; scarcity of
dentists; high turnover of dental staff; diet high in sugar; high costs; and poor oral hygiene. Lack of awareness and fear; lack of education about the need to seek treatment, neglect and ignorance of dental health habits, long waiting list for dental treatment, transportation difficulties and frequent geographic changes in residence also have influenced poor oral health status [Peninska 1993; Peninska & Barnard 1997].

The magnitude of poor dental health among Aborigines is highlighted by Aborigines who do not generally seek dental care unless pain persists (use dental services mostly in case of emergency) [Peninska 1993]. The percentage of emergency care for persons over 25 years of age in 1994 is higher for Aboriginal and Torres Strait Islander patients than other Australians. Tooth extraction is counter to the desired goal of maintaining a functional natural dentition for life. The percentage of patients receiving extractions increased across age groups for both emergency and non-emergency visits for Aboriginal and Torres Strait Islander patients, but remained steady for other Australians [AIHW 1995a].

However, some other studies have shown that there was no difference among racial groups. One such study is of USA children in an anti-poverty program, Boston (Head Start). Moosbrucker and Jong [1969] did not find any significance between racial groups within a sample clearly of similar income. These include recency of last visit, current felt need for dental treatment, making appointments when in need of care and attitudes towards visiting the dentists. Race had no effect on the number of visits once in the system [Kravtis & Schneider 1975; Milone et al 1973].
Davis [1980] analysed the dental services use for the period of 1957-60 and 1968-70 in the United States of America. He found that although there were some differences in the use of dental services among ethnic groups, the ethnicity and race did not determine whether or not individual would seek dental care. The low use of dental care is often better understood in the **broader context of social class** [Davis 1980].

The findings of Soh [1992] also indicated that, differences in education and exposure to product information, rather than racial factors, attributed the differences between knowledge of prevention and preventive dental behaviours among racial groups in Singapore.

In the early 1990s, young Korean-American immigrants used more prophylaxis public health services than the elderly, even when the cost barriers was removed by providing free or low-cost dental services in the USA [Lee & Kiyak 1992].

Kiyak [1993] discussed the influence of age and culture based on the surveys conducted in the United States of America, during the 1960s-1990s. The researcher concluded that the difference in utilisation of dental services in ethnic groups might be related to cultural values, language differences and other factors such as **socio-economic status**, residence, access to dental services, and availability of a regular source of dental care.
2.3.4 Income

Income is usually measured by self-reported net and gross income for an individual family or head of household. A relationship between income levels and dental care utilisation does exist [Douglas & Cole 1979, Evashwick et al 1982]. The relationship between income and utilisation of dental services reported in literature is a direct and positive one: as income increases so does utilisation, with the differences showing up more in income extremes [Chen et al 1997; Gift 1984; Kiyak 1989]. In one study, people with incomes near the median were seven to eight times more likely to seek dental services than those with the lowest income. [Evashwick et al 1984]. In most of the epidemiological studies income remains significant for dental service utilisation, when other variables such as sex, age and number of symptoms are controlled [Gift 1984; Najman 1988; Najman et al 1998; Newman 1971; Sheilham 1981].

The results of the second International Collaborative Study (ICS II), which was undertaken from 1988-1992, have shown that the proportion of adults reporting a visit increased with income in Erfurt (Germany), New Zealand and Baltimore (USA). The differences were significant and quite large in New Zealand and Baltimore for both adult age groups. [Chen & Andersen 1997].

The 1994 National dental telephone interview survey in Australia has shown that the percentage who last visited for a dental check up steadily increased with increasing income, reaching 52 per cent among those from households of $40,000 or more per annum. It may not be the buying power of the income per se that is the explanation of differences in dental service uses, but rather culture or value differences within the income groups [AIHW 1998b].
Different income groups consume different types of facilities [Freeman & Lambert 1965]. Low-income people are more likely to visit the public dental clinic, while high-income people are more likely to see private dental practitioners. In the United States of America, salaried employees and families are more likely to use a company-sponsored dental plan than hourly paid employees and families [Leverett et al 1977].

The Iowa survey in 1980 has shown that as family income increased the proportion of people with recent visits to the dentist also increased. Feldstein [1973] developed a model, which illustrates an increase in the use of services of 15 per cent with an income increase of 10 per cent; also a similar increase in price of dental service will produce a similar decrease in use.

Income also appears to help explain specific types of dental care which will be sought; since the orientation towards preventive and restorative dentistry increases with income, while conversely, patients with lower income tend to make more visits for extractions and relief of pain [Freeman & Lambert 1965].

The data of the National Oral Health Survey in Australia in 1987-1988 has shown that low-income persons made fewer dental visits for preventive and more visits for dental emergencies than higher income respondents did. Possible explanations are financial barriers, unavailability of accessible providers, ignorance of the benefits of preventive dental care and difference in attitudes, or beliefs about dental care [Barnard 1993]. Survey data have shown that, in 1994, health care card holders (low-income persons) were more likely to make dental visits because of a problem than were non-card holders [AIHW 1995a, 1995b, 1995c].
2.3.5 Occupation

A direct relationship exists between occupational status and frequency of dental visits. Persons in managerial and professional occupations, who are in high occupational status, visit their dentists more frequently than semi- or non-skilled manual workers. Highest utilisation is found among professional/executive level occupations. Members of professional families are also more likely to go for preventive visits and regular check-ups than the manual workers. Non-skilled manual workers only go when having trouble, needing emergency care or for extraction treatment. Non-shift workers show the better use of health services. [Gift 1984; Newman & Anderson 1972; Petersen 1981; Sheiham 1981].

Utilisation depends upon possibilities of leaving work, shift work and other influences from the work environment. Financial loss is one of the barriers, as being absent from work may reduce wages for manual-workers. Higher-salaried persons can usually visit to a dentist without an unpaid period from their work. Srikandi et al [1983] studied a group of South Australian employees and found that, higher occupation employees made regular visits more often than the lower-income persons.

