

**SURVEY OF DENTAL SERVICE UTILISATION
BY YEAR SIX STUDENTS IN WESTERN SYDNEY AREA**

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SUMMARY

Over the last few decades, the Australian community has experienced a great decline in dental caries experience. The rapidly growing population of the Western Sydney area, with such rapidly changing oral health status, requires particularly careful planning in regard to the evaluation of current dental services, the development of dental care programmes and the assessment of dental workforce requirements if problems of imbalance between dental workforce and the demand for dental treatment are to be avoided.

In order to gather information to enable this planning, the writer conducted a descriptive behavioural survey on dental service utilisation by Year six students in the Western Sydney area from 28 July to 19 August 1993. A stratified cluster sample of 1,180 Year six students from fifteen representative government and Catholic schools in the area were invited to complete a questionnaire survey in class. Only students with parents' permission were allowed to participate and 603 responses were complete enough for analysis. The results were analysed by computer SPSS programme and compared with the previous ABS 1979 and 1983 studies, and also with the 1987-88 NOHSA. The major findings of this survey on the Year six students were:

- (1) Private dental insurance held: yes 32%, no 40%.
- (2) About 7% of students did not brush their teeth on the previous day.
- (3) The mean number of times teeth brushed per person each day was 1.7.
- (4) Dental service utilisation in previous 12 months: yes 71%, no 27%.
- (6) The average number of dental visits per person visiting was 1.8 in the previous 12 months.
- (7) About 4% of students had never made a dental visit.
- (8) Main reason for not visiting in the previous 12 months: no problem with teeth 61%, too expensive 6%, other reason 11%.
- (10) Perceived availability of School Dental Service at school: yes 45%, no 39%.
- (11) Utilisation of the School Dental Service: yes 47%, no 48%.
- (12) Reason for not using the School Dental Service: use a private/family dentist 48%, no problem with teeth 17%, other reasons 14%.
- (13) Period since last used the School Dental Service for those who had used the service: 12 months or less 60%, more than 12 months 28%.
- (14) Current availability of dental appointment: yes 36% (23% has appointment for a check-up, 12% for a special dental problem), no 53%.
- (15) Usual number of check-ups per year: once a year 32%,

twice a year 36%, three or more times a year 15%, less than once a year 17%.

(16) Purpose of the most recent dental visit: check-up 64%, other reason 34%.

(17) Place of last dental visit: private dental practices 34%, school dental clinics 27%, hospitals 13%, dental clinics 17%, other places 3%.

(18) Treatment received at last dental visit: teeth cleaned or polished 32%, check-ups/no treatment 31%, fluoride treatment 23%, dental fillings 22%, dental x-ray 18%, teeth extracted 14%, orthodontic treatment 4%, other treatment 4%. The mean treatment per person per visit was 1.47.

(19) Use of orthodontic treatment service: currently wear braces/bands 2.4%, used to wear braces/bands but not now 4.7%, never worn braces/bands 90.4%.

The dental disease, treatment and dental service utilisation patterns showed some variations from the more representative national samples of previous studies. Nevertheless, the findings of this survey tend to follow the general trend for the pattern of dental services to change towards more diagnostic and preventive procedures.

Industrialised countries have shown that the preventive approach succeeds and that the curative/rehabilitative approach does not. The dental services should continue the present emphasis on preventive approach and oral health education. Schools should also be a place where dental health education messages are transmitted to students. Dental health education programmes should be based on modern health education principles and methods to motivate behaviour change. It should be designed and delivered in a form culturally acceptable by the recipients. Evaluation of outcomes of dental health education programmes should be carried out at regular intervals to monitor the effectiveness of the programmes in achieving the set goals and objectives.

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Dedicated to my mother

and

In memory of my father

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LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
LGA	Local Government Area
LGA's	Local Government Areas
NOHSA	National Oral Health Survey of Australia
TAFE	Technical And Further Education
WSAHS	Western Sydney Area Health Service

1 INTRODUCTION

1.1 BACKGROUND

The dental disease pattern of the Australian community is rapidly changing. Over the last two decades, Australia, like many industrialised countries, has experienced a great decline in dental caries prevalence.

In 1956, the DMFT for 12 year old children in Australia was reported to be as high as 9.3 (Barnard 1956).

