2.5.2 Motivation

Slack [1981] stated that motivations and perceptions about frequency of the disease in the population and the seriousness of its consequences may be the important determinants of utilisation of health services.

McKinlay [1972] suggested three major principles on motivation. They are:

1. The extent to which people see the problem as having both serious consequences and a high probability of occurrence (individual susceptibility) and the extent to which they believe that some course of action is open to them which will reduce that threat, will effect the preventive and therapeutic behaviour relative to a given health problem.

2. Behaviour emerges out of the conflict among motives and among courses of action. Where motives themselves conflict and compete for attention, those that have the highest value or salience for the individual will actually be aroused.

3. Health related motives may not always give rise to health-related behaviour and conversely, health-related behaviour may not always be determined by health-related motives.

Kegeles [1961] found that although most people feel susceptible to dental disease, they do not consider it as serious. Therefore feelings of susceptibility have little motive strength in themselves and that salience or value explains the low priority of dental care for some people. Belief in the efficacy of preventive actions tends to be positively
associated with income and education [Kirscht et al 1966]. The low socio-economic groups are principally motivated by the need to exist. Their frequent life crises override considerations about dental health.

Knowledge about dental health and dental services has been considered an important prerequisite for utilisation of preventive and therapeutic services in the USA. However, researchers did not find a strong relationship between knowledge and beliefs on the one hand and behaviour on the other [Kriesberg & Treiman 1962; O'Shea & Gray 1968].

Perhaps knowledge is necessary but not sufficient for taking a dentally related action; motivations and perceptions about frequency of the disease in the population and the seriousness of its consequences, may be more important determinants of utilisation [Sheiham 1981].

A fear of painful, socially unacceptable and unattractive consequences may be a greater motivator of self-care behaviour in dental health than is the knowledge of how one can prevent dental disease. Even where there is availability of free care, motivation and incentives are essential to cause a significant increase in utilisation [Hughes & Legler 1979; Pelton 1972].
2.5.3 Attitudes toward oral health, money and the value of teeth

Attitude towards oral health has been suggested as an important variable and has been found to be related to the use of dental services [Kiyak 1993]. Attitudes appear to be more highly correlated with dental visits among those who have to pay for their own care [Davies et al 1987; Kiyak 1989]. Individual attitudes, knowledge and behaviours determine what a person knows about oral diseases and their prevention and control; how information is interpreted and decided upon; and what action is ultimately taken [Gift 1993].

One of the few studies conducted (IOWA survey) in the USA found that attitude variables had more predictive value than traditional socioeconomic values [Beck et al 1981]. Attitudes depend on financial status, value of teeth, presence or absence of dental symptoms, perception of need, preventive knowledge & behaviour [Dunning 1986].

Trithart [1968] studied the attitudes of underprivileged people and summarised as follows:

Castration complex: There is a reluctance to be at the complete mercy of the health practitioner. This is marked by reluctance to have a general anaesthetic or sedation for dental or surgical procedures.

Contradiction of common sense: Some dental or medical procedures such as the continuation of drug after acute symptoms have subsided seem to contradict common sense.

Coming in crowds: They tend to come in with family and friends.
The last-ditch effort: They often turn to medical or dental treatment by health professionals as a last resort after all individual efforts have failed.

If it hurts, you are a quack: They have the general feeling that medical and dental treatment should be painless.

Unclean or dirty feeling: The aseptic cleanliness of a dental office or clinic convey the feeling of personal uncleanliness.

The clinic was built there, not here:

Cold professional attitude: They value empathy as well as professional competence as an essential characteristic of the practitioner.

Difference in pain threshold: The pain threshold for those in poor health may be low.

Complication of the unknown: Fear of the unknown feeling is accentuated with disadvantaged people.

The pills don’t work: There is a tendency to expect immediate results from the administration of any drug.

Appointments not important: Appointments of any kind have never been an integral part of the lives of the underprivileged.

Teeth lost anyhow: There is a feeling that despite competent and conscientious personal and professional care, the ultimate loss of teeth is one of the natural vicissitudes of life.

Traditions: They usually have strong and deep-seated traditions

Kravits and Schneider [1975] indicated that race and income interact such that low-income blacks in the USA have the most negative attitudes toward health care and the lowest level of utilisation. Their attitude appeared to be more fatalistic and less
positive about the health care provider. The significance of attitude was underemphasized because such attitudes differ mainly among subcultural groups.

The findings of Miller and Kiyak [1980] also indicated the complex interaction of attitudes with socio-demographic variables in the USA.
2.5.4 Attitudes towards dentist and dental care

Generally, the public’s chief concerns are with the dentist’s personality and his skill in minimizing pain and fear of what may happen. They have the general feeling that medical and dental treatment should be painless [Trithart 1968]. Surveys in the United States of America and Finland have shown that behavioural components of the dentists’ professional competence and personal recommendation, such as communication and supportiveness were the most important [Lahti et al 1992].

Other important characteristics of the ideal dentist are quality of care and attention, friendliness, willingness to talk, sensitivity to children, trustworthiness, gentleness, caring attitude, concern about prevention and use of the latest equipment [Kriesberg & Treiman 1962; Lahti et al 1992; McKeithen 1966; Shuval 1970; Van Groenestijn et al 1980a, 1980b].

Parents of high socio-economic status cite professional competence as a reason for their satisfaction with the dentist, whereas parents of low socioeconomic status state a positive relationship between their child and the dentist as being most important in the USA [Jenny et al 1973]. Another study showed that high socio-economic status patients expect their “ideal dentist” to be first of all skilful and only later, friendly and informative. Patients of low socioeconomic status quote reassurance and friendliness as most important with professional skill rated lower [Van Groenestijn et al 1980b].

Dimatteo et al [1995] analysed the nationwide public opinion survey of adult Americans’ attitudes toward dentist. Approximately 85 per cent of respondents reported having at least a moderate degree of trust in dentists in general.
In the USA, dentists’ ethical conduct, effective diagnosis/treatment and communication with patients are highest on the list of importance. Of least, but still high, concerns were dentists’ expertise with the latest technology and their ability to cooperate with other health professionals. Sensitivity to pain and cost, as well as expertise in prevention received intermediate ratings of importance. The patients’ attitudes toward the skills and competence of the dentist, in combination with their orientation toward the value of oral health care have been found to be related to utilisation. Attitudes of parents toward the dentist and perceived need were more predictive than were socio-demographic or other attitudinal variables for children’s dental utilisation. [Gift & Newman 1979; Kegeles 1963a].

Research studies have shown that dentist/patient relationship affects utilisation. Some studies suggested that discrepancies between dentist’s values and beliefs and those of their patients might be a significant deterrent to dentist/patient relationships and, thus, utilisation. General satisfaction with dentists’ competence was found to be associated with utilisation. [Bailit et al 1974; Davies &Ware 1981].
2.5.5 Preventive knowledge and behaviour

Knowledge about dental health and dental services has been considered an important prerequisite for utilisation of preventive and therapeutic services. General preventive orientation may carry over to the use of dental services [Kriesberg & Trieman 1960b; Suchman & Rothman 1969; Tash et al 1969]. However, knowledge alone does not predict dental behaviour. A strong relationship of knowledge on one hand and behaviour on the other hand does not exist [Kriesberg & Treiman 1962; O'Shea & Gray 1968].

Kiyak [1981] found no relation between knowledge of prevention and home care and the use of services, in her study of lower socio-economic groups in the USA. A fear of painful, socially unacceptable and unattractive consequences may be a greater motivator of self-care behaviour in dental health than is the knowledge of how one can prevent dental disease.

2.5.6 Present-passive orientation

Using professional dental services and engaging in home oral health practices both assume a future orientation toward life events. There is some evidence that persons with a future orientation do use dental services more than those with a present-passive orientation [Kriesberg & Trieman 1960a].
2.5.7 Socio-cultural variables

In a sociological perspective, culture consists of all humanly created physical objects and patterns for thinking, feeling and behaving that are passed from generation to generation among members of a society. The culture within which an individual has been raised provides the individual with a body of knowledge about health and illness and about the kind of actions to take when some departure from normal functioning is observed [Locker 1989].

In all societies health cultures are found which influence how people tend to cope with health problems, either through contact and the formal health care system or by alternative lay health care practices. Differences may be observed between ethnic groups and also between members of different socio-economic groups. Reality is 'in the eye of beholder' and therefore what people see and understand about the world around them is shaped by their social experience [Berger & Luckmann 1967].

There are broad cultural differences in dental behaviour, attitudes and in the way in which people view dental aesthetics and good oral hygiene in general. Standards of oral hygiene, the cleanliness and health of the dentition and gums, the absence of discomforts and embarrassing blemishes, all these are related to central cultural ideals of body image and healthfulness [Davis 1987]. Lack of familiarity with appointments and other system characteristics are the cultural barriers.

Virtually, everybody suffers to some extent from caries or periodontal disease, and yet for only a minority is the interference with normal social activities such that disease related signs and symptoms prompt a visit to a dentist. Furthermore, the way in which
these signs and symptoms are filtered is again a social process: oral discomfort, bad breath, packing of food, these are likely to be the cues for action rather than any ‘objective’ assessment of the underlying biological condition [Davis 1987]. Except for a few cases of extreme oral pain, dental problems do not normally threaten a person with sickness or social incapacity [Gerson 1972].

Social factors determine oral health in patterns of active prevention and self-care. The procedures and the philosophy of conscious self-care and prevention in oral care seem to be widely diffused in the population [Silversin & Kornacki 1984]. Oral preventive practices vary strongly by social group and reflect powerful society-wide cultural influences that are probably more closely linked to grooming behaviour and cultivation of body image than they are to maintenance of health [Davis 1987].

Among low-income groups, Caucasian patients in the USA were better informed about the causes and consequences of dental disease, but were less likely to perform appropriate health care behaviours than Pacific Asians. Asians are more concerned about the aesthetic and social consequences of poor oral health and more likely to describe pain as an outcome of dental disease [Kiyak 1981].

Oral health care service utilisation is found to be related to cultural factors in a number of studies. Ismail and Szpunar [1990] surveyed the Mexican-Americans and found that persons with a low acculturation level were significantly less likely to have dental insurance and to have visited a dentist than Mexican-Americans with a high acculturation level.
The study of immigrants and oral health care services in Denmark showed that Turkish, Pakistani and other immigrants had lower levels of utilisation compared with Danish children [Heidmann & Christensen 1985].

Garcia and Juarez [1978] studied the utilisation of Chicanos and Anglos in the USA. Chicanos not only underutilised dental services, but also used services primarily for problems of a symptomatic nature. This was significant even with other variables such as socioeconomic status were held constant.

In their study in Japan, Domoto et al [1988] observed the dental behaviour of Japanese and American patients. The prevalence of dental fear in Japan appears to be higher than among the American populations. Although Japanese showed a higher tendency to delay appointments because of fear, they were found less likely to cancel once the appointment was made, due to their strong sense of obligation to authority figures.
2.5.8 Orientation of parents

Current individual perception of teeth and dental care is influenced by many factors. These include: 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 socioeconomic conditions of the child’s family [Antoft 1983].

Socialisation of the child regarding oral health care and dental visits and orientation of parents has been shown to affect adult utilisation behaviour. Children introduced to dentistry at an early age are more likely to develop a more preventive dental health orientation than those who first visit the dentist later in life [Durward & Wright 1989; Kriesberg & Treiman 1960b].

The influences of parents’ preventive practices on children’s practices appeared to be stronger than either income or education of parents [Metz & Richards 1967]. It has been found that regardless of social class, education of mothers to provide good examples seemed to be the key to changing children’s dental health practice. Patterns of behaviour learnt during early childhood are deeply ingrained and resistant to change and mothers have a primary role to this situation in the USA [Baric et al 1974; Kriesberg & Treiman 1962; Rayner 1970].
2.6 PREDICTORS FOR USING DENTAL SERVICES

Research studies have shown that age is the most powerful predictor of oral health care utilisation [Barnard 1993; Manga & Charette 1986]. On the other hand, 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].

American data suggest that income is a better predictor of dental utilisation than it is of medical and hospital services use [Wolinsky 1978]. The analysis of the data from the Youth Dental program in Denmark has shown that younger age and higher income groups are more likely to see a dentist. The best predictors of who will seek and obtain dental treatment are (1) whether their mother sought out dental treatment and (2) whether the individual went to a dentist as a child [Petersen 1981].

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].

Different associations are shown in combining results from participating study sites in the International Collaborative Study of Dental Manpower Systems in Relation to Oral Health Status conducted during 1973-1981. Utilisation is an important predictor only in those systems which are unstructured, that is, systems in which there is no fixed system which enables or even requires regular checkups and treatment. For example, Japan, Australia and Federal Republic of Germany have open-structured systems for all aged groups. It became evident that utilisation is a poor predictor of
oral health status in sites where there are structural dental programs, such as in New Zealand and Norway [Arnjolt et al 1985; Cohen 1976].

Even if cost or payment is no longer a problem, there is still a large group of people who do not perceive themselves as patients, or who do not realise that they need to be patients (self perception of need for care), or who do not even want to be patients [Miller 1973; Newman & Larsen 1979]. The belief that one is susceptible to dental disease and that disease will have serious effects have been identified as important factors in predicting utilisation of dental services [Kegeles 1961, 1963a, 1963b].

The analysis of the data from the Youth Dental program in Denmark has shown that there was decrease in the utilisation as age increased. The result also indicated that the best predictors of adult visits were: high occupational level; young age; being a non-shift worker; having teeth; having a realistic perception of scheduling problems; and living in an urban area. Other indicators are living conditions and the structure of dental delivery system which influence the regular use of the dental visits [Petersen 1981].

Socio-economic status is directly related to use of dental services; utilisation of dental service increases as social status increases. High socio-economic group persons with more extensive social network and white collar workers were more likely to have the higher the probability of increased utilisation of dental services [Barnard 1993; Burt & Eklund 1992].
2.7 REASONS FOR NOT USING DENTAL SERVICES/ BARRIERS TO ORAL HEALTH CARE

The major reason for non-utilisation of dental services is low level of perceived need or care. Having no teeth was a major reason in earlier decades. The presence of a dental condition means that individuals are much more likely to visit a dentist than if they have no conditions or at least no perceived conditions. The major reason given by first year Australian university students for not visiting a dentist was 'no need' [Barnard 1981].