In a study of workers from industrial plants, in NW England, during 1980, there was a significance difference in the dental service utilisation between manual and non-manual workers. Manual workers had less dental utilisation and were more likely to lose their teeth. Non-manual group made more dental visits at each given age and had their teeth filled more [Sheiham et al 1985]
2.3.6 Education

Level of formal education appears to be one of the most powerful forces in oral health. A person with higher education usually has a higher level of dental knowledge, positive attitudes to teeth, regular use of dental services, and continuity of care. Education appears to reflect an improvement in both orientation and specific oral health knowledge. [Gift 1993].

Education of the head of the household is usually the primary measure used in epidemiological studies. Each individual’s education within a household is also frequently considered. Generally, dental service utilisation increases as the level of education increases. [Gift 1984; Newman & Anderson 1972]. Research studies have indicated that education was the most important predictor for utilisation of dental services in the United States of America [Andersen et al 1970]. Educated parents who make regular visits to the dentist give more care for their children's oral hygiene. This explains the higher rate of dental care usage in highly educated families [Gift 1984; Todd 1975; Todd & Dodd 1985].

In the Iowa survey [1980], Beck et al [1981] found that as education level increased, the proportion of people with recent last visits to the dentists also increased. Individuals with less than 11 years of education were much more likely to have infrequent visits to the dentists. The gaps in utilisation between the very poorly educated and those with moderate education were larger than the differences in utilisation among other educational groups such as high school and college graduates [Beck et al 1981].
After analysing the data from the 1986 nationwide telephone survey, Hayward et al [1989] indicated that a lower education level is a risk factor for having fewer dental visits in the United States of America. Kiyak [1993] stated that during 1964-1974 [HRA 1977], families in the USA headed by university graduates were two or three times more likely to see dentists than those headed by an individual with eight years or less of education.

Rajala et al [1978] found subjects with higher education used dental care facilities more regularly than those with less education in Finland. There were similar findings in Denmark, where, persons graduating from high school and secondary school had more regular visits than persons who had only completed primary school [Petersen 1983]. Mak et al [1990] found regular users had a higher educational standard than the irregular users and non-users in Hong Kong.

Chen & Andersen [1997] analysed the results of the second International Collaborative Study (ICS II), which was undertaken from 1988-1992, and found that there were significant education group differences in oral health service utilisation among adults at most sites. Adults, aged 35-44, were significantly more likely to report a visit if they were in the high education group at all sites except Yamanashi (Japan) and the Lakota (USA) site. The differences were quite large at several sites, equalling or exceeding 16 percentage points in Erfurt (Germany), New Zealand, Lodz (Poland) and Baltimore (USA). For adults aged 65-74, the proportion reporting a visit increased with level of education at every site and most of the increases were. The high education group was more likely than the low education group to have made a preventive visit.
2.3.7 Socio-economic status

Social inequality or social stratification appears to be a nearly universal characteristic of social life. The rich and poor really are separated by much more than money. Social class differences have been observed in many areas of life, including: language; marital and family relations; political attitudes and behaviour; religious affiliation; and participation in social activities. [Petersen 1990].

An individual’s assessment of physical well being appears to be influenced by social factors: such as position in the socio-economic structure; being male or female; black or white; high or low income; educated or uneducated; rural or urban [Kiyak 1989]. Social factors represent and create a lifestyle. The lifestyle represents patterns of behaviours and social support networks and is strongly associated with dental visits, oral hygiene health care practices and oral health status [Gift 1993].

Life styles are correlates of stratification structures. Social class is associated with different personality characteristics. This occurs because the pattern of socialisation varies from social class to social class. As a whole, members of one social class exhibit a given characteristic more than members of another class do.

Each person has a social status; that is the position he or she occupies within the social system. There are, broadly speaking, two types of status; ascribed and achieved. An ascribed status is one that is determined at birth such as sex or caste. An achieved status on the other hand is gained during the lifetime of the person and may, for instance, be based upon the occupation of the individual [Beal 1996].
A status group may be either 'open' or 'closed'. An open form of stratification is found in the Australian Aborigines where status is related to age and where each man becomes successively a hunter, a warrior, and eventually reaches the heights of elderhood. The caste system, conversely is an example of a closed status grouping. Contact between different castes is limited and governed by predetermined rules, and movement from one caste to another is not allowed. In Western society, social status is based upon the class system. This is relatively open system in which mobility from one group to another is not automatic, but it is permitted and can be made with comparative ease [Beal 1996].

In the USA and Canada more complex classification systems are used to measure social status in which: occupation; income; and education; are combined to produce a composite rating. In addition to composite scales, income and education are often used independently as indicators of socio-economic status [Locker 1989].

The American Dental Association Bureau of Economic Research and Statistics [1956] used certain social classes and studied the reaction of each to dental care. Dunning [1986] reviewed that study as follows:

The members of upper middle class "seek out expert advice and in areas where they feel it is important, follow the advice with considerable religiosity". They value their teeth, are interested in preventive dentistry, and actively pursue various types of dental care. The dentist is visualised as a professional who not only repairs teeth more attractive and useful. The upper middle class members are much impressed with the desirability of having their own teeth for as long as possible. [Dunning 1986].
The lower middle class includes generally the owners of small business, minor executives, teachers, salesman and white-collar workers. They are not nearly so individualistic as the upper middle group; they are the most compulsives in their dental care attitudes and practices of any social class. "The dentist is regarded as an authority (as tends to be the case among upper middle class people) but someone who 'fixes' teeth". The dentist is also viewed as one who gives directions as to how teeth should be cared for and who is useful for preventive dentistry. Training in dental health habits begins early in this group and is followed with persistence, though not always with accompanying flexibility. The necessity to be clean, good conforming and socially presentable makes for a high standard of dental care among people at this status level [Dunning 1986].