Carr (1988) reported there has been a reduction of caries experience (DIMF) from 4.79 in 1977 to 2.13 in 1985. There was an increase of 233% in the proportion of 12 years old children with no DIMF teeth from 10.4% in 1977 to 34.6% in 1985 (Carr 1988).

Barnard (1993) reported the DIMFT at 12 years of age to be 1.8.

Such rapid decline of dental caries has serious implications for oral health manpower. As a result of the changing pattern of dental disease there will be a consequent change in dental treatment. Careful planning, which requires correct and continuing information about oral health status, treatment needs and attitudes of the community is essential if problems of imbalance between dental workforce and the demand for dental treatment are

to be avoided.

There has been many studies carried out on schoolchildren in Australia. In 1979 and 1983 the Australian Bureau of Statistics had undertaken two children's dental surveys to provide dental behavioural information. These are:

(1) Australian Bureau of Statistics (1980).

Sight, hearing and dental health (persons aged 2 to 14 years). February - May 1979.

Canberra: ABS Catalogue no. 4337.0

(2) Australian Bureau of Statistics (1985).

Children's dental survey, Australia. November 1983.

Canberra: ABS Catalogue no. 4350.0.

In 1987-88, the first national clinical community survey providing important information concerning dental disease and abnormality affecting both adults and children in Australia was carried out. The results are summarised in:

Barnard PD (1993).

National Oral Health Survey of Australia 1987-88.

A report of the first national oral health survey of Australia.

Canberra: Australian Government Publishing Service.

1.2 THE NEED FOR A STUDY IN THE WESTERN SYDNEY AREA

The National Oral Health Survey of Australia 1987-88 provides very important and useful information particularly for planning purposes with regard to dental manpower needs, dental under-graduate and continuing education and dental services on a national level. However, the lack of up to date and continuing information about the rapidly changing oral health status, attitudes of the community, and demand for the dental services at a regional level like Western Sydney area is a serious limitation to assessment of current dental services, planning of dental care programs and estimation of dental workforce requirements for the area.

Western Sydney area is chosen for this study because the writer is convinced that Western Sydney is under resourced in public health service both in absolute terms and in relation to other areas of N.S.W. Western Sydney is the most poorly resourced region of N.S.W. Across the State, there are an average of 4.61 acute hospital beds per 1,000 population. Western Sydney has only 3.11. Across Sydney, an average of \$496.53 was spent per person in public health care in 1987/88. In comparison, only \$358.11 was spent in Western Sydney residents (Western Sydney area health taskforce - New South Wales 1988).

This under resourcing is the result of an historic failure to increase health resources commensurate with an

increase in population growth. Western Sydney's population is growing rapidly. A report in 1988 stated that the region was growing at a rate equivalent to 104 persons per day and by 2001 Western Sydney's population will exceed that of the rest of Sydney. This population of the community is characterised by a young age group and economically less advantaged. Also, The current financial system has failed to recognise this growing need for health services. Budgets are established upon historical expenditure patterns and there is no allowance made for increasing health care needs (Western Sydney area health taskforce - New South Wales 1988).

1.3 AIMS OF THE THESIS

The aims of this thesis are:

- (1) To review the literature in dental service utilisation.
- (2) To collect and analyse data on:
 - (i) utilisation of dental service
 - (ii) utilisation of the School Dental Service
 - (iii) factors contributing to non-utilisation of dental service and
 - (iv) number of times teeth brushed per day by schoolchildren in the Western Sydney area.

1.4 ANTICIPATED BENEFITS

The information collected in this survey will be of great value in:

- (1) planning for future dental service and dental workforce requirements in the Western Sydney area.
- (2) giving some indications of schoolchildren's oral health status; their accessibility to dental service and if any modification of the present dental care delivery system is required.
- (3) establishing baseline data for comparison with future surveys and
- (4) comparing with previous studies for possible changing patterns in dental service utilisation.

The writer also benefits by gaining invaluable experience and learning how to conduct a survey and analyse the results properly so that the writer can conduct similar surveys in Hong Kong in future.

2 LITERATURE REVIEW

2.1 INTRODUCTION

The available literature indicates that, with respect to standards of unmet need, dental service utilisation is at a low level relative to the utilisation of other types of medical services (Gift 1984).