Low priority given to treatment, preference for folk medicine, suspicion of innovative ideas, fatalistic attitude, and physical or mental impairments to dental care are some of the barriers for utilisation [Gift 1984].

Other reasons given most often for not visiting a dentist [Gift 1984; FDI 1986, 1998] include:

* perceived inevitability of tooth loss;
* less positive attitudes toward preservation of teeth;
* access problems (for example: travel time, waiting time, inconvenience of appointment times);
* lack of knowledge about the system;
* expenses, cost of dental care and indicators of a lower quality of life (ie, weak social network or support, passive lifestyle in general);
* dental fear or anxiety (elderly and small portion of population);
* being too busy;
* the opinion that the cost is too high for the return;
* problems related to work (losing wages);
* a generally low priority given to visiting dentist;
* not wanting to bother other people and
* feeling that one was too old.

According to FDI [1986; 1998] the barriers to oral health care can be classified by illustrating the role of the dental profession and its interaction with: (1) the individuals; (2) society; and (3) government. Barriers referring to individuals include: lack of perceived need; anxiety or fear; and lack of access; apart from the financial considerations. Barriers associated with the dental profession include: inappropriate manpower resources; uneven geographical distribution; training inappropriate to changing needs and demands; and insufficient sensitivity to patient attitudes and needs. Barriers referring to society are: insufficient public support of attitudes conducive to health; inadequate oral health manpower planning; and insufficient support for research. Barriers with reference to government are: lack of political will; inadequate resources; and low priority.

Issues such as price, income, time and distance from services are considered to be barriers to dental service utilisation. Being elderly, being poor, having lower education levels, and being a black or Hispanic continue to be risk factors for having fewer dental visits in the United States [Hayward et al 1989].

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.
Among the elderly, 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. [Petersen & Holst 1995; Smith & Sheihman 1980].

Research data has shown that cost of dental service is the most frequently cited barrier to receiving dental care in industrialised or non-industrialised countries [Davies & Schwarz 1994; Douglas & Cole 1979; Grembowski et al 1988; Slack 1981]. Surveys among the elderly population in Britain, which has a nationalized, almost free, dental health service, found that the cost of dental care was a deterrent to a proportion of adults [Slack 1981].

In the 1994 National Dental Telephone Interview Survey, in Australia, nearly a quarter of a random sample of persons aged five years and over reported that they had avoided or delayed visiting a dental professional in the last twelve months because of cost. Some 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 1998b]. The cost of dental services is especially relevant to adults due to the limited availability of care for those adults unable to afford dental services in the private sector.
2.8 DENTAL INSURANCE AND UTILISATION OF DENTAL SERVICES

One of the features of the most frequent users of dental services in the United States of America is dental insurance coverage [Burt & Eklund 1992]. Non-white, poor, uninsured, less educated and rural portions of the population have lower rates of utilisation of oral health services than do whites and those with economic advantages and access [Gift 1993]. Higher income families have greater rates of insurance coverage than do lower-income families. There is lower dental insurance coverage among persons aged 65 and above [ABS 1994c; Barnard 1993; Grembowski et al 1985; Manning et al 1985; Slade 1993; Waldman 1989].

Insurance is one of the main methods which either help the participant to share catastrophic risks with other people, help him to spread his own health bills over a long period of time, or help to channel financial aid to him from an outside source. Generally, insurance consists of a group of unconnected individuals paying premiums at regular intervals to compensate any subscribing individual for a catastrophic loss [Locker 1989]. In developing countries, nationally organised health insurance programs are commonly agreed to present a number of important equity problems [Janovsky 1996].

In health care insurance, there may be unpredictable events and medical expenses may be large. Dental Expenses are predictable. Payment for services is made through some agency. Coverage for dental expenses emerged as an area for negotiation by labour groups as additional fringe benefits. Although the dental health costs are rarely catastrophic to the individual's finance, the use of insurance for dental services is
growing in popularity. However, the individual with a health insurance policy, will tend to demand more than he/she would if uninsured.

In the United States of America, the agencies involved for dental insurance are mostly private sector third-parties. Petersen & Holst [1995] found that the children of United States of America, in higher income families, have greater rates of insurance coverage than do children in lower income families. They stated that for all age groups of children, dental insurance seemed to be a positive factor in: the use of dental services; total number of visits; checkup visits; and level of oral health as measured by decay. In the Rand Health Experiment [1972-1984] conducted in the USA, younger persons, those with lower incomes, and those with less generous dental insurance were less likely to see the dentist than were other more advantaged individuals, regardless of underlying differences in oral health, perception, attitudes and regular source of care. That experiment also studied the reduction in the level of cost sharing. Data has shown that when a person pays less and insurance pays more, it resulted in greater demand for oral health care services. Insurance therefore increased the probability of a dental visit [Davies et al 1985; Davies et al 1987; Manning et al 1985].

Utilisation of dental services can be measured by the quantity of dental services ultimately consumed or purchased [Feldstein 1973]. It is a result of decisions arrived at jointly by the patient and the dentist [Grytten 1991; 1991a; 1992]. Consequently, utilisation rate is considered complete only if quantity of services provided is translated to cost.

Cost can affect utilisation either if the price of the service is considered high or if
the amount of disposable income for buying the service is low. Price is a statistically significant determinant of utilisation of dental services, but estimates of the price elasticity of demand for dental care vary widely [Yule & Parkin 1985].

Studies conducted in the USA have suggested that demand for dental services will decrease from between 30 to 40 per cent when the price of dental care goes up by 10 per cent. When income increases by 10 per cent, demand increases from 10 per cent [Holtman & Olsen 1976] to 170 per cent [Feldstein 1973]. However, even when cost barriers are reduced, wide variations still remain in the utilisation of dental services [Kegeles 1963; Nikias 1968] because social, cultural and demographic factors are such important determinants [Slack 1981].

Utilisation is sensitive to differences in insurance coverage and varies considerably. Some of this variability is attributable to population differences, since there is evidence that price and coinsurance elasticities vary with age, income, the degree of insurance coverage, and other socio-economic characteristics [Yule & Parkin 1985]
2.8.1 Sources of finance for health care

Financing reflects how the money gets into the system. It is quite possible for health services to be: publicly financed (government revenues); or privately provided [Andersen et al 1995]. Financing and provision interact, and policies to promote private provision of health services are likely to increase finance as well. Financing systems range from market-based to centralised tax-financed national health services systems with mixed systems in between the two extremes [Evans 1981]. Although it varies throughout the world, the structure of payment plans affect the quantity and quality of oral health services, as well as their costs [Andersen et al 1995; Anderson & Newman 1973; Dunning 1986; Davis 1980; Gift 1984, 1993; Gift et al 1981, 1990; Slack 1981].

There are three aspects to an event, which make it particularly attractive for insurance coverage [Dunning 1986]:

(1) Unpredictibility for the individual;

(2) Predicability among large numbers of individuals; and,

(3) A financial burden of the catastrophic size if payment falls due all at one time.

The basic principles of insurance state that to be insurable, a risk must:

* Be precisely definable;

* Be of sufficient magnitude that if it occurs, it constitutes a major loss;

* Be infrequent;

* Be of an unwanted nature, such as destruction of a home through fire;

* Be beyond control of the individual;

* Not constitute a ‘moral hazard’, which means that the presence of insurance itself should not lead to additional claims. [Faulkner 1959].
Three principal types of insurance are:

(1) Government or social insurance;
(2) Private insurance;
(3) Employer-based insurance. [Gift et al 1997].

**Health insurance** is a system in which prospective consumers of care make payment to a third party in the form of an insurance scheme, which in the event of future illness will pay the provider of care for some or all of the expenses incurred. Health insurance is a mixed source of finance, as it often draws contributions from both employers and employees, and sometimes from government. A health insurance policy provides coverage over a defined area of potential health care costs [Tuominen 1994].

Most commonly, health coverage is restricted by: high premiums; a problem exacerbated by cost inflation; and even where coverage is universal in theory, unequal distribution of suppliers prevents equitable outcomes [Kutzin & Barnum 1992]. Government subsidies often constitute substantial proportions of financing for the schemes, and therefore imply a subsidy to better-off groups. In some schemes, further inequities follow from the presence of high co-payments, which imply decreased accessibility to the poorer among the insured [Dahlgren 1991; Yang 1991].

Private health insurance organisations offer ancillary benefits in which dental plans are packaged with other ancillary covers, such as chiropractic, dietetic, optical, ophthalmic, physiotherapy, pharmaceutical, podiatry, psychology, aids and appliances and ambulance services [ABS 1994c].
Douglas & Cole [1979] indicated the characteristics of particular population groups who come under dental insurance coverage. These are:

* The effect of dental insurance coverage varies with the socioeconomic class of the insured population;

* Groups who voluntarily purchased dental insurance had the highest utilisation rates as might be expected;

* Marketing and enrolment characteristics of the plan did affect utilisation substantially; and

* After an initial marked increase, utilisation rates declined as the length of time of coverage increased, with the resulting rates being 5 to 10 percentage points above the prebenefit rates; for example, a group might go from 39 per cent to 49 per cent utilisation.

In the United States of America, the agencies involved for dental insurance are mostly private sector third-parties: such as contract provider organisations; group capitation programs; independent practice associations; dental plans sponsored by professional dental associations; and health maintenance organisations [Burt & Eklund 1992; Jong 1993; Striffler 1983].

There was a rapid expansion of dental insurance coverage in the United States of America in the 1970s, from 40 to 60.3 million persons. It was accompanied by a 12 per cent annual rise in the dental component of the Consumer Price Index, and 16 per cent annual increase in dental expenditures per capita [Gibson & Waldo 1981].
2.8.2 Expenditure on health and dental services and sources of funds in Australia

Traditionally oral health care services are provided on a fee-for-service basis in Australia. Dental services are provided predominantly through the private sector with 82 per cent of dentists in private practice [AIHW DSRU 1996b]. Less than 20 per cent of dentists were being employed by Government or other services. For the dentate population in Australia four out of every five visits made annually were to a private dental practitioner [AIHW 1998b].

In private dental practice, rates of services per visit have changed between 1983-1984 and 1993-1994, reflecting changes in oral health and population demographics. Over this period there were increases in rates of diagnosis, preventive, endodontic (root canal), crown and bridge, general/miscellaneous, and orthodontic services, and decrease in rates per visit of prosthodontics (denture) services [Brennan 1997].

There is no universal coverage for dental services in Australia. There are some government-funded schemes for specific beneficiaries, such as Pensioner Dental Scheme and Veterans' Affairs Dental Scheme. All states and territories have some publicly funded dental care for the adults who hold a Health Care Card, Health Benefit Card, Pensioner Health Benefits card or for the adult dependant of a card holder [Dooland 1992].

Public subsidy towards dental costs is limited, with 89% of total dental costs met privately either through out of pockets payments by individual or through private
health insurance arrangements. The dental insurance is mostly marketed by non-profit health benefit organisations as an ancillary benefit [Spencer & Lewis 1988].

In 1960-61, Australia spent about 5% of its Gross Domestic Product (GDP) on health, by the mid 1970s it exceeded 7.5% of GDP and has remained between 7.5% and 8% since then. In the mid 1980s most developed countries had showed a levelling off in health expenditure, except USA where health expenditure continued to rise and to about 12% of GDP in 1989 [Figure 9][AIH 1992; AIHW 1996b; OECD 1995].

In 1990-91, health expenditure by Australian Government and individuals were $31,132 million. Total health expenditure can be classified into Commonwealth Government, State and Local Government and private components [Table 3]. The Commonwealth components include the Medicare compensation grants, which the Commonwealth contributes to the States for their hospitals. Spending by the private sector includes most of the expenditure on private hospitals and dental (and other professionals) services [AIH 1992; AIHW 1996b; Donovan 1995].
Figure 9: Health expenditure for Australia and selected OECD countries as a percentage of GDP, 1970-1994.

Table 3 gives a useful summary of the health services provided in Australia and the relative importance of dental services as measured by the amount of money spent on it. That is only 5.1 per cent of total health expenditure. The classification by sources of funds also yields a measure of the relative importance of the Commonwealth and State Governments and of the private sector, in the financing of health services provision. [AIHW 1996b].

Table 3: Total health expenditure by sources of funds, 1990-1991 ($ million).
Source: AIHW 1996b [Modified].

<table>
<thead>
<tr>
<th>Public sector</th>
<th>Private sector</th>
<th>Total</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Common-</td>
<td>State/</td>
<td>Health</td>
</tr>
<tr>
<td></td>
<td>Wealth</td>
<td>local</td>
<td>insurance</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>funds</td>
</tr>
<tr>
<td>Total health</td>
<td>13,219</td>
<td>7,992</td>
<td>21,211</td>
</tr>
<tr>
<td>Expenditure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total recurrent</td>
<td>12,991</td>
<td>6,743</td>
<td>19,734</td>
</tr>
<tr>
<td>Expenditure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dental services</td>
<td>33</td>
<td>62</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Percentage of total health expenditure by sources of funds from 1982-83 to 1993-94, can be seen in Table 4. Since 1984-85, the proportion of total expenditure funded by government has fallen from 72 per cent to 67 per cent in 1993-94. Private sector expenditure was 35 per cent in 1982-83 and decreased to 28-29 per cent during 1984-88, and then steadily increased and reached to 33 per cent in 1993-94 [AIHW 1996b].
Table 4: Public and private sector expenditure as a proportion of total health expenditure, 1982-83 to 1993-94 (current prices) (per cent)

Source: AIHW 1996b.