The upper lower class people are generally skilled- and semiskilled blue-collar workers. They are resigned to whatever happens and feel there is little they can do to stave off the inevitable, including the loss of their teeth. On the basis of that attitude, it is probable that they do not receive professional dental care geared to maintaining their own teeth. They acquire artificial denturers at a relatively early age and are reasonably happy with them. They instruct their children how to care for their teeth, but the children are more or less on their own after that. These people are often happier receiving their care from a clinic than from an individual practitioner [Dunning 1986].

The lower class, also called underprivileged or disadvantaged, is a group of the unskilled labourers, people who shift from job to job, have a limited education, live in
slum areas and exhibit no stable pattern of life. They are the ones who reveal the most consistent neglect of teeth [Dunning 1986].

The interaction models, emphasise that one can reach a realistic understanding of the utilisation of services only if individual factors as well as characteristics of the individual’s social environment and society are addressed [Petersen & Holst 1995].

A lower socio-economic status individual usually has less prior and current access to health-sustaining resources in society, such as food, basic education; a lower level of oral health; health orientation inconsistent with professional norms; and absence of a regular source of care [Gift 1993].

Socio-economic status (SES), which is a composite measure of income, occupation and education [Gift 1984], is the characteristic most commonly used in the analysis of social inequalities in health [Locker 1989]. Studies have shown continued inequalities in health and differences in utilisation of health services among different socio-economic status. [Feinstein 1993; Marmot et al 1987; Roberts-Thomson et al 1995].

Among the various elements of socio-economic status, income and education are highly correlated with dental health and dental utilisation but education is the “critical factor” [Hicks 1981].

Studies of the use of general and dental practitioner services have shown that the size and composition of a person’s social network and the number and types of individuals
consulted, whether lay or kin, influence the use of health services [Barnard 1993; McKinlay 1973; Scrambler et al 1981].

Oral health inequalities and use of dental care services among different socio-economic groups, disadvantaged and non-disadvantaged populations are distinct [Beal 1996; Chen et al 1997; Gift 1984; Davis 1987; Locker 1989; Petersen 1997]. Socio-economic status can have either a negative or positive effect on an individual's dental care utilisation and oral health status: health promoting knowledge; attitudes and behaviours; out-of-pocket cost of care; and potential outcome of any oral health promotion activities. [Gift 1993].

It is clear that great variability in beliefs and practices exits among different social groups. People from lower social status have more dental disease and thus need more dental treatment than those from the higher social classes [Beal 1996]. However, there are some differences among need, demand and actual utilisation of dental services. There is a direct relationship between social class and utilisation of dental services; higher social classes utilise dental services more frequently than the lower social class, as a result of limited access to dental care for lower social class [Chen 1995].

A study comparing health inequalities between socio-economic groups in 32 countries, found that some countries have high inequalities, for example, New Zealand, Poland and the United States of America, while others have low inequalities, for example, Japan and the GDR [Le Grand 1987]. Socio-economic status in industrial countries is inversely related to most measures of oral diseases (caries,
edentulousness, periodontal diseases) and treatment needs. Also there is positive relation between income, education; occupation and oral hygiene behaviours and dental utilisation [Grembowski et al 1989; Petersen 1990].

Researchers have suggested that the quality of life or lifestyle of each social class as well as different levels of knowledge are at least partially responsible for the utilisation differences found [Beal 1996; Gift 1984]. Social class differences in attitudes toward teeth and the dental services available may be explained by difference experiences with dental treatment, dentists and the dental care delivery system [Festinger 1957].

The impact of socio-economic forces on oral health status and use of dental services seems to remain after other confounding factors are controlled [Grembowski et al 1989; Petersen 1990].

The socio-economic gradient in utilisation of dental services is well documented, not only in terms of a relatively lower frequency of dental visits for low-income groups or less-educated persons, but also in relation to a lower consumption of preventive services and a relatively higher consumption of radical treatment services. These socio-economic inequalities have been found for children as well as adults but with differing patterns of effects for adults and children. On the other hand, the second International Collaborative study has shown that the socio-economic variables measured were mostly not significant for the children [Andersen et al 1997; Beal 1996; Bulman et al 1968; Burt & Eklund 1992; Chen 1995; Davis 1980; Gift 1990; Ingle & Blair 1978; Petersen & Holst 1995; Richards 1971].
The **highest users** of dental services are those with the **highest income** and the **highest levels of education**. Per capita income or family income, out-of-pocket or net dental prices and non-dental prices are market forces that play a major role in the use of dental care [Beazoglou et al 1993; Glasser & Hoffman 1981; Hay et al 1982; Manga & Charette 1986; Striffler et al 1983].

In highly industrialised countries, utilisation of dental services is reported to be lower among disadvantaged population groups (e.g., institutionalised elderly persons, persons with handicaps or disabilities, or chronically ill persons, or psychiatric patients) than among other groups. In these groups, a substantial number of persons tend to visit the dentist mainly for symptomatic reasons [Chen 1995; Petersen & Holst 1995].

In the United Kingdom, despite the provision of free dental service, there is evidence of social class gradient in the use of dental services [Bulman et al 1968; Dickson 1968; McKinlay 1969; Scarrott 1969; Todd & Lader 1991]. A study in England by O’Mullane and Robinson [1977] showed that, even with poor accessibility to dentists, highly motivated and **high socio-economic** individuals would seek out dental care.

National surveys of adult dental health in United Kingdom have shown that in 1988, in contrast to their respective dental needs, nearly 6 out of 10 from the highest social group had been attending the dentist on a regular basis. Only one third of the subjects from social class IV and V had attended for regular check-ups. Only one quarter of those from social class I, II and III non-manual waited until they were having trouble with their teeth compared to over a half of those in class IV and V [Todd & Lader 1991].
Low SES parents are less likely than high SES parents to take their children to the dentist. Todd [1975] and Todd and Dodd [1985] reported that not only were mothers from the highest social groups more regular in their own dental attendance, but also that they took their children to the dentist at an earlier age. The dental attendance pattern of the mother in urban health districts in the NW England was a good predictor of children’s dental attendance [Greatrix et al 1990; Todd & Dodd 1985].