There are several definitions of utilisation in the literature. The annual number of visits per person is a common measure of utilisation. The major problem with using annual visits as a measure, however, is that all visits are treated with equal weight without regard to the quality or quantity of services (Gift 1984).

Another frequently used measure of utilisation is the proportion of persons visiting the dentist within a year. Though providing a good public health measure that reflects the contact of the public with the dentist, this measure's value is diminished because all visits are equalised (Gift 1984).

There are many factors that affect the utilisation of dental service. This chapter is devoted to reviewing the available literature on this issue.

2.2 FACTORS AFFECTING UTILISATION OF DENTAL SERVICE

2.2.1 SOCIO-DEMOGRAPHIC VARIABLES

The utilisation of dental services is known to be related to a number of socio-demographic variables such as age, sex, race and ethnicity, income, occupation, education, socioeconomic status and geographic location. Over the years there have been many studies on utilisation relating to these variables.

2.2.1.1 Age

The age-utilisation patterns fall in an inverted U-shaped curve, with the very young and the very old groups utilising services less than the adolescents and young adult groups.

In a nationwide survey in the United States, Newman and Anderson (1972) found utilisation pattern was in an inverse U-shape. Utilisation was low for the youngest age group (2-13 years); highest for those 14-24 years; followed by a constant decline for the remaining ages.

In an extensive literature review, Gift (1984) stated that utilisation patterns typically fall in an inverted U-shaped curve. The very young and very old seldom use dental services. Adolescents and young adults have the highest use of services. A moderate decline in use is observed in middle age.

Many European studies report the highest use of services during school age as result of school delivery system, with declining visits after school age. The height of the inverted-U curve is at an early age. Up until the age of 6, most people have had little contact with a dentist. After age 10, there are few people who have never been to a dentist (Gift 1984).

Some research shows a changing trend in age relationships. Increases in utilisation are being found among the elderly and the very young. If this trend continues, the inverse U-shaped curve will level out, ultimately eliminating predictive relationships between age and utilisation (Gift 1984).

The ability to perceive need for dental treatment is the major determinant in dental service utilisation among the elderly (Demers, Simard, Kandelman 1988; Kiyak 1989).

In the National Oral Health Survey of Australia 1987-88, it was found that utilisation of dental services was greatest in children 5-14 years, especially in States with extensive school dental service coverage, and least in those over 65 years. The elderly group had less private dental insurance (26%) compared to the overall average (46%), and was much more dependent upon government than other adults groups (Barnard 1993).

In the U.S.A., Hayward, Meetz, Shapiro and Freeman (1989) found dental visits were most common for children 6-16 years of age and least common among those under 6 years of age, followed by persons 65 years of age or older.

The traditional pattern of relatively low use of dental services by older adults was once thought to come from loss of interest in dental health with age, but it is now clear it is related to loss of teeth rather than interest (Burt, Eklund 1992).

2.2.1.2 Sex

The traditional pattern is that females utilise dental services more than males. This relation, however, appears to be diminishing in some of the more recent studies.

In a study on 2013 urban adults in greater Tel Aviv, Jerusalem, and Haifa, in Israel, Shuval (1970) found women reported more preventive dental behaviour than men.

In a survey on 1,482 American adults in 1968, Cohen and Fusillo (1971) found women more likely than men to have visited the dentist within the previous year and only slightly more likely to have gone for preventive reasons than men.

In the U.S.A., Newman and Anderson (1972) found females utilised services more than males. Mean expenditures on

dental services for females were greater than males for all age categories. Mean visits followed a similar pattern with the exception of the 14-24 age group where the mean number of visits for both sexes was the same. Overall, the greatest difference in utilisation by sex occurred in the 25-44 years category.

In a survey of 279 employees of a paper mill in Finland, Rajala, Rajala and Paunio (1978) found differences in dental visiting patterns between sexes were not as great as in previous studies.

The Iowa survey of oral health 1980 (1982) showed females utilised dental services more frequently than males.

In a study on 1,302 individuals aged 20-60 years in Sweden, Eriksen and Hakansson (1982) found that in all age groups, women had a higher frequency of dental visits than men.

From a study on a group of 642 South Australian industrial employees, Srikanthi, Carey and Clarke (1983) found there was no significant association between time intervals since the last dental visit and sex.