<table>
<thead>
<tr>
<th>Year</th>
<th>Commonwealth</th>
<th>State and local</th>
<th>Total</th>
<th>Private sector</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982-83</td>
<td>38.4</td>
<td>26.9</td>
<td>65.3</td>
<td>34.7</td>
<td>100.0</td>
</tr>
<tr>
<td>1983-84</td>
<td>38.3</td>
<td>26.5</td>
<td>64.7</td>
<td>35.3</td>
<td>100.0</td>
</tr>
<tr>
<td>1984-85</td>
<td>46.1</td>
<td>25.8</td>
<td>71.9</td>
<td>28.1</td>
<td>100.0</td>
</tr>
<tr>
<td>1985-86</td>
<td>45.8</td>
<td>25.9</td>
<td>71.7</td>
<td>28.3</td>
<td>100.0</td>
</tr>
<tr>
<td>1986-87</td>
<td>44.3</td>
<td>26.4</td>
<td>70.8</td>
<td>29.2</td>
<td>100.0</td>
</tr>
<tr>
<td>1987-88</td>
<td>44.0</td>
<td>26.0</td>
<td>70.1</td>
<td>29.9</td>
<td>100.0</td>
</tr>
<tr>
<td>1988-89</td>
<td>42.6</td>
<td>26.0</td>
<td>68.6</td>
<td>31.4</td>
<td>100.0</td>
</tr>
<tr>
<td>1989-90</td>
<td>42.2</td>
<td>26.3</td>
<td>68.5</td>
<td>31.5</td>
<td>100.0</td>
</tr>
<tr>
<td>1990-91</td>
<td>42.3</td>
<td>25.8</td>
<td>68.1</td>
<td>31.9</td>
<td>100.0</td>
</tr>
<tr>
<td>1991-92</td>
<td>42.7</td>
<td>25.0</td>
<td>67.8</td>
<td>32.2</td>
<td>100.0</td>
</tr>
<tr>
<td>1992-93</td>
<td>43.6</td>
<td>24.3</td>
<td>67.8</td>
<td>32.2</td>
<td>100.0</td>
</tr>
<tr>
<td>1993-94</td>
<td>45.1</td>
<td>22.2</td>
<td>67.3</td>
<td>32.7</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Dental expenditure in Australia for 1993-1994 was $1,831 million. Only $197 million (11 per cent) was spent in the public sector, $539 million (29 per cent) was paid out from the health funds for those who had dental insurance and the majority expenditure of $1089 million (59 per cent) was direct out of pocket payments from individuals [AIHW 1996b].

Figure 10 shows recurrent expenditure for 1993-94 according to the source of that expenditure: Commonwealth, State and local government, or private. Private sector is the greater proportion of the dental and other professional services.
Figure 10: Recurrent health expenditure at current prices, Australia, 1993 - 94.

Source: AIHW 1996b.

(a) Other expenditure includes public psychiatric hospitals, ambulance, aids and appliances, and other expenditure not elsewhere classified.

(b) Public acute hospital expenditure includes recognised public and repatriation hospital expenditure.
2.8.3 Health insurance in Australia

Health insurance in Australia developed from formation of the first “friendly societies” in Sydney in 1831. The friendly societies provided members with weekly sickness or unemployment benefits, funeral benefits and medical attention from their own doctors. Members paid regular contribution, including payment towards the doctors’ salaries, which were based on the capitation fee system. In 1905, more than a quarter of Australia’s population was covered by friendly society schemes. Doctors in New South Wales established a Medical Benefits Fund, which was opened to public subscription in 1947 and reimbursed the medical expenses of contributors on a fee-for-service basis. [AGPS 1978].

The first government sponsored health insurance program in Australia, the Earle Page voluntary scheme was introduced by a Liberal-Country Party Coalition Government, in 1953. It was primarily a method whereby the Commonwealth Government subsidised private insurance by meeting part of the cost of the rebates for medical expenses. The scheme was administered by private, non-profit health funds, under condition established by a national health program [AGPS 1978; Palmer & Short 1989].

The National Health Act of 1953, strengthened legislation on hospital and medical benefits. The Government encompassed also the Pharmaceutical Benefits Scheme and the pensioners, widows and tuberculosis patients (and the dependents of these groups). Medical and hospital benefits were covered by a voluntary health insurance scheme, in which the Government subsidised voluntary insurance, hospitals and other institutions. The patient who was a health fund member also paid a proportion of the bill directly [AGPS 1978].
In July 1975, Medibank, a compulsory national health insurance scheme for the whole population, began under Labour Government. It covers 85 per cent of the medical benefits schedule fee for a specified range of services by medical practitioners. Health insurance funds cover private hospital, the gap between the medical benefit schedule fee and the commonwealth rebate and other extras not covered by Medibank [AGPS 1978; McGuire et al 1988].

The present National Health Insurance Scheme, Medicare, was introduced in February 1984. It is universal tax-funded health insurance, administered by the Health Insurance Commission. Through Medicare, all Australians are insured for medical services and by arrangements with the States, for public hospital services free at point of delivery [AIH 1988, Grant & Lepsley 1993].

In the early 1980s, the proportion of the population covered by private insurance was between 60 to 70 per cent. The proportion of people holding private insurance was 68 per cent in 1982 and 65 percent in June 1983. It had fallen from 53 per cent in March 1986 to 49 per cent in 1989. Private health insurance coverage in 1983 was 64 per cent of income units. It had fallen to 47 per cent of income units by 1986 [ABS 1992a, 1992b, 1994c; Donovan 1995].

The decline was rapid in anticipation of and after the introduction of Medicare in February 1984. The subsequent decline was slower, 0.8 percentage points per year from June 1984 to June 1989. [ABS 1992a, 1992b]. By June 1992, people covered by private health insurance represented 48 per cent of the population, with the level falling continually to 38 per cent in December 1993. Only 34 per cent of the
population held health insurance in December 1995. In June 1992, it was estimated that an additional 5 per cent of the population had ancillary insurance only, which caters largely for the provision of services not funded under Medicare. [ABS 1993c, 1994c].

Health Insurance Funds in 1989 were about 60. In the 1990s the private health industry contributed $2.7 billion annually towards the cost of the health care system.
At 30 June 1991, there were 52 organisations operating 71 non-profit health insurance funds and 2 organisations operating funds on a for-profit basis. [ABS 1992a, 1992b, 1994c].

Under Medicare legislation, all registered private health insurance organisations are required to offer a basic private table providing benefits in public hospitals equal to the public hospital charge, and benefits towards the cost of private hospital accommodation. Private health funds also offer extensive supplementary tables to cover single room accommodation and ancillary benefits for services such as theatre fees, dentistry, physiotherapy and home nursing. [ABS 1992a, 1992b, 1994c].

Since the introduction of Medicare in 1984, private health insurance funds have not provided coverage of medical practitioner services outside hospitals. Private insurance pays benefits for services received by private patients in both private and public hospitals. It is available in two forms: basic and supplementary. [AIHW 1994b].
The basic hospital table provides full coverage for standard facilities for private inpatients of recognised public hospitals and partial coverage for private hospitals and day hospital facilities. It also provides coverage of the gap between Medicare benefits
and schedule fees for services received by private patients in both private and public hospitals. [AIHW 1994b].

The supplementary hospital tables provide additional hospital accommodation benefits to cover the higher charges of private hospitals and the extra charge for private rooms in public hospitals. The distinction between basic and supplementary hospital tables ceased from July 1997, when other changes were also made. [AIHW 1994b].

Since October 1995, individual private health funds and private hospitals have been able to make agreements so that a patient insured with the fund will be fully reimbursed for charges by the hospital. Individual private health funds and doctors have also been able to make agreements on fees charged to insured patients in hospital. [AIHW 1998b].

Ancillary health insurance mainly provides cover for services not funded by Medicare although some such services are provided at no, or low, cost to certain sections of the population (eg holders of government health concession cards). [AIHW 1994b].

From the data of the 1989-90 National Health Survey in Australia, the characteristics found to effect the chances of an income unit having private health insurance are: State and Territory; income; age; income unit type; self-assessed health and happiness; number of long term conditions; whether has a government health card [ABS 1992a].
Age and income were found to be strongly related to the likelihood of an income unit having private health insurance. An income unit comprises a head and all persons in the same family who are assumed to be dependent on the head. Overall, the higher the income of a unit and the older the head of the unit, the higher the probability that the unit was insured. For age, the association with private health insurance was only evident after controlling for the effect on age of income and the possession or otherwise of a government health card. The lowest probability of having private health insurance was found for units, which had a government health card [ABS 1994c].

Age is a prime determinant of demand for private health insurance. Private health insurance coverage generally increases with age. Declines in coverage among younger people continue, but coverage where the head of the contributor unit was aged 60 and over increased from 1986. [ABS 1994c].

The data of the National Oral Health Survey conducted in 1987-88, has shown that the elderly group had less private dental insurance, that is 26 per cent, compared to the overall average of 46 per cent, and was much more dependent upon government than other adult groups. More persons in the extra-metropolitan area indicated that they held private dental insurance than the persons in capital [Barnard 1993]. Other data indicated that the proportion of those with hospital insurance who are 65 years and over has increased from 10 per cent in June 1990 to 13 per cent in June 1995. The elderly are comparatively heavy users of hospital services. However, of those contributor units where the contributor was aged 65 years or more in 1992, 61 per cent had no private insurance. While this is due in part to the generally lower incomes of elderly group, many also had access to government health
concession cards (79 per cent). Seventy four per cent of those not covered by government insurance had private insurance [ABS 1994c].

Type of private health coverage also varies with age. Persons aged 35-64 years were four times more likely to have ancillary only insurance than those aged 65 years or more [ABS 1994c].

Health insurance is highly related to income; the level of private health insurance coverage increases with increasing income. A greater variation in coverage occurs across income groups than across age, family status, or health status groups. Those who earn more than $1000/week in 1988 were twice as likely to have taken out health insurance as those earning less than $400/week [ABS 1989].

In 1992, 24 per cent of people (637,000 persons) in contributor units with low incomes (less than A$240 gross a week) were covered by private insurance compared to 68 per cent (4.6 million persons) of those in contributor units with high incomes (A$600 or more gross a week)[Figure 11]. Of all persons in contributor units with private health insurance 8 per cent were in low-income units, 33 per cent in middle-income units and 59 percent in high-income units [ABS 1994c].
A more complicated pattern was revealed when age and income are combined as factors involved in private health insurance coverage. In general terms, private health insurance coverage increases with age and income (Table 5). In 1992, the youngest, low-income contributors had the lowest level of private health insurance coverage at 21 per cent and the oldest, high-income units had the highest at 84 per cent. [ABS 1994c].

The proportion of people with private health insurance was higher among middle-aged contributors than among young or old contributors. Private health insurance coverage increased for each age and income group except the oldest, middle-income group whose level of coverage was lower than that of middle aged, middle-income units. Contributor units with high incomes were more likely than other groups to have combined hospital and ancillary insurance, 77 per cent compared to 59 per cent of low-income groups. [ABS 1994c].

Contributor units consisting of couples (with or without dependent children) had the highest levels of private health insurance. In June 1988, the insurance coverage was
relatively higher for those in traditional families (62 per cent of households consisting of a contributor, partner and dependent children) than single persons (39 per cent insured) and sole parents (23 per cent insured). In 1992, cover was over 50 per cent for couples while those consisting of one contributor and dependent children had the lowest of 23 per cent [Table 6], [ABS 1994c]. The low prevalence of health insurance among sole parents partly reflects their economic situation and partly the failure of the health insurance funds to introduce special tables for non-traditional families [ABS 1994c].
Table 5: Contributor unit income by age of contributor, 1992

Source: ABS 1994c {Health Insurance Survey}

<table>
<thead>
<tr>
<th>Income</th>
<th>15-34 years</th>
<th>35-64 years</th>
<th>65 years and over</th>
<th>Total '000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'000</td>
<td>'000</td>
<td>'000</td>
<td>'000</td>
</tr>
<tr>
<td>Low-income (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privately insured</td>
<td>194.5</td>
<td>134.9</td>
<td>180.1</td>
<td>509.5</td>
</tr>
<tr>
<td>Not insured</td>
<td>717.7</td>
<td>456.7</td>
<td>468.9</td>
<td>1643.3</td>
</tr>
<tr>
<td>Middle-income (b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privately insured</td>
<td>516.2</td>
<td>578.5</td>
<td>256.6</td>
<td>1351.3</td>
</tr>
<tr>
<td>Not insured</td>
<td>1006.5</td>
<td>753.7</td>
<td>361.8</td>
<td>2132.0</td>
</tr>
<tr>
<td>High-income (c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privately insured</td>
<td>497.9</td>
<td>1116.5</td>
<td>73.2</td>
<td>1687.7</td>
</tr>
<tr>
<td>Not insured</td>
<td>347.3</td>
<td>461.1</td>
<td>14.0</td>
<td>822.5</td>
</tr>
<tr>
<td>Total(d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privately</td>
<td>1252.3</td>
<td>1962.5</td>
<td>562.0</td>
<td>3776.8</td>
</tr>
<tr>
<td>Not insured</td>
<td>2141.3</td>
<td>1764.5</td>
<td>872.2</td>
<td>4777.9</td>
</tr>
</tbody>
</table>

Table 6: Proportion of contributor units with private health insurance, 1992

Source: ABS 1994c {Health Insurance Survey}

<table>
<thead>
<tr>
<th>Income</th>
<th>Contributor and dependent children</th>
<th>Contributor only</th>
<th>Contributor and partner</th>
<th>Contributor partner and dependent children</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Low-income (a)</td>
<td>11.2</td>
<td>23.6</td>
<td>37.2</td>
<td>38.0</td>
<td>23.7</td>
</tr>
<tr>
<td>Middle-income (b)</td>
<td>22.8</td>
<td>42.8</td>
<td>38.8</td>
<td>34.4</td>
<td>38.8</td>
</tr>
<tr>
<td>High-income (c)</td>
<td>57.0</td>
<td>63.8</td>
<td>67.8</td>
<td>69.4</td>
<td>67.2</td>
</tr>
<tr>
<td>Total(d)</td>
<td>23.3</td>
<td>37.9</td>
<td>51.6</td>
<td>44.7</td>
<td>44.1</td>
</tr>
</tbody>
</table>

Less than $240 gross per week.
$240 - $599 gross per week.
$600 or more gross per week.
Includes income not known.
Couples with dependent children were more likely than other types of contributor units to have hospital and ancillary cover while couples without dependent children had the highest rate of hospital cover only [ABS 1994c], {Figure 12}.

**Figure 12**: Contributor units with private health insurance.

**Source**: ABS 1994c [Health Insurance Survey]

The percentage of Australian population, who had basic private hospital insurance, varied across States. New South Wales, where there was an increase in coverage following a doctors' dispute in 1984, experiencing a net decline of only 1.8 per cent to June 1989. The small decline of 4.1 per cent in Queensland may reflect history; membership of health insurance funds in Queensland had been low before February 1984 because for decades the State provided public hospital services free to all. [ABS 1994c].