Studies in the 1970s and 1980s have shown that low SES parents in England are more likely to take their children for dental visits only when their children have serious symptoms. They are less likely to receive advice from dentists concerning dental care for their children [Bradnock et al 1984; Silver 1987, 1992].

Choice of dental services also depends on the classes in England. Middle class mothers are more likely to take their children to private practice, while working class mothers send their children to community dental services after receiving a note informing them that a school screening inspection has indicated a need for treatment [Todd 1975].

A smaller proportion of mothers in an area of social deprivation, South Manchester of the United Kingdom, was attending dental clinics in a study carried out, during 1989-90, by Crawford and Lennon [1992]. A smaller proportion of children went to the dental community services in both the ‘attender’ and ‘non-attender’ groups of mothers. Although a substantial proportion of mothers who did not attend the dentist themselves did ensure the attendance of their children.
In a survey in Denmark, among the 35-45 years olds, 84 per cent of the high socio-economic status group made regular dental visits, compared with 55 per cent of the middle and 37 per cent of the low socio-economic status group [Jensen 1974].

Analysis of data from the National Oral Health Survey (1988-1989), National Health Survey (1989-1990) and Telephone Interview Survey (1992) of Australia suggested that there is a significant social inequality in access to dental care in Australia [AIHW 1993b,c; Barnard 1993; Davies 1993].

Davies [1993] analysed the nationwide Telephone interview Survey [1992] undertaken by the Dental Statistics and Research Unit of Australian Institute of Health and Welfare. The results have shown that persons aged 45-64 years in the lowest group of household income are eightfold variations in the percentage of persons reporting being edentulous and 1.7 times as likely to wear a denture, compared to persons from the wealthiest income group.

Gaughwin et al [1999] studied the oral health of children in South Australia in 1994 and found that there were differences in choosing school dental service and private practice. Family with higher levels of income who had private dental insurance used both the private and mixed providers (Private and SDS). The SDS and No Recent Care groups had higher percentages of families who were health cardholders than did the Private and Mixed groups.

There are differences in the use of the type of dental services among social class. Middle and higher social class groups usually have deferred gratification. They see value in foregoing the pleasures of today in order to gain greater benefit in future.
They use more preventive measures. Lower class groups have more emergency treatment, which indicates immediate gratification [Beal 1996].

Motivation alone does not account for the incongruities in utilisation of preventive dental visits. Douglass and Cole [1980] examined the motives for and barriers to, seeking asymptomatic dental care. They found that not all people in the higher socio-economic levels visited dentists preventively and that minorities of the lower socioeconomic levels do make preventive dental visits.

Srikandi et al [1983] studied a group of South Australian employees in Adelaide, and found that, higher occupation employees made regular visits more often than the lower-income persons. High socio-economic group had planned regular dental visits.

Data on the choice of treatment has shown that higher social class patients favour restoration of permanent teeth as well as primary teeth. Members of professional families are also more likely to go for preventive visits than manual workers’ families. Low SES groups are more likely to have curative or irregular use of dental services, and receive services such as extraction, which may not promote tooth retention. [Beal 1973; Beal & Dickson 1974; Maizels et al 1991; Silver 1992; Todd and Dodd 1985].

Analysis of data from the National Oral Health Survey (1988-1989), has shown that number of dental visits during the previous twelve months was lower in lower socio-economic groups and treatment receive was likely to be extraction in comparison to higher socio-economic groups. [Barnard 1993].
A survey of 1,895 first year students of Sydney Metropolitan State High Schools in Australia showed more children in the working class group had never visited a dentist. They were less likely to have had a checkup but more likely to have had extraction at their last visit. The average length of time since last visit to dentist was 11 months compared with 6.7 months for the upper-middle and lower-middle socio-economic groups [Barnard 1976].

There are also differences between social groups in referral for specialist treatment in the United Kingdom, during 1980s. Higher social groups like to have more referrals for orthodontic advice and treatment and are also more likely to seek treatment for minor malocclusions [Jenkins et al 1984a, 1984b; Kenealy & Shaw 1989].

The patterns of utilisation contribute to poor oral health status. Studies in various industrialised countries have shown a consistent pattern of relatively worse dentition status for low SES adults. The low SES adults have more untreated decayed teeth and more missing teeth and a greater proportion are edentulous than is the case with high SES adults [Chen 1995].

Infante and Owen [1975] found that the lower socioeconomic status preschool children in the United States had greater caries experience and lower level of treatment manifested by restoration or extraction of teeth compared with children in the middle socio-economic group.

In their study, French et al [1984] observed that 5-year-old children from semi-skilled and unskilled classes in both low income and high income areas of England had more
than twice the number of untreated decayed teeth than 5-year-olds from professional or managerial class families. The poor health status of permanent teeth among older children is also observed in low socio-economic status groups in many countries [Chen 1995].

Honkala et al [1997] analysed the dental service utilisation by Finnish adolescents of different socio-economic levels between 1977 and 1995. They found that the gender difference seemed to vary according to the occupational status of the parents. It did not exist in the higher socio-economic groups, but for the whole period remained consistent among the children of blue-collar workers.

In the analysis of a nationwide Telephone Interview Survey [1992], Spencer [1993] found that high percentage of low-income individuals and health cardholders faced direct out-of-pocket costs in the use of dental services in Australia. Direct out-of-pocket costs were highest among: adolescents; individuals with high annual household income; and those without a health card. Approximately one in four of individuals avoided or delayed visiting or had to forego recommended or wanted treatment because of cost. Almost one in five of individuals would have a lot of difficulty in paying a $100 dental bill.