In a study on 1,655 16-22-year-old males and females in Denmark, Antoft (1983) found women were 'more frequently constant users' than men.

Many studies indicate a larger portion of females than males saw a dentist during the past year, had a more recent dental visit, and had more visits per year. This relation appears to be diminishing in some of the more recent studies. Females entering the labour force in proportions more like males levels and acquisition of values more similar to each other may account for convergence of male/female dental care patterns in recent years (Gift 1984).

In a survey on 160 Pakistan immigrants in Norway, Selikowitz and Holst (1986) found a larger proportion of women had visited the dentist, with the exception of the youngest men, and the proportion of the participants who used the services decreased with increasing age. These differences were, however, not significant.

Sex has consistently been related to patterns of health care utilisation. This may be because men and women view the sick role and evaluate health service differently (Reisine 1987).

In a survey on 750 subjects attending the Dental Faculty, University of Malaya, Razak and Jaafar (1987) found overall there was no appreciable difference in service utilisation between men and women. The attendance behaviour of women was more preventively oriented and more inclined towards rehabilitation compared with that

of men.

In a study in which 500 adults attending the University dental centre in Malaysia were randomly selected and analysed by sex and ethnic group, Jaafar and Razak (1988) found women more likely to use rehabilitative and preventive services than men. A greater need for rehabilitation among women may either reflect more concern for aesthetics than men or a faster rate of tooth loss requiring rehabilitation.

In the National Oral Health Survey of Australia 1987-88, it was found more females utilised dental services. Differences between males and females were not marked. (N=16,897) (Barnard 1993).

2.2.1.3 Race and ethnicity .

A number of utilisation studies have focused on only one racial group (primarily Caucasians). The most consistent finding regarding race/ethnicity is that a larger proportion of whites than non-whites use dental services (Gift 1984).

In the U.S.A., Newman and Anderson (1972) found whites utilised services more than non whites.

From a survey in 1969 and 1970 on preschool children aged between one and six years in the United States, Infante

and Owen (1975) found black children had greater caries experience and less level of treatment compared with white children.

From a study in the Nelson County, Virginia, Horowitz and Korts (1976) found the backlog of accumulated dental needs was greater in blacks than in whites.

In the U.S.A., Strauss (1976) found the two major racial groups (black and white) had highly significant differences in perception of dental services, experiences with dental disease and treatment. This related to different patterns in seeking recent preventive dental services and a marked disparity in utilisation early in life. Fear and anxiety about dental care, degree of orientation towards prevention and differences in exposure to preventive information varied with race (N=180).

A long-standing gap in dental utilisation in the United States exists between blacks and whites and between poor and non poor. These continuing inequities in dental utilisation have been attributed to the lack of access to dental care. The average dental visit rates among blacks and the poor remain far below rates for whites and the non-poor (Okada, Wan 1979).

From a study in Malaysia, Jaafar and Razak (1988) found

most Malays and Indians attended clinic because of toothache, whereas most Chinese who attended clinic requested check-up and dentures. Although culturally different, Malays and Indians shared a remarkably similar pattern of utilisation compared to the Chinese. Racial groups may view the functions of the dental services differently perhaps as a result of different value systems, beliefs, perceptions and therefore attitudes (N=500).

In the U.S.A., Hayward et al (1989) found among all respondents, 65% of whites had a dental visit within the past year, compared to 50% of blacks and 55% of Hispanics ($p < 0.01$). Among the poor respondents, no significant differences were found among whites, blacks and Hispanics. Most of the differences between blacks and whites in dental visit frequency were due to non whites being less likely to receive preventive dental care (N=9,352).

Utilisation data are not easy to interpret because race and ethnicity in the United States are inextricably related to wealth and poverty, education, cultural value, and residential location. Hispanics and African-Americans also suffer historically from the deliberate exclusion from many care facilities. There have been very few dental providers from these groups down the years. Most probably socioeconomic factors have largely determined

the use of dental services, and middle class African-Americans and Hispanics use dental services much the same way as anyone else does (Burt, Eklund 1992).

This relationship between race, ethnicity and socioeconomic factors in relation to dental service utilisation probably also holds for other countries.