In contrast, Western Australia and South Australia experienced declines of 11.3 per cent and 7.9 per cent over this period. After 1989 the Australian average decline increased to 1.7 percentage points per year. Again the decreases varied. Coverage fell
16.7 percentage points from 50.8 per cent to 34.1 per cent in Victoria. Queensland experienced a small net decrease of 0.6 percentage points over the same period. [ABS 1994c].

Although there has been convergence of the proportions in each State with private health insurance, significant geographical differences within States remain. The availability of private hospitals may partly explain them, especially between the non-metropolitan areas, where coverage is lower, and the metropolitan areas, where it is higher. [ABS 1998b].

Basic table membership has declined since Medicare was introduced. Some had it transferred to supplementary table membership, which has shown three main phases since the introduction of Medicare. From 1984 to 1987 the proportion of the Australian population with supplementary cover increased by 8.3 percentage points, from 30 per cent to 38.3 per cent. This was largely due to a 14.5 percentage points increase in New South Wales (from 24.2 per cent to 38.7 per cent). [ABS 1998b; Donovan 1995].

In the second phase, from 1987 to 1990, the national proportion with supplementary cover increased by 1.1 per cent, an average increase of 0.4 per cent a year. This was the net result of increases in New South Wales and Victoria, stability in Queensland and South Australia, and declines in Western Australia and Tasmania. Lastly, from December 1990 to June 1995 there was a decline of 6.7 percentage points in national supplementary cover (from 38.4 per cent to 32.7 per cent of the population), again with variations from State to State. [ABS 1998b].
In 1990, families with two adults and dependent children were most likely to have private health insurance (62 percent of such families), followed closely by families with a contributor and partner only (55 per cent of such families). One-parent families were least likely to have private health insurance (26 per cent). However the coverage rate ranged from 19 per cent of one-parent families to 47 per cent of couples with dependent children in 1990 [ABS 1992a]. In June 1992, 8.2 million people were covered by private health insurance: 6.0 million had both hospital and ancillary cover, 1.5 million had hospital cover only and 0.7 million had ancillary cover only [ABS 1994c].

As gross weekly income increased the proportion of contributors units with private health insurance increased. The two most common reasons cited for having private health insurance were security and peace of mind, and having a choice of doctor [ABS 1992b; 1994c].

The rapid increase in the price of health insurance over recent years may have contributed to the reduction in private hospital insurance membership. Of those who ceased private health insurance in the two years before the 1992 survey, 67 per cent said they had done so because they could not afford it [ABS 1993].

An individual or family decision to take out private health insurance is influenced by many factors: including the perceived adequacy of Medicare; personal and family health status; the affordability of private health insurance; and access to health services through government health concession cards [Wilcox 1991]. In turn these factors are influenced by: age; income; and family composition.
2.8.4 Dental Insurance in Australia

In Australia, there is no general dental insurance scheme. Only school children, armed forces personnel, war veterans, indigent population, certain disadvantaged adults and pensioners and health care-card holders are eligible for free government (public) dental services. All other adults have to pay for their dental care either directly out-of-pocket or through individually purchased private dental insurance. Health insurance funds reimburse patients with standard rebates on a fee-for-service basis. The estimated waiting time for those eligible for government (public) dental service in New South Wales was up to 58 months and this is increasing. A large number of Australians experience difficulty paying for private dental care [AIHW 1995a, 1995b, 1995c; SCARC 1998].

In Australia, the likelihood of having private insurance varies with age and income, being higher for middle-aged contributors and lower for both younger and older contributors. As gross weekly income increases, the likelihood of having private health insurance also increases [ABS 1994c]. 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]. The elderly group (65 years and over) and health card holders and lower socio-economic groups have less private dental insurance and less utilisation of dental services [ABS 1989, 1994c; Barnard 1993; Slade 1993].

In Australia, nearly a quarter of a random sample of persons aged five years and over reported that they had avoided or delayed visiting a dental professional in the last twelve months because of cost. Some 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 adults due to the limited availability of care for those adults unable to afford dental services in the private sector. As the public dental system is unable to deliver services to all those in need, it is imperative that private dental insurance is made more affordable and equitable to a larger population. This in turn would reduce the cost barrier to receiving private dental care. [Carter et al 1994]

There has been, since 1975, a very marked and rapid change in the availability of dental benefit schemes through Australian health and medical benefit organisations. A few funds had a long history of dental benefit schemes but it was not until the introduction of Medibank that the funds offered the possibility of budgeting (with some insurance) by premium payments against the cost of dental services. [Carter et al 1994]

Usually dental plans are packaged with other ancillary covers. Ancillary insurance covers all other health services, but accounts for only 22% of private health insurance benefits payments. Its coverage varies from fund to fund, but typically includes dental, chiropractic, physiotherapy, dietetic and other services rendered by health professionals other than medical practitioners, aids and appliances, especially spectacles, and ambulance services. [Carter et al 1994]
By October 1978, there were some 58 funds with an estimated 46% of the Australian population able to claim rebates against the direct payments they had made to dentists in private practice. Approximately 40 per cent of the populations in the State of New South Wales have had private dental insurance in 1994 [Carter et al 1994].

Health funds do not offer group dental plans and dental associations are not involved in insurance programs. Most funds cover all or most of the items listed in the Australian Dental Association Schedule of Dental Services [ADA 1994]. The contracts are between the individual member and the fund.

It is important to have a flexible design that allows for the introduction of systems modification or adaptations in tune with advances in the practice of dentistry. The extent to which dental benefits has affected utilisation has not been documented, but overseas studies and observations in Australia indicate a greater utilisation in frequency and number of persons attending and an increased demand for more specialised services. 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].
2.9 TRENDS AND PATTERNS IN UTILISATION OF DENTAL SERVICES

2.9.1 Trends in utilisation of dental services

Demand for utilisation changes with: availability of dentists; alternative measures of the dentist to population ratio; variables reflecting discrete changes in the system of charges; and a general time trend [Parkin & Yule 1988].

Major changes in population and disease patterns have a major impact on demand for dental care. Changes in disease patterns have been observed over the past decades. There is a marked reduction in the prevalence of dental caries in children in industrialised countries, such as Australia [Murray 1996; Shelham 1984; Spencer 1986].

Evidence from epidemiological studies indicates that there will be an increase in utilisation of dental services. In particular, an increased proportion of elderly dentate people will demand more services in both industrialised and developing countries for next decades [AIHW 1993c; Douglas & Furino 1990; Grytten & Lund 1999; Murray 1996; Shelham 1984; Spencer 1997; Waldman 1988].

Generally there has been a moderate increase in the utilisation of dental services in most of the countries, for the previous decades. There is a pattern of slow growth in recent times. There has been a general increase in dental services use among children of all ages, boys and girls, whites and blacks and family groups at all income levels. [Douglas & Furino 1990; Grytten & Lund 1999; Hayward et al 1989; Locker 1989; Murray 1996; Newman & Larsen 1979; Peterson & Holst 1995; Shelham 1984; Spencer 1997; Waldman 1988].
The World Health Organization ten nation report [Arnjolt et al 1985] has shown that just over half of all adults in the 35-44 age group had visited the dentist at least once in the previous year on average. Overall, for two-thirds of the adult population, the last dental visit is likely to have been prompted by symptoms.

In highly industrialised countries (ie the United States, Canada, United Kingdom, Scandinavia, Australia, and New Zealand), the trend showed an increase in the number of persons in all age groups who visited a dentist. Lower rates of utilisation have been shown for older age groups compared with younger age groups. However, this difference seems, in large part, to be related to the fewer number of teeth present in elderly persons [Petersen & Holst 1995].

The first major dental service utilisation study, conducted in 1930 in the United States of America had shown that 21 per cent of the population made at least one visit to a dentist in the previous year. It has been suggested that an annual utilisation rate was only 20 to 25 per cent, prior to 1930. [Locker 1989].

The overall utilisation of dental services continues to increase over time in the USA. In 1949 only 40 per cent of the population had been to the dentist at least once a year. This increased to 37 per cent in 1958, and 46 per cent by 1969 [Dworkin et al 1978]. In 1973 the percentage of persons visiting the dentist had increased to 49 per cent; however, it was estimated that only 15 per cent to 20 per cent of the population received regular care [Kegeles 1963 a, b]. By 1979 this had risen to 55 per cent of the USA population [Locker 1989].
Brown & Lazar [1999] analysed the various studies on dental care utilisation of 25 years of age or older Americans. They stated that the percentage of people who indicated they visited a dentist within a past year increased gradually between 1983 and 1997. The dental care utilisation rates are higher among women than they are among men, and they decrease with age and increase with income and educational level [Figure 13-15].

There was nearly a three fold increase of dental care usage in America where persons aged 65 years and older have made the greatest gains, from 16 per cent in 1957-58 to 43 per cent in 1989. Whether or not middle-aged and older adults have teeth is clearly associated with use of dental care. Edentulous persons lagged far behind their dentate counterparts [Jones et al 1994].
Figure 13: Percentage of people 25 years of age or older who visited a dentist within the past year by age, 1983-1997

Source: Brown & Lazar 1999

Figure 14: Percentage of people 25 years of age or older who visited a dentist within the past year by income level, 1988-1994 and 1997

Source: Brown & Lazar 1999
Figure 15 : Percentage of people 25 years of age or older who visited a dentist within the past year by educational level, 1983-1997

Source : Brown & Lazar 1999

Data from the United Kingdom has shown the same trend, from 18 per cent in 1949 to 49 per cent in 1978. Canadian studies indicate that utilisation rates rose from 15 per cent in 1950-51 to about 50 per cent in 1978-79 [Locker 1989].

A Norwegian study has shown that in spite of an increase in the proportion of people visiting a dentist regularly over the period 1972-1983, there was no discernible reduction in social inequalities in the use of dental services [Rise 1985]. The analysis of the data from the Youth Dental program in Denmark has shown that there was a decrease in the utilisation as age increased [Petersen 1981].

Honkala et al [1997] analysed the dental service utilisation of Finnish adolescents between 1977 and 1995 and found that the percentage of visiting a dentist increased between 1977 and 1981 and thereafter remained stable. Dental visits seemed to
to correlate with the occupational and educational status of parent’s up to 1983, but not after that. The gender difference, however, 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 Australia 35-44 year-olds who reported a dental visit within the previous twelve months increased from 45 per cent in 1979 to 51 per cent in 1992-1993. The utilisation remained stable among children aged 5-14, at 82 percent in 1979 and 81 per cent in 1992-1993. Fifty two per cent of 55-64-years-olds had annual dental visits in 1992-1993 compared with 30 per cent in 1979; this showed the substantial increase in this age group. Visiting a dentist by the elderly persons, 65-years-old and above, increased nearly twofold, from 22 percent in 1979 to 40 percent in 1992-1993 [AIHW 1993 a, b, c; Brennan & Stewart 1993].

The growth of public and private insurance schemes, the growth in the number of dentists, rising incomes and educational standards, and a trend towards healthier lifestyles are some of the factors which have influenced the volume and pattern of dental care utilisation. Even so, major inequalities in use exist between socioeconomic groups and different geographic regions. [Locker 1989].

Beazoglou et al [1993] studied the dental care utilisation for the previous four decades in the United States of America. The aggregate nominal expenditures on dental care have increased every year since at least 1950. Much of this increase in nominal expenditure can be attributed to dental practice increases. Dividing aggregate real
dental expenditure by population gives per capita real dental expenditures. Between 1950 and 1978, per capita real dental expenditures grew at an average annual rate of 3.3 per cent. Between 1978 and 1989 there was virtually no net growth in this measure of dental care utilisation.

Beazoglou et al [1993] found that economic and dietary factors were significantly related to changes in utilisation. They presented a model of dental care demand, 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, noncaloric sweeteners, and exposure to fluoridated water).

In Beazoglou et al [1993]'s model, the economic and dietary factors are significantly related to changes in utilisation. Net price and income elasticities of demand exhibit the expected signs and are compatible with estimates from cross-sectional studies. Decreases in cane and beet sugar consumption, facilitated by the increase in the use of noncaloric sweeteners are associated with reduction in utilisation in recent years.

The first International Collaborative Study has revealed the following dental health status of dental health care utilisers in the 1970s. Better dental health status was found among those who: were frequent utilisers; had no perceived prosthetic needs; and were satisfied with their teeth; and those who had gone to the dentist for previous treatment. Lesser levels of dental health were found among those who: did not have a recent visit; had a perceived prosthetic need; were not happy with their teeth; and those whose most recent visit was for symptomatic reasons [Arnljot et al 1985; Gift 1984].
The utilisation of dental services is highly associated with oral health status. Epidemiological studies have shown that there is a decline in the prevalence and severity of dental disease, particularly among children and young adults. [Anderson 1981; Anderson et al 1981; Burt 1985; Glass 1982; Murray 1996; WHO 1986]. Improvements in child oral health have been accompanied by increasing percentages of children making visits [Davies et al 1985; Waldman 1989a].

The prevalence of dental caries in children and adolescents has declined in most developed countries and it is now a minority of young people who experience most of the disease. Substantial reduction in the decay experience of children has been observed in developed countries. The data indicate an overall reduction of between 30 and 50 percent over the past 10 to 20 years. The interpretation of epidemiological data collected during the 1970s suggests that the rate fell by 36 per cent in American and British schoolchildren. The caries prevalence and levels of edentulousness in the adult populations of developed countries have also declined. [AIHW 1998b; Anderson 1981; Anderson et al 1981; Burt 1985; Glass 1982; Murray 1996; Spencer 1986, Spencer et al 1993, 1994; WHO 1986].

It has been estimated that the pool of teeth present in Australians aged 15 years and over will increase from 308 to 384 million from 1989 to 1999. Data on Australian children indicate a substantial decrease in caries experience. Between 1986 and 1996, the proportion of 12-year-old children in New South Wales who were decay-free increased rapidly from 37 per cent to 56 per cent [NSW Health Dept 1997; Spencer et al 1993]. In 1995, the average DMFT score for 12-year-old children was 1.01 [AIHW 1998b].
Despite that improvement in oral health in Australia, there has been an increase in the per capita use of services by all ages since the late 1970s. The large rise was in the adolescents (12-17 years). The 1996 National Dental Telephone survey data has shown that, 61 per cent of them attended private practice in the previous twelve months. For the 18 years and over age groups nine in ten visited a private dental practice. In total, for those with their own natural teeth, four out of every five visits are made to a private dental practitioner. [AIHW 1998b].