Spencer [1993] concluded that affordability and hardship were associated with age, annual household income and health card status. Individuals with affordability or hardship difficulties were: less likely to have visited recently; less likely to visit for a check-up; and likely to have had fewer visits in the previous 12 months.
In their investigation about barriers to dental attendance, Todd and Lader [1991] found more of those from lower social groups felt anxious about going to the dentist and would rather take painkiller than go to the dentist. Dental insurance has made some difference to the problem of affording care. Although the cost barrier is completely removed there are still marked differences in use of dental services among the different socio-economic groups [Burt & Eklund 1992; Kiyak 1993].
2.3.8 Geographical locations

A number of studies have shown an association between attendance rates and locality [Barnard 1993; Carmichael 1985; Jackson et al 1973; Kiyak 1993]. Geographical factors and density of the population often combine with socioeconomic factors predisposed in the development of inequalities in access to health services between urban and rural areas.

Particularly in developing countries, utilisation of dental services has been found to be lower in rural areas than in urban areas. The urbanites visit a dentist more regularly. People in areas with a high dentist to population ratio and with a choice of easily accessible dental services, are more likely to use dental services. Regions with relatively few dentists per capita also had a relatively low per capita use of services but a relatively high proportion of emergency treatments [Ashford 1978; Eriksen & Hakansson 1982; Hayward et al 1989; Gift 1984; Newman & Anderson 1972; Petersen 1983].

The lower utilisation in rural areas is ascribed to: less availability of dentist; longer travelling distances; longer waiting times; and cultural factors that present barriers to seeking care. Cultural barriers such as lack of familiarity with appointments system and other system characteristics appear to be greater in rural areas. [Elliot 1972; Howards et al 1980; Petersen & Holst 1995].

Countries that are more developed economically and whose people have a higher socio-economic status generally have a higher prevalence of dental caries, particularly
in urban areas. These distributions are closely related to socioeconomic status and race and ethnicity, perhaps also to age and dental status [Burt & Eklund 1992].

In Australia, because of its large geographical size and uneven distribution of its relatively sparse population, the provision of adequate services among non-metropolitan areas possesses logistical and economic problems. Persons in the state capital cities of Australia during 1987-1988 had more utilisation of dental services and more fillings, but had less dental insurance, use of fluoride tablets, caries, decayed or missing teeth, or persons edentulous [Barnard 1993].

Even though the United States of America is a highly developed country there are still varying levels of caries experience from region to region. This phenomenon can be explained by the presence or absence of fluoride in the drinking water, the level of available and climate differences that alter the amount of water consumed. In most of the studies in the USA, utilisation is found to be lower in those areas where the water is fluoridated [Douglas et al 1971].
2.3.9 Socio-demographic variables of lesser significance

2.3.9.1 Usual activity status

This measure differentiates among the activity status of individuals, such as, working, unemployment, housekeeping, and retired. The multiple roles performed by many members of society render an interpretation of this variable difficult [Gift 1984]. Employment status and nature of employment are related to oral health status. At the most basic levels, type of employment represents a lifestyle and often determines availability of dental insurance or accessibility of services during non-working hours [Gift 1993]. For example, among Danish industrial workers, individuals in shift work had more untreated dental decay than did similar workers in other industries [Petersen 1981, 1983].

2.3.9.2 Religion

Religion, which is one of the traditional measures of sociological differentiation, has been found to be associated with utilisation [Nikias 1968; Wan & Yates 1975]. Rogers [1991] reported that Muslim women in the United Kingdom had the lowest level of attendance at a dental clinic during pregnancy.
2.3.9.3 Marital status and family characteristics

Married persons used services more than non-married persons did in the United States of America [Avnet & Nikias 1967; Cohen & Fusillo 1971]. In Australia, variation was found in the percentage of children who had visited a dental professional by family characteristics such as; two-parent compared with single-parent families; language usually spoken at home; occupational status; and parental income [ABS 1995a].
2.4 SOCIOENVIRONMENTAL AND STRUCTURAL VARIABLES OF DENTAL CARE DELIVERY SYSTEM AFFECTING UTILISATION OF DENTAL SERVICES

2.4.1 Socio-environmental variables

Socio-environmental characteristics of a community are comprised of social, political and economic characteristics specific to oral health, (for example, diet, including sugar consumption, the availability of fluoride toothpastes, and water fluoridation) and the resources and organisation of general health care system [Chen et al 1997].

2.4.1.1 Sugar consumption and diet

As the standard of living improved in most industrialised countries at the beginning of the twentieth century, sucrose and sweets become more readily available to the general population. The rate of dental caries increased, utilisation of dental services rate increased, and need to provide curative oral health gradually rose [Ainamo 1980; Beal 1996; Sheiham 1979]. Since the 1970s, the sugar consumption declined in some industrialised countries. For example, the United States of America and Japan have experienced a great decline in sugar intake. Sugar consumption has increased in Poland and the former GDR. Although New Zealand has a reduction in sugar intake similar to that of Japan, sugar consumption is highest in New Zealand and lowest in Japan in the early 1990s. [Chen et al 1997].
2.4.1.2 Fluoride exposure

The use of fluoride is a primary reason oral health has improved so much in the developed world over the last generation. Toothpaste is the most widely used fluoride vehicle in the world, many consider it the most important single factor in the caries decline [Burt & Eklund 1997].

Fluoridation reaches everyone in a community and it reduces coronal and root caries over a lifetime by 20-40 per cent [Murray 1993; Murray et al 1991; Newbrun 1989]. It is assumed that utilisation of dental services is directly related to oral health. The reduction in dental caries may lead to decrease utilisation of dental services. [Gift 1984]. In most reported studies, utilisation is found to be lower in those areas where the water is fluoridated [Douglas et al 1971; Murray & Naylor 1996].