2.2.1.4 Income

The relation between income and utilisation reported in the literature is a direct and positive one: as income increases so does utilisation, with the differences showing up more in income extremes. The association is not entirely linear. There are bigger gaps between some income groups than others (Gift 1984).

It may not be the buying power of the income per se that is the explanation, but rather cultural or value differences within the income groups. Fee and cost barriers have different impacts on each socioeconomic groups. Different income groups consume different types of dental services when they do go for service and use different types of facilities, possibly reflecting traditional or patterned beliefs about the appropriateness of certain types of care or differences in access. Members of lower class groups are less likely to recognise symptoms. The ability to pay is not an isolated barrier. It must be considered in the broader

context of individualised responsibilities, community services, and system characteristics (Gift 1984).

Dental treatment is the most sensitive of all the health services to variations in family income. Family income remains an important factor in determining whether individuals attend for dental service even when the financial barrier to receiving care is reduced. This indicates that socially determined patterns of behaviour associated with high incomes are often related to high-status occupations and good educational background, because these three factors are often positively associated with each other (Sheiham 1981).

In the U.S.A., Newman and Anderson (1972) found income directly related to utilisation. Differences were not great at lower income levels. Ability to pay and the family's prior income level was directly related to utilisation.

In the U.S.A., Leverett, Hooper and Russell (1977) found salaried employees and families more likely to use a company-sponsored dental plan than hourly paid employees and families (N=1,896).

In a study on 279 employees of a paper mill in Finland, Rajala, Rajala and Paunio (1978) found people in the higher income groups used more dental services than

people in the lower income groups. The higher income groups visited the dentist more often because of regular dental check-up and less because of toothache.

The Iowa survey of oral health 1980 (1982) found as family income increased, the proportion of people with recent visits to the dentist also increased.

In a study on 5,151 Danish adults, irregular dental visits were frequently found in the low income groups. The indirect costs may have an effect. Usually dental visits have to take place during working hours which means a reduction in wages to these groups (Petersen 1983).

In a survey on 642 South Australian industrial employees, Srikanthi, Carey and Clarke (1983) found regular visits were made more often by subjects in the higher income level.

In the U.S.A., Hayward et al (1989) found low income persons had fewer dental visits, particularly for preventive care, but more visits for dental emergencies than higher income respondents. Possible explanations included financial barriers, unavailability of accessible providers, ignorance of the benefits of preventive dental care, differences in attitudes, or beliefs about dental care (N=9,352).

From a study in 1987 on 490 Hong Kong Chinese Civil Servants eligible for a freely available government dental service, Mak, Lind and Evans (1990) found regular users had a higher income level than the irregular and non-users of the dental service.

2.2.1.5 Occupation

Frequently, the measure of occupation used is that of the head of household, although occupation is sometimes identified for each individual in the study (Gift 1984).

A direct relationship exists between occupational status and frequency of dental visits. Persons in professional occupations visit their dentists more frequently than semi- or non- skilled manual workers. Members of professional families are also more likely than manual workers to go for preventive visits (Sheiham 1981).

Available findings indicate lower use among the unskilled and semi-skilled population than among those in higher level occupations, with the highest utilisation rate found among professional/executive level occupations. The majority of workers in the middle range of occupations do not exhibit utilisation patterns that differ dramatically from each other (Gift 1984).

In the U.S.A., Newman and Anderson (1972) found the higher status occupation (professional - managerial and

clerical - sales) had more recent utilisation of dental services than either middle status occupations (craftsman - foreman, operative, and service workers) or low status occupations (farmers - farm labourers and labourers).

Petersen (1981) found non-shift workers had better use of services.

The Iowa survey of oral health 1980 (1982) found in general, service workers, labourers and farm labourers tended to utilise services more infrequently than professionals. The semi-skilled and farm labourers seemed to be least likely to utilise frequently.

Srikandi, Carey and Clarke (1983) found regular visits were made more often by subjects in the higher occupational level in a group of 642 South Australian industrial employees.

From a study in Denmark, Petersen (1983) found the effect of work in shifts was not significant. This could be explained by the fact that fewer persons in the present study had participated in shifts for long periods (N=5,151).

In a study on 446 employees of two industrial plants in England in 1980, Sheiham, Maizels, Cushing and Holmes (1985) found regular attendance was more frequently

observed in non-manual than manual workers.