However, in many developing countries the prevalence of caries in young children is high and is increasing in those populations who are adopting a cariogenic diet. Data from the World Health Organization indicate that in Central and South America the prevalence and severity of dental caries is high whereas throughout Asia, Africa and China caries levels generally remain relatively low. In countries such as Kenya and China, caries is the major cause of tooth loss but levels of edentulousness are low. There are considerable variations in disease levels between and within countries and it is evident that lower socio-economic and certain racial groups exhibit high level of dental caries. However, it is observed that high socio-economic groups with lower disease appearance use services more than low socio-economic groups. [Barnard 1993; Blinkhorn & Davies 1996; Davies et al 1985; Megas & Athanassouli 1989; Spencer 1986, 1997; Spencer et al 1994],

In highly industrialised countries, 1980s data have indicated that the previous differences in dental visit habits according to gender are levelling out. However, in regions that have a relatively low number, or no tradition of dental visits, utilisation of dental services seems higher in females than in males. [Petersen & Holst 1995].
2.9.2 Pattern of utilisation of dental services and service mix

Epidemiological studies have shown that different patterns of utilisation of dental services occurred according to age, sex, race, marital status, occupational level and income. The higher the level of income and education, the greater the utilisation of dental services for prevention. [Anderson et al 1970; Barnard 1993; Dworkin et al 1978; Gift 1984; NSW Health Dept 1997; Petersen & Holst 1995].

In the United States of America and Sweden, in the 1960s, high social class, smaller families, urban location and female sex were associated with greater utilisation of dental services for prevention or symptomatic relief of dental disease [Anderson et al 1970]. Data from a NORC survey of 1965 indicated that 33 per cent of all dental visits were primarily preventive; the remaining visits were for relief of symptoms [Dworkin et al 1978].

Analysis of survey data in Australia have indicated that the number of dental visits during the previous twelve months was lower in lower socio-economic groups and treatment received is more likely to be extraction when compared with higher socio-economic groups [AIHW 1993b, 1993c; Barnard 1993; Davies 1993]. The large rise in the dental service usage of adolescents (12-17 years) in 1996 was largely due to the increase in orthodontic services [AIHW 1998b].

Meskin et al [1990] discovered that American elderly required more removal and fixed prosthodontics and that there was more interest in implants. An increasing proportion of elderly populations visits a dentist regularly for preventive reasons or dental checkups, while the consumption of radical treatment services (eg, tooth extractions)
or prosthetic care seems to have declined [Petersen & Holst 1995]. Future generations of elderly will have significant needs for preventive and restorative services [Gluck 1993].

Some of the other factors that have influenced the volume and pattern of dental care utilisation are:

* a trend towards healthier lifestyles;
* rising incomes and educational standards of patients;
* the age and sex composition of the population studied;
* area and country of residence;
* awareness of oral health status;
* declining of the number of edentulous adults
* retaining more teeth in adults;
* the growth in the number of dentists and private general dental clinics;
* changing pattern of providing dental services which is shifting from resignation and replacement to repair, protection and prevention;
* the presence or absence of treatment facilities;
* the growth of public and private insurance;
* awareness of the benefit of dental insurance schemes; and
* the perception of both the providers and the recipients of dental service.

2.10 SOCIO-ECONOMIC STATUS (SES), DENTAL INSURANCE AND UTILISATION OF DENTAL SERVICES.

Socio-economic status (SES), which is a composite measure of income, occupation and education, is the characteristic most commonly used in the analysis of social inequalities in health [Gift 1984; Locker 1989].

There is inequality in health and differences in utilisation of health services among social groups within countries. Oral health inequalities between disadvantaged and nondisadvantaged populations are distinct [Gift 1984; Davis 1987; Locker 1989]. 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 dental service utilisation differences found [Gift 1984]. Numerous studies have found that socio-economic status is directly related to use of dental services; utilisation of dental services increases as social status increases [Burt & Eklund 1992].

Income or financial resources such as health insurance for dental services are obviously determinants of the utilisation of dental services [Brennan et al 1997; Dworkin et al 1978; Gift 1984; Grembowski et al 1985; Manski 1994; Manski et al 1999a]. The nature of financing in a system, the mechanism of payment {for example; salaries, contracts, fee-for-service}; and its specific characteristics {for example; eligibility, degree of cost sharing} interact with individual socio-economic status [Andersen et al 1995; Gift 1984, 1993]. The type of care received varies among people in distinct socio-economic and demographic groups [Manski et al 1999a]. Cost of care influences demand for services and consequently affects the system [Manning et al 1985].
In their study, Newman and Larsen [1979] indicated that family resource variables; particularly insurance coverage and family income are the most important variables affecting utilisation [Table 2], p 28. Studies have shown that the uninsured persons use fewer health services than the insured persons [Anderson et al 1987, Freeman et al 1987]. It is hardly surprising that more people with dental insurance visit a dentist than people without dental insurance [Burt & Eklund 1992]. Studies [Conrad et al 1987; Grembowski et al. 1985; Kovar et al. 1988; Manning et al 1985; Mueller & Monheit 1988] have documented that insurance coverage is positively associated with utilisation of dental services.

Prepayment is seen as one way to reduce out-of-pocket expenditures, control costs over time and assist in making dental care less of a discretionary service. Studies have shown that dental insurance coverage has been shown to increase: demand for dental care; access to and use of dental services; and improve oral health status. [Ahlberg et al 1996; Bailit et al 1985; Conrad et al 1987; Gift et al 1981; Kiyak 1993; Kovar et al 1988; Lewis 1981; Manning et al 1985; Mueller & Monheit 1988; Mueller et al 1998; Newhouse et al 1981; Newman & Larsen 1979]. Insurance is estimated to more than double demand for dental services and surprisingly, this effect is larger for children than adults [Manning & Phelps 1979]. The largest impact was shown on those who were already regular or irregular users of dental services rather than non-users [Galgainaitis & Gift 1980].

These differences are to be expected because dental insurance can reduce the direct financial burden of dental care. The studies have shown that the cost is not as much of a barrier to receipt of dental care. Even among groups where there is no direct charge
for dental treatment there is still the relationship between receipt of care and socio-economic status [SES]. The persons who have dental insurance are principally professional, white-collar workers and the members of larger labour unions, who receive group dental care as a fringe benefit of employment. So again, there is likely to be an SES relationship here as well as some financial incentive [Burt & Eklund 1992].

Douglas & Cole [1979] also observed that dental insurance would shift a variable percentage of non-utilisers into that population that was demanding care and doing so effectively. The largest utilisation increases were seen among professionals and executives, those with high incomes and who were well educated.

Among persons who generally do not go to the dentist, except when they perceived need or feel pain, fewer people go to dental clinic immediately after introduction of a prepayment plan. The introduction of dental insurance does not guarantee the desired changes occur rapidly. Although edentulous persons from underprivileged group received more treatment, fewer people visited the dentist during the first year, after the National Dental Insurance was implemented in Sweden [Barethin 1976]. The National Dental Insurance causes an initial surge in visits but do not appear to continue the high utilisation pattern [Gift 1984].

Morehead et al [1971] found members of the Teamster Comprehensive Care Program in the United States of America, which provided free medical and dental care, received more dental services than they had before it started. Similar patterns can be
seen in Medicaid programs in Massachusetts. More low-income families were receiving regular dental care and going to private practitioners. When compared with the previous year, there had been a sharp increase in the number of families seeking regular dental care and a shift in the sources of care from clinics to private practice [Leverett & Jong 1970].

Locke et al [1989] examined the association between dental insurance, dental utilisation and oral health outcomes among elderly people living independently in two communities in Ontario, Canada. They found that dental insurance had no independent effect on use of dental services, dissatisfaction with oral health status, or clinically defined treatment needs. Dentate elderly had higher levels of utilisation but still had high levels of treatment needs.

Among 975 elderly persons from the 1990 Health Supplements to the Penal Study of Income Dynamics in United States, Kingdon et al [1995] found that persons with a separate dental insurance policy, younger and better educated persons, and those with greater financial resources were more likely to use dental services.

Newman and Larsen [1979] analysed the 1964 and 1974 national studies in the United States of America. The largest increase in utilisation occurred in the professional/managerial or clerical sales subgroup, aged 45-64 years, with an increase from 2 to 2.7 visits per year. There is an average of one visit more for persons with insurance compared to those without insurance in people aged 14-24 and 45 and over. Generally, dental insurance coverage had minimal impact for the ages 2-13 and 25-44. Low-income groups with coverage also had, on the average, one visit per year more
than did those without coverage. One of the largest discrepancies in utilisation occurred among those 55 to 64 years old, with fair oral health status. Those with insurance coverage had 4.9 visits per year while those without insurance had 1.5 visits. [Gift 1984].

A major beneficiary group of prepaid plans appeared to be children from low-income families and/or who had parents with little formal education. Although they had dental insurance coverage, utilisation rate for elderly in the United States of America continued to be low [Kiyak 1993].

Jones et al [1994] analysed the findings of NCHS (National Centre for Health Statistics) regarding use of dental care by elders of different races and dental origin. Race or national origin appeared to have little effect on whether elders had dental insurance. The percentage who had private dental insurance ranged from a low 11 per cent in black elders to a high of 16 per cent among Hispanic elders, with 15 per cent of non-Hispanic elders and 15 per cents of whites having insurance. [Jones et al 1994].

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. In addition, the discrepancy between elders with and those without private insurance is somewhat greater among blacks than whites [Jones et al 1994].

Cheung [1993] analysed the survey of dental service utilisation by year six students in Australia and found that private dental insurance appeared to have positive impact on the students. Students from Catholic schools, whose parents were in the white collar
occupations, born in Australia, had parents born in Australia, or spoke only English at home were significantly more likely to have private dental insurance.

Cheung's [1993] study has shown that students with private dental insurance were: significantly more likely to have visited more recently; significantly more likely to have visited more frequently; significantly more likely to have dental appointments currently; significantly more likely to have teeth cleaned or polished; significantly more likely to be receiving/used to receive orthodontic treatment; significantly more likely to have fluoride treatments; and significantly more likely to have visited private dental practices in the last visit. They also had significantly more usual number of check-ups per year. The purpose of the most recent dental visit was significantly more likely for a check-up.

The US National Health Interview Survey (NHIS) data indicated that use of dental care was positively and strongly associated with insurance coverage. Seventy per cent of individuals and families with dental insurance utilised dental services compared to those without insurance. Individuals with dental insurance also had a higher number of visits per year (2.6 vs 1.7 for those without insurance) and a greater percentage of them reported that their last dental visit were checkup [Kovar et al 1988].

Legler et al [1979] found that although barriers of cost, accessibility and lack of appreciation for health care were eliminated for the study population of a young adult group, there was no significant difference in dental care utilisation. Other factors such as psychological factors, patient business, and lack of perceived needs may also be important determinants in the utilisation of prepaid dental care. Mexican-Americans
with a low acculturation level were significantly less likely to have dental insurance and to have visited a dentist than those with a high acculturation level [Ismail & Szpunar 1990].

The US NHIS data also showed that socio-economic variables, as measured by family income and dental insurance, were associated with dental visits. Forty per cent of the children aged 2-4 and 45 per cent of those aged 5-17 had dental insurance in 1980. Among 12-to 17-year-olds, dental insurance was associated with almost a twofold increase in the number of visits. The average number of visits was four times higher for children from high-income families than for children from low-income families [Gift & Newman 1992].

Grembowski et al [1985] compared dental utilisation rates among Pennsylvania Blue Shield members with dental insurance to rates in the US population. Insurance appeared to stimulate the utilisation of dental services above national norms. The annual insured utilisation rate for all sampled PBS members was 54 per cent and was significantly greater than the 41.1 per cent US rate. Children appeared to be a major beneficiary of insurance's incentive effect on dental service use.

For employee and spouse members, the variation in utilisation rates across sex, education and income groups follows US utilisation patterns but at higher levels. Employee who are female or have high incomes or education have higher utilisation rate (over 60 per cent) than other adult and the US population. One of the most significant findings was the substantially higher utilisation rate for children in households with a low family income (53 per cent) or a parent who did not complete high school (70 per cent). [Grembowski et al 1985]
The National Oral Health Survey, 1987-1988 data has shown that, 70 per cent of Australians with private dental insurance visited a dentist within the last year, compared to 50 per cent of those without. Fifty five per cent of the group aged 35-44 years had cover with private dental insurance. This group had greater utilisation of dental services, more through private practice and had more cleaning and less extractions. They had lower perception of dental treatment need and less need for dental treatment [Barnard 1993].

Hoskin et al [1994] studied the use of dental services among dentate non-institutionalised Australians aged 60 and over living in Adelaide and Mt Gambier. Private dental insurance coverage, Pensioner Health Benefit (PHB) entitlement and financial hardship defined the groups. Use of dental services by older adults was lower among PHB recipients and appeared to be strongly influenced by their own financial resources.

The result of RAND Health insurance experiment [1972-1984] in the United States of America tend to confirm the view that utilisation is dependent upon the form of insurance coverage. There was a substantial surge in demand during the first year of more generous coverage. The first year response to cost sharing was nearly twice the second year response. It also showed that a reduction in the level of cost sharing, that is when a person pays less (decrease out-of-pocket expenses) and insurance pays more, resulted in greater demand for oral health care services [Manning et al 1985; Newhouse et al 1981].
In the review made by Yule and Parkin [1985], they found that utilisation is sensitive to differences in insurance coverage. There is evidence that price and coinsurance elasticities vary with age, income, the degree of insurance coverage, and other socioeconomic characteristics.

In their study of the United Auto Workers, Glasser and Hoffman [1981] reported the patterns of dental utilisation from before and after the benefit plan for the workers. They stated that male and female differences were essentially eliminated and more adults and families with children used the care, especially in the child-rearing ages of 25-45 years. Another finding was the percentages of persons seeking care increased over the three-year period study, especially for preventive services.