2.4.1.3 Other community-based measures.

Utilisations of dental care are also affected by community-based determinants other than water fluoridation. Some of them are social structure of community, cultural factors, race and ethnicity, beliefs of ethnic groups, urbanisation, social network relation, desire and acceptance of dental programs and lack of public knowledge about improved dental techniques [HRA 1976].
2.4.2 Availability/Delivery Systems

A delivery system is a collective expression that incorporates the various means by which health care is provided to patients. The principal components of delivery system are:

(1) the structure of the system, meaning the organisational arrangements by which patients and providers get together;

(2) how the care is paid for; and

(3) the supply of various types of health care personnel. [Burt & Eklund 1992]

An oral health system is fundamentally defined by the existence of specially trained dental professionals, working in various roles and settings and for various sections of the community. Policy, organisation, payment mechanisms and outcomes can describe oral health care systems. They are characterised by the following parameters: who provides; what services or functions; for whom; in what locations; with what resources; by what payment mechanisms; and with what effects. Oral health care system characteristics include the development of modern oral health care and the organisation and financial, human and material resources of the system [Anderson et al 1998a; Chen et al 1997].

Traditionally, independent private practitioners using fee-for-service arrangements, deliver dental care. There is diversity of practice mode in different countries around the world. For example, government organised national social security system or health service is well established in Denmark, Finland, Sweden and United Kingdom. Government regulated social insurance with the option of voluntary private system is the delivery system of countries such as Austria, France and Switzerland. Some
countries have more than one system (eg. Greece, Ireland, Iceland) [Anderson et al 1998a; Arnjolt et al 1985; Burt & Eklund 1992; Chen et al 1997; Cohen 1978; Ingle & Blair 1978].

Delivery systems for oral health differ in the focus placed on the range of functions. For example, many developing countries emphasise relief of pain and emergencies; some national health care systems traditionally have focused on treatment and many nations have limited or no research, administration or policy functions in the oral health care systems [Gift et al 1997]. How each system functions depends on the particular political, socio-economic and cultural factors [Oberweis 1997].

The first and second International Collaborative Studies (ICS I, ICS II), which were performed under the auspices of the World Health Organization, compared the different impact of the delivery systems on the use of services. Both utilisation and reasons for utilisation appear to differ across systems, with motivation being a far greater explanation in open, non-structured systems. All evidence has suggested that there are different advantages in structured and unstructured systems. The utilisation of children dental care has been increased in the countries with highly structured oral care program, for example, New Zealand, former GDR, Poland, and the United States of America. [Arnljot et al 1985; Chen et al 1997; Cohen 1978].

In the first International Collaborative Study (ICS I), conducted from 1973-1981, countries with highly structured school dental care systems had a very low level of unmet need for students. Taking the services to the target population will guarantee that almost all persons will become users of dental services while they are eligible for
those programs. However, even the best school dental care system may not be able to affect a satisfactory level of oral health on a long-term basis. The advantages of the school system are frequently not extended to adulthood [Arnljot et al 1985; Cohen 1978; Douglas & Cole 1979].

The results of the second International Collaborative Study (ICS II), which was undertaken from 1988-1992, have shown that an individual’s oral health behaviour can be influenced by some system-level factors relating to the country’s socio-environmental characteristics, the oral care system, and certain personal characteristics [Andersen et al 1997].

The type of oral health care system made a difference in the proportion of children who made visits in the year prior to the ICS II survey. In New Zealand, with its school dental nurse program, virtually all (almost 100 per cent) reported a visit. All other sites, where treatment services that were provided through school oral health services programs, had 12 per cent or fewer reporting no contact. In contrast, at sites that did not have such programs for their children, reports of no visits were higher [Andersen et al 1997].

In Australia, universal free school dental services operate in all states and territories, with high population coverage. School dental service has a positive effect in reducing and controlling social disparities in oral health. Gaughwin et al [1999] found that, during 1993-1994, children with less advantaged backgrounds in South Australia, seen through school dental services, had more favourable oral health outcomes than children seen by private practice.
In Finland every child is expected to have an examination and treatment (if required) at least every second year through school dental service and primary oral health care system in recent years. School dental care with an organised system of recall has been shown to reduce the socio-economic differences [Honkala 1993; Milen et al 1981]. The prevalence of dental visits is not correlated with the occupational and educational status of the parents after 1983 [Honkala et al 1997].

Unmet need is greater among children in open systems. The comparison of unmet need among adults does not show as great a difference [Cohen 1978]. Motivational variables are more relevant when an individual is free to choose when and where to receive services. The more a dental care system incorporates the open structure, the greater the individual compliance that will be required [Jenny 1979]. The relative significance of social position was greater in the open system than for the students in the highly structured closed system [Arnljot et al 1985].

The first ICS for oral health care systems has shown that countries in which insurance systems predominated as third parties in the payments for services had higher service out put than the others. In systems where private practices and third party payments predominated, the responsibility for acquiring needed treatment still rested on the parent acting for the child or student [Arnljot et al 1985].

Findings suggested ease of entry into the dental system is the “crucial contingency”. Once people are actually in the dental system, in other words, once the hurdle of access has been surmounted, neither education or income exert much influence on the volume of care received. [Davis 1980; Eddie & Davis 1985].
2.4.3 Alternatives to Traditional Care

The traditional and predominant manner of delivering dental care is through a fee-for-service private practice system in the United States of America. Alternatives to this predominant system include: retail dentistry; large group practices and clinics; hospitals; outpatient clinics; health maintenance organisations; department store practices; worksite clinics; and independent practice of hygienist and denturists. The system which best control costs, increase accessibility and enhance quality will gain the competitive edge [Rovin & Nash 1982].

Changing payment arrangements following in the changes in prepayment and insurance, for example prepaid group practices or closed panels in which funding for care is restricted the patient to select dentists, may have an impact on the utilisation of services and removal of some barriers to care. The effect of national health policies (eg decisions regarding national health insurance) will clearly influence the utilisation of services [Gift 1984].
2.4.4 Accessibility.

Accessibility and availability of dental service affect use of dental services. Improved access to dental services increases utilisation. Access to dental care is not limited to a measure of the distance from the patient to the dentist. [Penchansky & Thomas 1981; Yule & Parkin 1985].

Several factors influence access to dental care.