2.2.1.6 Education

Most often education of the head of household has been the primary measure used, but within a household each individual's education has frequently also been considered in relation to dental utilisation (Gift 1984).

Generally, utilisation increases as the level of education increases. Gaps in utilisation pattern between the very poorly educated and those with moderate education are larger than the differences in utilisation among other educational groups such as high school and college graduates (Gift 1984).

In the U.S.A., Newman and Anderson (1972) found as education of head of household increased, utilisation also increased.

From a study in Finland, Rajala, Rajala and Paunio (1978) found subjects with higher education used dental services more regularly than those with less education. The clearest difference was observed between people with high school education or more and other groups (N=279).

The Iowa survey of oral health 1980 (1982) found as education level increased, the proportion of people with recent last visits to the dentist also increased, and the

proportion of people with infrequent visits to the dentist tended to decrease dramatically. Individuals with less than 11 years of education were much more likely to have infrequent visits to the dentist.

From a study in Denmark, Petersen (1983) found persons graduating from high school and secondary school had more regular visits than persons who had only completed primary school (N=5,151).

In the U.S.A., Hayward et al (1989) found those with fewer than 12 years of education were less likely to have had annual dental visits than those with a high school education or college degree (N=9,352).

From a study in Hong Kong, Mak et al (1990) found regular users had a higher educational standard than the irregular users and non-users (N=490).

2.2.1.7 Socioeconomic status

Socio-economic status (SES) as a composite measure of income, occupation and education is hypothesised to be related to use, but has not been used frequently in research because it is difficult to measure (Gift 1984).

There is a close relationship between social class and utilisation of dental services; higher social classes utilise the dentist more frequently than the lower social

class (Sheiham 1981).

Numerous studies have found utilisation of dental services increases as social status increases. Researchers have suggested the quality of life or lifestyle of each social class, as well as different levels of knowledge, are at least partially responsible for the utilisation differences found (Gift 1984).

In a survey in Denmark, Jensen (1974) found among the 35- to 45-year-olds, 84% of the high socioeconomic status group made regular dental visits, as opposed to 55% of the middle and 37% of the low socioeconomic status group (N=2,071).

In the U.S.A., from the analysis of data from 1,155 preschool children, Infante and Owen (1975) found that the lower socio-economic status children had greater caries experience and lower levels of treatment manifested by restoration of, or extraction of teeth, compared with children in the middle socio-economic group.

In a 1972 survey on 1,895 first year students of Sydney metropolitan State high schools in Australia, Barnard (1976) found more children in the working class group had never visited a dentist. They were less likely to have had a checkup but more likely to have had extraction at

their last visit. The average length of time since last visit to dentist was 11 months compared with 6.7 months for the upper-middle and lower-middle socio-economic groups.

From a study in Denmark, Antoft (1983) found individuals from the higher social groups were 'more frequently constant users' than individuals from the lower social group (N=1,655).

Socioeconomic status is directly related to use of dental services. The reasons for this relationship are complicated. Values and attitudes are naturally different. Many of the poor are from backgrounds in which dental care was virtually nonexistent. Lower socioeconomic status groups are less able to afford care when it does exist. Since there are fewer dentists in lower socioeconomic status areas, care is usually less available. Dental insurance has made some difference to the problem of affording care, but when the cost barrier is completely removed there are still marked differences in use of dental services among the different socioeconomic groups (Burt, Eklund 1992).

2.2.1.8 Geographic location

Proportionately more persons in urban than in rural areas visit the dentist, and the urbanites visit more regularly (Sheiham 1981).

Urban location or residence in the larger metropolitan areas has been found to be associated with higher rates of utilisation. Community type has been found to be associated with levels of utilisation. Although the differences are small, the use of dental services increases with the density of the population from farm to rural non-farm, to suburban, to central city. Cultural barriers such as lack of familiarity with appointments and other system characteristics appear to be greater in rural areas. Use of services has been found to be higher in areas with higher socioeconomic status (Gift 1984).

In the U.S.A., Newman and Anderson (1972) found a steady decline in utilisation from large urban to rural farm inhabitants. Major differences, however, were between the urban area categories and the rural non farm and rural farm areas.