In the United Kingdom, despite the provision of free service, there are evidences of social class gradient in the use of dental care [Bulman et al 1968; Dickson 1968; McKinlay 1969; Scarrott 1969]. In addition to availability of free care, motivation and incentives were essential to cause significance increase in utilisation [Hughes & Legler 1979; Pelton 1972].

Nikias [1968] found large differences in utilisation of prepaid dental services among social classes, in New York. Survey data of 5,980 Americans shown that the higher the occupational level, the greater the utilisation. In the transition from low to high there was a quantum jump between the blue-collar group and white-collar category. The elimination or reduction of economic barriers via prepayment did not appear to result in equity of use of dental care. The greater part of services was emergency care.
Sjostrom et al [1998] analysed the insurance claims data of National Dental Insurance in Sweden. They found that demand for dental care was related to age. Women went more regularly to a dentist than men. Fifty per cent of those who had obtained dental care received a complete dental examination. Six per cent received an emergency examination or no examination. The number having had only an emergency examination was highest among those who had visited a dentist in only one of the three years that was studied.

Dental insurance also has a direct effect on the type of services demanded or accepted by patients. Changes in the mix of dental services provided have also occurred. The insured used more expensive elective dental care such as crown and bridge work [Mueller & Monheit 1988]. When dental insurance reduces the patient's financial barrier to care, the patient is more likely to accept the treatment recommended by the dentist [Bailit et al 1979]. 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 towards greater utilisation of reconstructive procedures [Gotowka 1985].

Grembowski et al [1987] studied the insured children in the United States of America, and indicated that, among children who had insurance, cost sharing reduced social class differences in the demand for oral health care, except for the orthodontic care.

The survey data in the United States of America during the 1980s has shown that having lower socio-economic status, being black and being young children or elderly persons were variables consistently identified as independent negative factors for
dental visits [Bloom et al 1992]. Age was found to be an important determinant in the use of dental services in insured patients in private general practice in Australia [Barnard 1993; Sivaneswaran et al 1994; 1995; 1998; 1999]. The data of the National Oral Health Survey of Australia conducted in 1987-88 has shown that the elderly group (65 years and over) had less private dental insurance (26 per cent), and less utilisation of dental services (23 per cent of visits) than the younger age groups [Barnard 1993].

Eklund et al [1997] analysed data on the use of dental services by American insured patients between 1980 and 1995. The overall utilisation increased gradually through the period from about 60 per cent in 1980 to 70 per cent in 1995. It showed clear trends that indicate profound improvement in oral health. These improvements are evident in all age groups, and the effect of the caries decline in children that begin about 20 years ago has moved well into the adult population.

Eklund et al [1997] found a clear pattern of increasing use of oral examination and prophylaxes (1/year in 1980 vs 1.5/year in 1995) which was evident across all age groups. Restorations and simple extractions showed decline across the entire age spectrum. There was an increase in endodontic treatment in adults aged 65 and over. While the use of crowns in older beneficiaries had increased, in beneficiaries under age 35 years the use of crowns was declining sharply. The provision of full and partial dentures was rapidly declining among all older age groups. There was a decline of use of fixed bridges of about 75 per cent over that time in those under age 35. The use of periodontal services had increased among all adult groups those aged 25 and above,
periodontal services had increased among all adult groups those aged 25 and above, with the highest levels among the beneficiaries who were 45 years of age and older. [Eklund et al 1997].

The dental service provisions between insured and non-insured patients in Australia were analysed by the AIHW Dental Statistics and Research Unit. Data from the National Dental Telephone Interview Survey 1994 has shown that coverage of private dental insurance was 40 per cent in Australia during 1994 and this was positively associated with income. There was a greater use of services among insured patients. For example 62 per cent of insured persons had a dental visit within the last year versus 42 per cent for uninsured persons in 1994. The percentage of persons who visited for check-up was 62 per cent for insured compared to 42 per cent for non-insured persons. [Carter et al 1994].

Brennan et al [1997] analysed the data collected from a random sample of dentists from a survey conducted in 1993-1994 in Australia. The percentage of persons receiving services per visit in private general practice in seven most commonly provided service areas are presented in Figure 16 by insurance status [AIHW 1998c; Brennan et al 1997].
Figure 16: Percent receiving services per visit in private dental services, by insurance status: 1993-1994.


Diagnostic, restorative, and preventive services were the top three ranked areas of service for both insured and non-insured patients. Significant differences between insured and non-insured patients in the percentage of patients receiving services were observed in four of the seven areas of services. Insured patients received higher percentages of service compared to non-insured patients for diagnostic (46.3 per cent vs 42 per cent), preventive (29.4 per cent vs 20 per cent), and crown and bridge services (7.5 per cent vs 3.4 per cent). However, insured patients received lower percentages of services than non-insured patients than for extraction services (4.3 per cent vs 10 per cent). [Brennan et al 1997].
After adjustment for age and sex of patients, geographic location and visit type, there were higher odds for receipt of preventive (OR=1.37), endodontic (OR=1.27) and crown and bridge services (OR=2.25), and lower odds of extractions (OR=0.25) for insured compared to non-insured patients. However no significant differences by insurance status were found for diagnostic, restorative or prosthodontic services in the multivariate models. [Figure 17]. These differences in service provision by insurance status indicate a more favourable pattern of services for insured patients. [AIHW 1998c; Brennan et al 1997].

Figure 17 : Adjusted odds ratios of areas of dental services by insurance status: 1993-1994.
Source : AIHW 1998c
In Australia, Health Care card-holders can freely access the limited public dental services. Data from the National Dental Telephone Interview Survey 1994 has shown that privately insured Health Care card-holders were less likely to have last visited for a problem, and were less likely to have received a filling than were insured non-card holders. However privately uninsured card-holders were more likely to have last visited for a problem than uninsured non-card-holders. Among uninsured card-holders who visited in the previous twelve months, 25.5 per cent had an extraction compared with 13.2 per cent of uninsured non-card-holders. [AIHW 1998c; Carter et al 1994].

Overall, insurance status had a larger effect with respect to reason for last visit, receipt of fillings and extractions for card-holders, than it did for non-card-holders [Figure 18]. It would appear that insured card-holders received more appropriate dental care than uninsured card-holders. This could be the result of insurance enabling access to more timely and appropriate care, or could reflect a greater financial ability to afford dental care [AIHW 1998c].

Figure 18 : Type of dental care received, by insurance status.
Source : AIHW 1998c [National Dental Telephone Interview Survey 1994]
In New South Wales the estimated waiting time for those eligible for government (public) dental service is up to 58 months [SCARC 1998] and this is increasing. With the public dental system unable to deliver services to those in need and a large number of Australians experiencing difficulty paying for private dental care [SCARC 1998], it is imperative that private dental insurance is made more affordable and equitable to a larger population. This in turn would reduce the cost barrier to receiving private dental care.

In Australia, dental insurance premiums are set in accordance with the community rating principles that were established in the National Health Act 1953. Health insurance funds are required to accept all applicants, and that policies be offered at the same rate to all members irrespective of age, race, sex, sexuality, oral health status, benefits claimed or family size. The repercussions of community rating are that if there were differentials in use of service, there would be cross-subsidisation from groups that use fewer services to those groups that use more services. [AIHW 1998a].

The higher use of health services by older people has been the predominant cause of the rise in health fund premiums in Australia. This rise in cost of health fund premiums is the major reason for dropping of private health insurance by healthier, younger members [NHS 1991; Mooney & Scotton 1999].
2.11 METHODS USED IN MEASURING SOCIAL CLASSES IN EPIDEMIOLOGICAL STUDIES

The relationships among socio-economic status, health status and health services are interesting. Many researchers and epidemiologists are concerned with the role of social factors in determining health status and the use of health services. Socio-economic status refers to a range of social and economic differences among people based largely on educational and occupational achievements. It involves the hierarchical ordering of people according to prestige and lifestyle [Davis 1987; Gift 1984; Locker 1989].

There are a number of health inequalities related to social class. Social class differences exist in the prevalence of dental diseases. Epidemiological data has shown that until about a century ago, dental caries was confined to the better off sections of the community [Beal 1996; Davis 1987; Gift 1984; Locker 1989].

Social class is one of the variables commonly used in measuring the utilisation of health care, to permit the control of confounding factors when testing etiological hypothesis or measuring the effectiveness of health care. Relationships with social class may express the effect on health and health care of behavioural, economic, environmental and other elements of social class, the influence of other characteristics that happen to be associated with social class, and the effect of health status on social mobility [Abramson et al 1982].

Social class refers to groups of people with common economic life chances determined by market forces. It is the profile of the social, economic and physical
environment in which the individual lives and works. Social class describes the position (both assumed and accorded) of a person or group of persons occupies in the societal hierarchy, and designates his or her access to social and economic resources and to valued life experiences [Daniel 1984; Kelly & McAllister 1983; Quine & Lancaster 1989; Roth & Wittich 1978].

Even though social class is a status, which is achieved during the lifetime of an individual, it also has an ascribed component, as a minor takes the social class of his or her father. In fact, the whole family is recognised as a unit of social class, a married women being classified according to the social class of her husband [Beal 1996].
2.11.1 Social class stratification and social indicators

Social class is multifaceted and composed of complex variables, which are difficult to identify and measure. An important dimension of social stratification is the prestige, or social recognition, respect, and admiration from others. Prestige is always a cultural and social matter. In the first place, favourable social evaluations are based on the norms and values within a group. Occupational prestige scores vary according to compensation, education required, skills and ability needed, power associated with occupation, the importance of an occupation to society and the nature of the work (mental or white-collar work versus manual or blue-collar work [Petersen 1997]).

McMichael [1985] has proposed three contending approaches to measure social class. These are based on:

(1) *Empirical categorisation*, derived from population survey measures of how individuals perceive their own social rank (self location);

(2) A *composite measure of status or prestige*, expressed as a continuum, and drawing primarily on consensus views of occupational prestige, income and education; and,

(3) A “conflict” *classification*, reflecting classical sociological theories about wealth, ownership, power and social function.
There are numerous systems of dividing the population into social classes, ranging from the early classifications of *Marx and Weber* to the *Registrar General's Social Class* [Davis 1987; Gift 1984; Locker 1989].

A widely used arbitrary classification is the British Registrar-General’s scale, in which occupations are broadly grouped in accordance with their ‘social significance’ and divides the population into six groups or classes [Beal 1996; Locker 1989; Petersen 1997].

Table 7 shows the type of occupation allocated on this scale to each social class together with examples for each class. One of the disadvantages of this particular classification is that about a half of the population falls into class III. This class is, therefore, frequently subdivided into non-manual and manual categories [Beal 1996; Locker 1989; Petersen 1997].

The advantage of this type of classification is that it enables one to make generalisations about the lifestyles, behaviour, and attitudes of others, based on the pattern for that group as a whole. Of course, not everyone from a social class will share the same lifestyle, but the differences between those from the various classes are often great enough to identify patterns and trends [Beal 1996].
Table 7  The Registrar General's Social Class.

Source: Beal 1996; Locker 1989; Pine 1997; Petersen 1997 [Modified].

<table>
<thead>
<tr>
<th>Social Class</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>‘Professional’ and top managerial occupations</td>
<td>Doctor, dentist, university lecturer, company secretary, accountant</td>
</tr>
<tr>
<td>II</td>
<td>‘Intermediate’ occupations, i.e. minor professions and lower managerial</td>
<td>Teacher, nurse, chiropodist, supermarket manager</td>
</tr>
<tr>
<td>III</td>
<td>‘Skilled’ occupations: non-manual</td>
<td>Draughtsman, clerk, cashier, policeman</td>
</tr>
<tr>
<td>III NM</td>
<td>manual</td>
<td>Plumber, tool-maker, coalminer, bus driver</td>
</tr>
<tr>
<td>IV</td>
<td>Semi-skilled’ occupation</td>
<td>Gardener, postman, storekeeper</td>
</tr>
<tr>
<td>V</td>
<td>‘Unskilled’ occupations</td>
<td>Labourer, kitchen hand, office cleaner</td>
</tr>
</tbody>
</table>

Different social scales have been developed as appropriate to their countries such as:

the Duncan SES scale in United States;

CCLO (Classification and Classified List of Occupation);

Vered scale and Hartman prestige scale in Israel

Daniel and Congalton classes in Australia; and

ASCO (Australian Standard Classification of Occupation); [Abramson 1982; Duncan 1961; McMichael 1985; Najman 1988].

ASCO (Australian Standard Classification of Occupation) contains nine major groups.

1. Managers and Administrators

2. Professionals
3. Associate Professionals
4. Tradespersons and related workers
5. Advanced Clerical and Service workers
6. Intermediate Clerical, Sales and service workers
7. Intermediate production and Transport workers
8. Elementary Clerical, Sales and Service workers
9. Labourers and Related workers

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].

The indicators of social class commonly used in epidemiological studies are; age; education; occupation; family income; marital status; residential address; and organisational rank or classification. Less frequently used indicators are: type of housing; condition of tenancy; ownership of cars; televisions and other consumer durables. Most of the indicators are based on the nature of the occupation. [Abramson et al 1982; Daniel 1984].

Epidemiology studies in Australia have widely used occupational prestige as a socio-economic status [Burnley 1992; McMichael 1985]. The Australian Census Occupational classification based upon a combination of industry membership and skill or educational qualifications [Siskind et al 1987].
Some of the simple social class indicators used in Australia that contained in the Statistical Local Area Summary File, Place of Usual Residence (*USLASF*) [Byth et al 1992] are:

* **Education**: the proportion of the population with a university or college degree (Item U16 USLASF).

* **Occupation**: the proportion of the population aged 35 years and over with an identifiable and stated occupation who were;
  
  # professional: professionals/paraprofessionals (Item U20)
  
  # blue collar: factory workers, trades persons, plant and machine operators, or those in similar occupations (Item U20)

Occupation provided two indicators, which are:

* **Unemployment**: the proportion of the labour force who were unemployed and actively seeking work. (Item U19)

* **Income**: the proportion of the population with a stated annual income exceeding $40,000 (Item U22).
2.11.2 Composite Socio-economic Score

Composite socio-economic scores are derived by creating distribution for occupational class, income and education, giving respondents a score based on their position in the distribution and then simply adding together an individuals score on each of the three criteria [Duncan 1961; Siskind et al 1987; Siskind et al 1992].