These factors include:

1. Adequate financial resources (prepayment and financial assistance, insurance coverage);
2. Distribution of providers;
3. Types of services available in a community;
4. Distance of the clinic from home or office and travelling time;
5. Transportation;
6. Time costs of waiting time for an appointment;
7. Convenience of keeping the appointment;
8. Availability of a dentist who will agree to special financial arrangements;
9. Visiting time for services;
10. Having a regular source of care;
11. Regular recall system and

In particular, several studies have found that various time prices have statistically significant effect on utilisation [House 1978]. Other studies that have included dentists
per capita in an effort to measure supply or inducement effects inadvertently may be capturing the effect of lower transaction costs (appointment delay, travel costs, office waiting time, etc.) on the demand for dental services [Yule & Parkin 1985].

O'Mullane and Robinson [1977] suggested that increasing the dentist-to-population ratio only affects middle class patients, raising them to rates characteristic of upper-class utilisation rates and high socioeconomic status groups.

When the National Dental Insurance scheme was introduced in Sweden in 1974, fewer people visited the dentist during the first year, after implementation. Edentulous persons received more treatment. It shows that the introduction of dental insurance does not guarantee that the desired changes occur rapidly. The removal of financial barrier is necessary but not sufficient prerequisite for gaining “better” equity of access to dental services [Barenthin 1976].

To improve their access, non-ambulatory, homebound and institutionalised patients may need portable dentistry programs and treatment facilities inside institutions. Dental associations should encourage even distribution of dentists. Public health authorities should provide increased support for oral health facilities suitable to local conditions, particularly in remote areas [FDI 1986].
2.4.5 Previous contact with the delivery system

Previous contact with the delivery system is one variable, which may explain the differences in utilisation rates associated with other variables such as age and education. Various studies suggest that prerequisites to use are perceived need and previous utilisation history [Jenny 1979]. Previous experience with dental care system is also dependent on cultural values and traditions. In some cultures, in which children are exposed to school dental services, there is a tradition of regular care for children and young adults. This is not necessarily associated with continued regular care in adulthood [Gift 1984].

Schwarz and Hansen [1976] found that previous contact with school dental care was an important predictor in adult utilisation in Denmark. However, most of those involved in a school program return to a very low level of oral health as adults, when they entered a co-payment program. The attendance drop for those who left school early was greater. This decline was closely associated with socio-economic status [Billie 1980; Schwarz 1980].

Persons with more recent visits are more likely to have had another visit earlier in the same year. Having a positive experience in the dental delivery system may provide the persons with the incentive to continue to visit the dentist [Gift 1984].

Response to recall is positively related to previous contact with dental care in the USA, as measured by having completed treatment at an earlier visit and having a regular source of care. Having more recent contact with a dentist is also related to visiting a dentist [Bonito et al 1978; Heloe 1973].
2.4.6 Having a regular/usual source of care

A regular source of care serves as an entry point to the health care system and provides a link to the more specialised forms of care. It also facilitates timely and continuous treatment and contributes to better health. Having a regular source of care is also found to be related to continuity of utilisation. There is a strong relation between having a regular dentist and actually visiting a dentist at least once in the past year. Of those people with regular source of dental care in the United States of America, 67 per cent had visited a dentist at least once in the past year compared with 18 per cent of those without a regular source of dental care [Jenny et al 1975; Kronenfeld 1979].

The results of the second International Collaborative Study (ICS II), which was undertaken from 1988-1992, have shown that there were large differences in the proportions reporting a visit between those who had and those who did not have a usual source of oral care, for adults at most sites and for children at some sites [Chen & Andersen 1997].

2.4.7 Receiving dental care in clinics

Clinic services usually target patient groups in the United States of America. Ethnic groups are found to be more frequent users of health clinics [Milone et al 1973].
2.4.8 Financing and prepayment

Providing health services relies primarily on the financing arrangements. Private fee-for-service payment or two-party arrangement is the traditional form of financing dental services. Third-party payment for dental services is payment to the dentist by an agency rather than directly by patient. When the government acts as the third party, the term more commonly recognised is the public financing of care. Private and public dental services rarely exist in pure form. Everywhere, health services involve some mix of private and public effort, although in widely varying proportions. [Burt & Eklund 1992].

Changing payment arrangements such as prepayment and insurance have an impact on the utilisation of services and the potential removal of some barriers to utilisation of dental services. Dental insurance has grown rapidly over the 1970s and 1980s. Prepayment appears to increase the proportion of persons visiting the dentist, particularly among selected occupational and age groups. The elderly are both the least dentally insured and the lowest dental care utilisers [Burt & Eklund 1992; Gift et al 1981; Lewis 1981; Newman & Larsen 1979].

The largest impact of prepayment system in the USA is on those who are already regular or irregular users of dental services rather than non-users [Galginaitis & Gift 1980]. Irregular attenders or persons who used dental care only if they feel pain, show an initial surge in dental visits after they entered the prepayment system, but do not appear to continue that high utilisation in the USA and California [Friedman 1970; Morehead et al 1971].
Kiyak [1993] found that a major beneficiary group of prepaid plans appeared to be children from low-income families and/or who had parents with little formal education. Utilisation rate for the elderly in the United States of America continued to be low whether they had dental insurance or not. Other researchers in the USA found that people who sought coverage on their own were more likely to visit a dentist than those who obtained it automatically as a benefit of employment. The amounts of care received were similar for both groups. The larger the portion of the premium paid by the employer, the fewer the number of visits [Avnet & Nikias 1967; Nikias 1969].

There was an increase in dental service output during that period (1970-1980s) of, increasing dental insurance. Changes in the mix of services provided had also occurred. The dental service mix provided in the late 1970s indicates a shift in American dental practice from reliance on routine restorative and removable prosthetic procedures toward greater utilisation of reconstructive procedures. In 1977, over 31 per cent of all dental expenditure were for fixed prostheses, a marked increase from earlier decades, and one that has been associated with the prevalence of dental insurance [Bailit et al 1979; Bailit et al 1984; Gotowka 1985].

Data from the National Oral Health Survey of Australia in 1987-88 were analysed and found that persons 35-44 years, with dental insurance, utilised dental services more and had less treatment requirements than those without dental insurance. The insured elderly had better utilisation patterns with more conservative dental treatment and better oral health, more teeth retained than the dentate non-insured [Barnard 1993; Sivaneswaran et al 1994; 1995].
2.5 SOCIO-PSYCHOLOGICAL FACTORS AND SOCIO-CULTURAL FACTORS AFFECTING UTILISATION OF DENTAL SERVICES

Some people attend dental clinics for preventive reasons without any symptoms of dental diseases. Some go to a dental professional only when they feel pain. Some do not use dental services although they have dental problems. Researchers have tried to explain these different patterns of dental service utilisations by using socio-psychological and socio-cultural models [Petersen & Holst 1995; Stronk et al 1998]. The more extensive the social networks persons are involved in the higher the probability is that they will utilise dental services and have better oral health status [Petersen & Nortov 1989; Rickardson & Hanson 1989].

Three inter-related and interdependent factors that have been proposed to explain socio-psychological model are motivation, perception and learning [Sheiham 1981].
2.5.1 Perception of needs/Presence or absence of dental symptoms

A number of studies have shown that perceived need and dental attitudes to be the most powerful predictors of dental care utilisation [Kiyak 1989]. Symptoms are defined as the patient’s description of the problem [Dworkin et al 1978]. Symptoms are acknowledged and experienced differently by individuals and influence behaviours differently.

Kasl and Cobb [1966] suggested in their illness behaviour and health behaviour models that if individuals view their symptoms as a threat and perceived that a visit to a professional is likely to reduce this threat, they will seek professional help. Social and cultural factors influence both the definition of a symptom as a threat and the value attached to a particular action. Age, gender marital status, racial group, and ethnic group all may influence the perception of symptom as a problem [Kasl & Cobb 1966].

As a perceived symptom constitutes a major determinant of self-care or provider-based care, a perceived symptom is a key variable in health studies [Feldman 1966]. Newman [1971] and Newman and Anderson [1972] indicated that a perceived symptom is the major explanatory reason for visits during the year.

The family, its kinship and friendship networks influence the manner in which individuals define and act upon symptoms or life crises [McKinlay 1972]. Medical sociologists have suggested that the particular symptoms acted upon are defined by the culture, ethnic or reference group [Zola 1973].
The perceived value of action is something that individuals learn from membership in a social group. Through a ‘lay referral’ system, which varies among social groups, individuals share experiences and seek advice on their symptoms and health problems from friends, relatives or family. Different social groups have different norms and values concerning recognition of symptoms and appropriate action [Petersen & Holst 1995]. A positive trigger to action may be internal in the form of a symptom or it may be external like a poster or social pressures [Sheiham 1981].

Mechanic [1968] has identified ten variables associated with the character of symptoms as follows:

1. The visibility, recognisability and perceptual salience of the symptoms;
2. The perceived seriousness of the symptoms;
3. The extent to which symptoms disrupt family, work and other social activities;
4. The frequency of the appearance of symptoms and their persistence or frequency of recurrence;
5. The tolerance thresholds of others who are exposed to the symptoms;
6. The knowledge, cultural assumptions and understanding of the person and relevant others;
7. Other needs or practical matters competing with the illness response;
8. Competing possible interpretations which can be assigned to symptoms once recognised;
9. Emotional barriers in the form of fear and anxiety which influence the choice of actions to deal with the problem; and
10. The availability, physical proximity, and the financial and/or emotional costs of taking various courses of action.
Specific symptoms may influence behaviours more than others, for example, loose incisors and retracted gums cause more concern than cavities, crooked teeth or bleeding gums [Schaub 1981]. A toothache alters quality of life enough to result in seeking professional care, more than other perceived oral symptoms [Gift 1996; Kressin 1996; Newman & Anderson 1972; Redford et al 1995; Schaub 1981].

Data from third National Health and Nutrition Examination Survey conducted in North Carolina demonstrated the relations among overall perception of dentition condition, self-reported treatment needs and clinically-assessed conditions. More positively perceived overall dentition condition was associated with clinical indicators of better oral health. Perceived overall condition of dentition was negatively associated with perceived treatment needs, but not associated with perceived need for preventive services among individuals whose overall perceptions range from excellent to fair [Gift 1997].

On the other hand, Anderson and Newman [1973] studied the people with various conditions who sought dental treatment. The data indicated that the mere presence of disease or symptoms, irrespective of their severity, was not sufficient to stimulate the seeking of professional dental care. Social and psychological and organisational factors are involved in the process that ends with a consultation.

In highly industrialised countries, utilisation of dental services is reported to be lower among disadvantaged population groups (eg, institutionalised elderly persons; persons with handicaps or disabilities; or chronically ill persons; or psychiatric patients) than
among other groups. In these groups, a substantial number of persons tend to visit the dentist mainly for symptomatic reasons [Petersen & Holst 1995].

Although research studies have shown age is the most powerful predictor of oral health care utilisation [Manga & Charette 1986], the perception of disease appears to assume more importance as a predictor of utilisation in areas where there is a higher unmet need [Barmes 1978; Kiyak 1989]. Perceived need and recent symptom experiences are the best predictors of dental care utilisation among elderly persons [Bordeur et al 1988, Holtzman et al 1990; Kiyak 1986, 1989; Wilson & Branch 1986].

Barnard [1981] studied the dental utilisation patterns of first year university students and found that the major reason for non-utilisation of dental services is low levels of perceived need or care.

In their study of American dental service utilisation between 1964-1974, Newman and Larsen [1979] concluded that the data appear to indicate perceived need, demographic and social factors showed medium importance while the family resource variable, particularly insurance coverage and family income showed the most important variables affecting utilisation. {Table 2, p 28}. 