Brotherton et al., [1979] developed an “Australian index of social class”, which assembled five variables; Income; occupation; education and (where available) respondent self-rating of ‘social’ class and the interviewers rating of ‘economic’ class [Daniel 1984]. Another type of composite indicator is the measures of material deprivation. These use up to five variables, such as the per cent of adults’ unemployed and the per cent of households without a car, to classify neighbourhoods according to their material circumstances.

Some other indicators are:

* subjective beliefs about one’s class membership, ownership and control over investments;
* the process of capital accumulation;
* authority rating (the number of subordinates in the work situation or for self-employed men, the number of employees);
* on-job physical activity;
* labour-force;
* interviewer rankings of the house and respondents appearance;
* room-person ratio;
* amenities score or FMPI (Family Material Possession Index) (the possession of the properties such as a motor car, television set, air-conditioner, and refrigerator);

* race ethnicity and language spoken at home.


As there are some limitations in using traditional socioeconomic measures, a number of researchers use areas or census based measure. Area of residence is usually known and has been used as a social class index. It appears that persons similar in wealth and position tend to live near each other. As residence is usually a family characteristic it may more aptly reflect social class than factors limited to the individual. This may be seen as an advantage, as the income and status of spouse may well contribute to the social consequent health outcomes. [Gordon et al 1989].

The examples of area based measures that classify individuals according to the socioeconomic characteristics of the neighbourhood of residence are: SEIFA (Socio-economic Indexes for Areas) in Australia [Smith et al 1996; Taylor et al 1992; Taylor et al 1998], ACORN (A Classification of Residential Neighbourhoods) in United Kingdom [Elly & Langford 1993; Frohlich & Mustard 1996; Locker 1996; Sarll et al 1984; Whittle & Davies 1992]; the JARMAN index [Jarman 1983]; Super Profile Group codings, [Charlton et al 1985]; the Overall Deprivation Index [Townsend 1988]; and deprivation indices by Carstairs and Morris [1989] and Curtis [1990].

For using these area-based indices, the only information that has to be sought is the postcode of the subjects in the study or their address from which their postcode can be
obtained. This is then used to derive the relevant census information required for any particular index of deprivation. The examples of variables used in the various indices include household with no car, housing tenure, overcrowding, unemployment, semi-skilled or unskilled manual occupations single parent families, children under five, elderly people living alone and ethnic minorities. Each index uses a different combination of these and other similar variables to calculate a score or classification for every locality. The result not only provides information about the association between the social variables and health but also allows the geographical location of the subjects to be plotted. [Beal 1993].

For example, ACORN is a composite system describing the subject’s residential neighbourhood, covering demographic, socioeconomic and housing characteristics [CACI 1983]. ACORN classification has been used as a descriptor of socio-economic status in a study to evaluate variations in dental health of children in Great Britain and to evaluate the change in these differences over time. The ACORN classification of each person is determined from the postal code of the home address. ACRON groups are amalgamated into three ranked divisions [Elly & Langford 1993].
3 METHOD

3.1 STUDY SAMPLE

The study sample comprised members of the Government Employees Health Fund [GEHF], (now known as Australian Health Management Groups) residing in the State of New South Wales, Australia, who had dental insurance cover and were members at 1 January 1992. This included any member who joined or discontinued from the fund at any time during the entire study period to 31st December 1995.

The Government Employees Health Fund has the fifth largest membership for dental insurance in New South Wales [PHIAC 1995]. Although only government employees could join this fund when it was first established, it is now an open fund for all persons, but is directed primarily to present and past employees and dependents of government services. An individual can join the fund at any time during a calendar year, can have courses of treatment, leave and then rejoin the fund again within the year or anytime later.

The Government Employees Health Fund offers hospital and ancillary covers. Persons with ancillary cover can have health benefits such as, dental, optical care, physiotherapy, chiropractic, neuropathy, or podiatry for example. There are three levels of ancillary covers; Select, Sports and Super plans. The premiums per annum vary from A$442 to A$702 for the top cover for a single person.
Members of the GEHF can have their dental treatment either from the dental centres that belong to the fund where salaried dentists provide service or in private general dental practice. For members with ancillary cover the fund’s Dental and Eyecare Centres provide most general dental services at no additional cost. General dental services consist of consultation, check ups, scale and clean, topical fluoride application, fillings, X-rays and mouthguards. High cost dentistry benefits include periodontics, oral surgery and endodontics by a dental specialist, implants and TMJ treatment, bridgework, crowns, dentures, gold inlays, facings and orthodontics. High cost dental services attract co-payments.

Members with ancillary cover can visit a private dental practice and claim a rebate. All three levels of cover offer rebates for all items of dental services listed on the Australian Dental Association’s Schedule. The rebates differ according to the level of cover.

There is a waiting time to qualify for a rebate. However, the waiting period is waived, if an individual moves from one fund to another fund and the waiting period required has been completed with the previous fund. There is a two-month waiting period for general dental services and a twelve-month waiting period for high cost dental services for the GEHF members. A member will be granted a waiting period credit equal to the waiting periods already served for comparable benefits, if he transferred from another registered health fund. In the case of treatment resulting from an accident, which occurs during the waiting periods, consideration for benefits will be given from the day after a person joins the GEHF.
3.2 TERMINOLOGY AND INDICES

An adult is defined as any person who was 18 years or over during the study period 1/1/92-31/12/95.

A member is defined as any adult person residing in New South Wales who has ever been a member of Government Employees Health Fund during the study period 1/1/92-31/12/95.

A patient is an adult New South Wales member of Government Employees Health Fund who made a visit to private general dental practice and made a claim during the study period 1/1/92-31/12/95.

The person-years measure enabled analysis of the dynamic study population by allowing the inclusion of members who joined or discontinued the fund at any time during the entire study period.

Patient-years computes the time at risk for each patient in a calendar year, which was then utilised as a denominator to calculate utilisation rate per patient per year. Data was considered on a single calendar year basis and then summed over the four-year study period.

Allowance was made for the potential to utilise dental services using the person-years method [Armitage & Berry 1994]. Two sets of person-years at risk were made to calculate utilisation rate. One was for all members and computed the time at risk for each member in each calendar year, which was then utilised as a denominator to
calculate utilisation rate per member. Another at-risk calculation follows the same methodology but only considers members who utilised a private general dental practice, at least one service (referred to as patients) and made a claim during 1.1.92 to 31.12.95.

The following indices were utilised to calculate the utilisation rate and cost of services for members who utilised services (patients) and made a claim.

1. The total number of visits made by a patient during the all study period divided by the number of patient-years was utilised to arrive at the mean number of visits per patient year.

2. The mean number of services per patient-year, which was derived by dividing the total number of services, utilised across all item categories by the total number of patient-years.

3. The mean number of services per patient-year, by item category, which was derived by dividing total number of services for each item category (service type) by the number of patient-years.

4. The mean number of services per patient visit, which was derived by dividing the total number of services for each item category by the number of visits. This index differed from the previous indices, as the denominator in this instance is patient visits.
5. The **mean services per patient visit by item category**, which was derived by dividing the total number of services for each item category by the number of visits.

6. The **mean cost per item of service** was arrived by summation of all fees charged by the dentists divided by the total number of services consumed for that calendar year.

7. The **mean cost of services per patient visit** was derived by dividing the total fees charged by the dentists by the total number of visits made by patients annually.

8. The **mean cost of services per patient-year** was calculated by summation of all fees charged by dentists divided by the total number of patient-years.
3.3 STUDY METHOD

The present study utilised the database of claims, for the services provided in private practice, from the GEHF members. The database, based on routinely collected claims records in the GEHF relational database, was established in 1996, in the Public Health Dentistry Discipline, University of Sydney at Westmead Hospital Dental Clinical School.

Files were organised with a separate record for every item of service received, as designated by the Australian Dental Association Item Code Numbers [ADA 1994; APPENDIX 1]. Each claim record had the number of services received for each of the items and other information such as date of visit, membership details, address with postcodes, amount charged by the provider, benefit paid by the fund and service provider numbers. These files were downloaded from a UNIX system directly into an IBM compatible personal computer.

3.3.1 Coding of item of dental services

A database of claims from 278,132 members including New South Wales members, with about 1.4 million items of services provided in private practice, was established. The item code numbers were recoded into 10 main item services categories using the Schedule of Dental Services defined by the Australian Dental Association [ADA 1994].
The 10 main item categories as designated by ADA schedule of dental services [ADA 1994] are:

000 Diagnostic services [for example: Initial, periodic or emergency examination; dental radiological taking and interpretation; diagnostic study models; consultation; other diagnostic services]

100 Preventive services [for example: dental prophylaxis; fluoride treatment; oral hygiene instruction; mouth guard; dietary advice]

200 Periodontics [for example: clinical periodontal analysis and recording; root planning; guided tissue regeneration; root resection]

300 Oral Surgery [for example: extraction; surgical extractions; surgery for prosthesis; treatment of maxillo-facial injuries]

400 Endodontics [for example: pulp treatment; periradicular surgery]

500 Restorative services [for example: Amalgam, Glass Ionomer, Composite restorations; Inlays, onlays; pin retention; cusp capping]

600 Crown and Bridge [resin, porcelain, gold crowns and bridges; repairs and other services for crown and bridges; implant prosthesis]

700 Prosthodontics [for example: new dentures; denture maintenance and repairs; surgical procedures for implant prosthesis]

800 Orthodontics [for example: removable and fixed appliances; extra-oral appliances]

900 General services [for example: palliative emergency treatments; drug therapy; occlusal therapy]
3.3.2 Classification of study sample

3.3.2.1 Age

Age groups were aggregated into ten-year brackets (from age 24 years), except for the first age group which was six-year bracket (18-24 years).

3.3.2.2 Length of membership

The members differ in their length of membership in each calendar year during the study period. Members can join or leave the health fund any time during the year. The total lengths of membership were calculated. Members were grouped according to their length of membership: less than one year; 1-2 years; 2-4 years; 4-7 years; 7-12 years; and 12 years and above.
3.3.2.3 Geographical classification.

In 1991, the estimated resident population of Australia was 17,384,000 and one third (34 per cent) of them lived in New South Wales [ABS 1993b]. The Department of Human Services and Health (HSH) developed the Rural and Remote Areas classification. It has been used in a wide range of programs and policy areas within the Department of Human Services and Health portfolio and by academic and other institutions in related fields. Rural, Remote and Metropolitan Zones classification was developed by the Department of Primary Industries and Energy. Commonwealth, State and other agencies have used it in a variety of policy or program areas [ABS 1994a, 1995b; DPIE & DSH 1994].

The Australian Bureau of Statistics divides each of Australia's states and territories into three groups:

1. Metropolitan areas;
2. Rural zones; and
3. Remote zones and a total of seven categories {Figure 19}.

The metropolitan areas are the state capital city statistical divisions (SDs) plus other statistical subdivisions (SSDs) or groups of SSDs that include urban centres of population 100,000 or more in size. Two metropolitan categories are Capital City and other metropolitan areas.
The study population of New South Wales (Figure 20) was classified into three groups according to the Australian Bureau of Statistics [ABS 1994a, 1995b].

Class 1: **Capital or Major urban**

An urban area, which consists of the New South Wales State capital city statistical division (Sydney);

Class 2: **Extra Metropolitan**

Other metropolitan centre (1 or more SSD’s) with a population of 100,000 and over;

Class 3: **Rural and Remote areas**

All population clusters of rural zones and remote zones were combined in this study. Rural zones are areas with a population of 10,000 to 99,999, and remote centres consist of population centres of less than 10,000 dwellings.
Figure 19: Structure of the geographical classification

Figure 20: Statistical Divisions of New South Wales, Australia.

3.3.2.4 Classification of social class using Socio-economic Indexes for Areas (SEIFA)

The Socio-economic Indexes for Areas (SEIFA), the composite indicator constructed by the Australian Bureau of Statistics, derived from 1991 Population Census material was used in the present study to classify patients into SES groups. This index was first constructed using data from the 1971 census, and has been reconstructed every five years following each census. A single SEIFA score for any configuration of geographical census areas was derived using multiple weighted variables relating to the economic resources of households, education levels and occupation. It measures different aspects of socio-economic conditions by geographic areas. [ABS 1994a].

This index combined male and female socio-economic status (SES) applicable to defined Australian census areas such as statistical local areas (SLAs) [formerly local government areas (LGAs)] and postcode areas. The smallest area for which the indexes are available is the Collection District (CD). A CD is roughly equivalent to a small group of suburban blocks in urban areas. In urban areas it comprises, on average, about 250 dwellings, while in rural areas it usually contains fewer. CD derived postcodes are approximated by aggregating CDs that lies wholly or partly within the postcode area. [ABS 1994a, 1994b, 1999a; Byth et al 1992].

There are five SEIFA indexes.

(1) Urban Index of Relative Socio-economic Advantage

(2) Rural Index of Relative Socio-economic Advantage
(3) Index of Relative Socio-economic Disadvantage

(4) Index of Economic Resources

(5) Index of Education and Occupation.

Classification of municipalities using the SEIFA index is shown in Table 8. The relatively advantaged area is where many high-income earners have high index values [ABS 1994a,b; 1998a].

An index of relative socio-economic disadvantage, which reflects relatively low educational attainment and income and high unemployment [ABS 1994a,b; 1998a], was used for each municipality in the present study.

The GEHF members were stratified into five groups (quintiles) based on the postcodes from the claim forms. Each member’s residential postcode was assigned a score using SEIFA, ranked and divided into quintiles that are lowest to highest. A higher score reflects higher socio-economic status or least disadvantaged and the lower score reflects the lower socio-economic status or most disadvantaged.
Table 8: Socio-economic status of areas in New South Wales, Australia, indicated by SEIFA Index

Source: ABS 1993d

<table>
<thead>
<tr>
<th>High socio-economic status</th>
<th>Low socio-economic status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highest</strong></td>
<td><strong>2nd</strong></td>
</tr>
<tr>
<td>Ku-ring-gai</td>
<td>Woollahra</td>
</tr>
<tr>
<td>Baulkham Hills</td>
<td>North Sydney</td>
</tr>
<tr>
<td>Lane Cove</td>
<td>Manly</td>
</tr>
<tr>
<td>Mosman</td>
<td>Camden</td>
</tr>
<tr>
<td>Hunters Hill</td>
<td>Ryde</td>
</tr>
<tr>
<td>Sutherland</td>
<td>Kogarah</td>
</tr>
<tr>
<td>Willoughby</td>
<td>Wollondilly</td>
</tr>
<tr>
<td></td>
<td>Lake Macquarie</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Warringah</td>
<td>Concord</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| SES Score *               | 1113                      | 1062             | 1019            | 983                       | 940                        |

| Population 1991          | 814,013                    | 416,835          | 699,170         | 1,185,646                 | 878,794                    |

Note: (a) Population-weighted average SEIFA SES score for aggregated Local Government Areas within quintiles = 999
3.3.3 Statistical analysis

After giving the code numbers for each record, the data were cleaned and analysed by using SPSS for Windows, Professional Statistics program [SPSS 1988]. Incompletely or mistakenly coded records were checked and recoded. Those values that did not have complete information were defined as missing values. The 22 members, whose sexes were not known, were grouped into a category called unknown.

Data was considered on a single calendar year basis and then summed over the four-year study period for analysis.

3.3.3.1 Measuring dental service rates

All counts of various quantities (number of visits, use of item categories of dental services and number of services per year) were utilised to measure the pattern of dental service utilisation. These counts were treated as Poisson random variables. The utilisation rate is compared across socio-economic groups using Poisson regression.

The Poisson regression model was utilised to analyse Poisson count variables with a Poisson error function and a logarithmic link function and has the form:

\[
\log(C_{ijklmn}) = b_0 + b_j \text{Age}_{ij} + q_k \text{Sex}_{ik} + g_i \text{length of membership}_{il} + s_m \text{socioeconomic differences}_{im} + r_n \text{geographical location}_{in} + \epsilon_{ijklmn}
\]

\[\text{i = ith subject, i=1,2,...,n_{jd}}\]

\[\text{j = jth age category, j=1,2,...,7}\]

\[\text{k = kth gender, k=1,2}\]

\[\text{l = lth length of membership category, l=1,2,...,6}\]
m = mth Index of Relative Socio-Economic Disadvantage category,
   m=1, 2, 3,

n = nth Rural, Remote and Metropolitan Area Classification category,
   n=1, 2, 3

ε = residual or error term

C is the count per person year, the terms b, q, and g, s and r represent vectors of (log) relative rates corresponding to each subject characteristic, while ε represents an error term or residual. Coefficients from the regression model indicate relative utilisation ratios (and its 95% confidence interval) which are expressed as a ratio of the utilisation rate in a given socio-economic status group compared to that of the selected referent group, which was chosen as the highest socio-economic status group. Therefore the estimated ratio of cost is obtained by exponentiating the regression coefficient.

As the data did not follow a simple Poisson distribution and exhibited more dispersion than expected, the scale parameter based on the deviance was utilised to correct for over dispersion in the calculation of standard errors and, therefore, of confidence intervals.

The large database presented computational difficulties if approached in unit record format. Hence data summaries (counts) were derived for utilisation data and ‘at-risk’ data. The two summarised data formats conducted in the SPSS system [SPSS Inc 1988] where descriptive tabulations were formed and then read into the SAS statistical program [SAS Institute 1990] for Poisson regression analysis.
3.3.3.2 Measuring cost

Each of the three indices used in this study quantified a distinct aspect of cost. Costs are described in 1995 Australian dollar value adjusted for inflation using The Consumer Price Index for Australia [ABS 1996b].

Cost per service provides insight into the nature of individual items of dental service, which can be obscured in total costs. Cost per patient visit measures cost at a visit depending on how many services are received per visit. Cost per patient-year calculates cost of services provided to each patient over multiple visits per unit of patient time. For this reason cost per patient-year can be described as the bottom line in determining the cost of dental services.

A statistical modelling approach was adopted to examine the independent effects of socio-economic status group after controlling for the potential confounding variables of age, gender, length of membership, and geographical location, on cost of dental service indices described above. Due to the highly skewed distribution of cost data the Weibull distribution [Alfblesch & Prentice 1980] was identified as being appropriate. This was confirmed by inspection of a Q-Q plot of residuals of the final fitted model. For each cost index, a single model was fitted, which includes terms for each of the study factors listed above. Differences between specified socio-economic status group and the referent group are reported as ratio of means along with 95 per cent confidence intervals and p-values.
Models were all of the following form:

\[ \ln(\text{Cost}_{ijklmn}) = b_0 + b_j \text{ Age}_{ij} + q_k \text{ Sex}_{ik} + g_l \text{ length of membership}_{il} + s_m \text{ socioeconomic differences}_{im} + r_n \text{ geographical location}_{in} + \epsilon_{ijklmn} \]

- \( i = \) ith subject, \( i=1,2,...,n_{ijkl} \)
- \( j = \) jth age category, \( j=1,2,...,7 \)
- \( k = \) kth gender, \( k=1,2 \)
- \( l = \) lth length of membership category, \( l=1,2,...,6 \)
- \( m = \) mth Index of Relative Socio-Economic Disadvantage category,
- \( m=1, 2,...,5 \)
- \( n = \) nth Rural, Remote and Metropolitan Area Classification category,
- \( n=1, 2, 3 \)
- \( \epsilon = \) residual or error term, where cost is the given cost index.

The term's \( b, q, s \) and \( r \) represent vectors of differences between Weibull means corresponding to each subject characteristic, while \( \epsilon \) represents an error term or residual. Coefficients from the regression model are expressed as the natural logarithm of the ratio of the cost in a given socio-economic status group compared to that of the selected referent group, which was chosen as the highest socio-economic status group. Therefore the estimated ratio of cost is obtained by exponentiating the regression coefficient.

Due to the highly skewed distribution of the cost data the median, along with its 25th and 75th percentile, is the preferred measures of central tendency and dispersion to describe overall costs rather than the mean and standard deviation. The means are presented only to enable comparison with other studies.
Data management and individual patient computations were conducted in the SPSS system [SPSS Inc 1988] while statistical modelling was carried in the SAS statistical program [SAS Institute 1990] using Proc Genmod.
4 RESULTS

4.1 CHARACTERISTICS OF STUDY SAMPLE

During the study period, some 67 per cent of insured persons of GEHF were from the New South Wales area. The total number of members, 18 years and over, was 133,467. Fifty seven percent of those NSW members, 75,501 (Table 9), described as patients in this study obtained private general dental practice services and made a claim. The claims data consisted of about 1.4 million items of services.
4.1.1 Age

The mean age of patients was 41.4 years and the median age was 40.0 years. Most of the patients were in the 35-44 year age group (30 per cent) followed by the 25-34 year age group (27 per cent). (Table 9).

Table 9: Number and percentage distribution of the GEHF members* and the patients** who utilised private general dental practice services and made a claim during 1992-1995, by age group.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Total members*</th>
<th>Total patients**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td>18-24</td>
<td>20,100</td>
<td>15.1</td>
</tr>
<tr>
<td>25-34</td>
<td>35,810</td>
<td>26.8</td>
</tr>
<tr>
<td>35-44</td>
<td>36,636</td>
<td>27.4</td>
</tr>
<tr>
<td>45-54</td>
<td>23,427</td>
<td>17.6</td>
</tr>
<tr>
<td>55-64</td>
<td>13,216</td>
<td>9.9</td>
</tr>
<tr>
<td>65-74</td>
<td>3,916</td>
<td>2.9</td>
</tr>
<tr>
<td>75&amp; over</td>
<td>362</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>133,467</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95

** Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund who utilised private general dental practice and made a claim during the study period 1.1.92 – 31.12.95
4.1.2 Gender

There were slightly more female members, 51 per cent compared with males (49 per cent). However, of those 75,501 patients there were significantly more females (55 per cent) than males (45 per cent). (Table 10) (Figure 21).

Table 10: Number and percentage distribution of the GEHF members\textsuperscript{#} and the patients\textsuperscript{##} who utilised private general dental practice services and made a claim during 1992-1995, by gender.

<table>
<thead>
<tr>
<th>Total members\textsuperscript{#}</th>
<th>Total patients\textsuperscript{##}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Female</td>
<td>68,584</td>
</tr>
<tr>
<td>Male</td>
<td>64,883</td>
</tr>
<tr>
<td>Total</td>
<td>133,467</td>
</tr>
</tbody>
</table>

\textsuperscript{#} Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95

\textsuperscript{##} Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund who utilised private general dental practice and made a claim during the study period 1.1.92 – 31.12.95

Figure 21: Distribution of the GEHF members and the patients who utilised private general dental practice and made a claim during 1992-1995, by gender.
4.1.3 Length of membership

Table 11 shows the distribution of members and patients by length of membership. Most of the members (28 per cent) had length of membership for 4 to 7 years. More than one third of the sample had been in the fund for more than 7 years with the mean length of membership being 8.1 years and the median being 6.1 years. Only 3 per cent of members had less than one-year of membership.

Table 11: Percentage distribution of the GEHF members# and patients## who utilised private general dental practice services and made a claim during 1992-1995, by length of membership.

<table>
<thead>
<tr>
<th>Length of member-ship (Year)</th>
<th>Per cent of Members#</th>
<th>Per cent of Patients##</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.7</td>
<td>6.3</td>
</tr>
<tr>
<td>1-&lt;2</td>
<td>4.5</td>
<td>9.9</td>
</tr>
<tr>
<td>2-&lt;4</td>
<td>8.1</td>
<td>19.7</td>
</tr>
<tr>
<td>4-&lt;7</td>
<td>25.4</td>
<td>28.1</td>
</tr>
<tr>
<td>7-&lt;12</td>
<td>30.3</td>
<td>15.0</td>
</tr>
<tr>
<td>&gt;12</td>
<td>28.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

# Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95
## Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund who utilised private general dental practice and made a claim during the study period 1.1.92 – 31.12.95
4.1.4 Geographical location

The majority of the members (64 per cent) lived in the capital city and only 27 per cent lived in the rural and remote areas. Nine per cent were from other metropolitan areas. The majority of the patients who utilised services were from the capital city (61 per cent), while 28 per cent lived in rural areas and 11 per cent were from other metropolitan areas (Table 12).

Table 12: Percentage distribution of the GEHF members\(^\#\) and the patients\(^{##}\) who utilised private general dental practice services and made a claim during 1992-1995, by geographical location\(^*\).

<table>
<thead>
<tr>
<th>Geographical location(^*)</th>
<th>Per cent of members(^#)</th>
<th>Per cent of patients(^{##})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>64.1</td>
<td>60.8</td>
</tr>
<tr>
<td>Extra-metropolitan</td>
<td>9.4</td>
<td>10.9</td>
</tr>
<tr>
<td>Rural &amp; remote</td>
<td>26.5</td>
<td>28.3</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

\(^*\) As defined by the Rural, Remote and Metropolitan Zones classification (Department of primary industries and energy and development of human services and health 1994)

\(^#\) Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95

\(^{##}\) Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund who utilised private general dental practice and made a claim during the study period 1.1.92 – 31.12.95
4.2 SOCIO-ECONOMIC STATUS AND UTILISATION OF DENTAL SERVICES

4.2.1 Frequency and percentage distribution by Socio-economic status, SES (SEIFA)**

The highest percentage, a quarter (25 per cent), of the members were from the highest socio-economic group and only 14 per cent from the lowest SES group. (Table 13, Figure 22). A similar distribution was found with the members who utilised private general dental services and made a claim (the patients). The highest per cent (26) of the patients were from the highest SES group. The lowest SES group showed the lowest percentage (only 14 percent). (Table 14, Figure 23).

Table 13: Number and percentage distribution of the GEHF members## and the patients### who utilised private general dental practice services and made a claim during 1992-1995, by socio-economic status (SES, SEIFA)**.

<table>
<thead>
<tr>
<th>SES (SEIFA)</th>
<th>Total members##</th>
<th>Total patients###</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td>Lowest SES</td>
<td>17,595</td>
<td>13.9</td>
</tr>
<tr>
<td>2nd SES</td>
<td>24,990</td>
<td>19.7</td>
</tr>
<tr>
<td>3rd SES</td>
<td>29,549</td>
<td>23.3</td>
</tr>
<tr>
<td>4th SES</td>
<td>23,574</td>
<td>18.6</td>
</tr>
<tr>
<td>Highest SES</td>
<td>31,248</td>
<td>24.6</td>
</tr>
<tr>
<td>Total</td>
<td>126,956</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing values^</td>
<td>6,511</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>133,467</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

## Any person aged 18 and years over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95

### Any person aged 18 years and over who has ever been a New South Wales member of Government Employees Health Fund who utilised private general dental practice and made a claim during the study period 1.1.92 – 31.12.95

** As defined by the Index of Relative Socioeconomic Disadvantage developed by the Australian Bureau of Statistics [Australian Bureau of Statistics 1998a]

^ Persons who were not fit into definite SES category
Figure 22: Percentage distribution of GEHF members from New South Wales, Australia, during 1992-1995, by socio-economic status (SES, SEIFA)**.

Any person aged 18 and over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95

** As defined by the Index of Relative Socioeconomic Disadvantage developed by the Australian Bureau of Statistics [Australian Bureau of Statistics 1998]
Figure 23: Percentage distribution of the GEHF members who utilised private dental practice services (patients) and made a claim during 1992-1995, by socio-economic status (SES, SEIFA)**.

- **Lowest [SES] 13.5%
- Second 19.5%
- Fourth 18.7%
- Third 22.1%

* Any person aged 18 and over who has ever been a New South Wales member of Government Employees Health Fund during the study period 1.1.92 – 31.12.95

** Any person aged 18 and over who has ever been a New South Wales member of Government Employees Health Fund who utilised private general dental practice and made a claim during the study period 1.1.92 – 31.12.95

*** As defined by the Index of Relative Socioeconomic Disadvantage developed by the Australian Bureau of Statistics [Australian Bureau of Statistics 1998]
The highest proportion of patients, who used private general dental practice and made a claim, for every SES group was from the 35-44 age group (29-30 per cent). (Table 14).

The percentage of the lowest SES members who used the private dental practice was the least for every age group except in 75+ years age group. (Table 15). The highest SES group showed the highest percentage in every age group.