Ashford (1978) showed the use of dental services provided under the aegis of the National Health Service in the regions of England and Wales was closely associated with the supply of care. Regions with relatively few dentists per capita also had a relatively low per capita use of

services but a relatively high proportion of emergency treatments and gave greater emphasis to extraction as opposed to conservation.

The Iowa survey of oral health 1980 (1982) found people in Northeast Iowa more likely to report frequent utilisation of dental services than in the South and Northwest. The differences between urban and rural residents were very small. They said that urban/rural residence made very little difference in terms of reported last visit.

In an investigation of a study that had been conducted on 1,302 individuals aged 20-60 years in Sweden, Eriksen and Hakansson (1982) stated the reason for residents of metropolitan areas making more dental visits than those in small towns and rural areas was probably due to a higher density of dentists in the metropolitan areas.

From a study in Denmark, Petersen (1983) found persons living in urban areas had more regular dental visits (N=5,151).

In the U.S.A., Hayward et al (1989) found urban whites more likely than rural whites, and urban blacks more likely than rural blacks to have visited a dentist within the past year. However, Hispanics had similar rates for making annual dental visits in both urban and rural areas

(N=9,352).

Suburbanites are the most frequent users of dental services in the United States, 61.4% of them reporting a dental visit within the last year in 1986. There were 54.3% of central-city residents who reported a visit, and 52.3% of people outside metropolitan areas. Almost certainly these distributions are closely related to socioeconomic status and race/ethnicity, perhaps also to age and dentate status (Burt, Eklund 1992).

2.2.2. STRUCTURAL VARIABLES OF DENTAL CARE DELIVERY SYSTEM

Dental service utilisation patterns have also been found to be related to a number of structural variables of dental care delivery system such as: organisational characteristics of the dental care delivery system, previous contact with the delivery system, delivery systems/alternatives to traditional care, access to dental service, having a regular source of care, and prepayment and financial assistance.

2.2.2.1 Organisational characteristics of the dental care delivery system

There are different advantages in structured and unstructured systems. Motivational variables are more relevant when an individual is free to choose when and where to receive services. Utilisation is an important predictor of oral health status only in those systems which are unstructured, i.e. systems in which there is no fixed system which enables or even requires regular checkups and treatment (Gift 1984).

While the student data from two highly structured school based dental care systems in the International Collaborative Study reveals their kind of organisational approach can result in very low levels of unmet need for students, the amount of unmet need from adult samples in those same areas approximates that found in two other

systems where children do not receive special treatment. The results of the adult data, reported in 1976 at the FDI meeting in Athens, suggest even the best school dental care system may not be able to effect a satisfactory level of oral health on a long term basis (Cohen 1978).

The more a dental care system incorporates the structural elements indicated by an open system approach to oral health, the greater the individual compliance will be required and the greater will be the unmet needs of both children and adults. The more a dental care system incorporates the structural elements indicated by the structured system, the less will be the individual compliance required and the more comprehensively will the dental needs be met (Jenny 1979).

Taking the services to the target population as in school based treatment programs will guarantee almost all persons will become users of dental services while they are eligible for these programs, but a significant number will not remain in the effective demand category once they leave the program, and one must weigh the costs against long-term benefits (Douglass, Cole 1979).

2.2.2.2 Previous contact with the delivery system

Previous contact with the dental delivery system is one variable which may explain the differences in utilisation rates associated with other variables such as age and education (Gift 1984).

Persons with more recent visits are more likely to have had another visit earlier in the same year. Having a positive experience in the dental delivery system may provide the persons with the incentive to continue to visit the dentist. Reducing the impact of the school system by leaving it early, in combination with lower socioeconomic status, has a detrimental effect on adult utilisation. Previous experience with the dental care system is also dependent on cultural values and traditions. In some cultures children are exposed to school dental services. There is a tradition of regular care for children and young adults. This is not necessarily associated with continued regular care in adulthood (Gift 1984).

Positive attitudes towards preventive health measures are determined by previous interactions with the health care system rather than the result of health education efforts aimed at creating positive attitudes (Douglass 1971).

Thornberry, Yacovone, Walker and Scott (1975) showed that for persons who saw a dentist, there was little

difference in the number of visits per person per year across income levels. After the first interaction with dental care, dental care seeking behaviour was supported and stimulated by this experience.

From a study in Kentucky, Murray and Wiese (1975) found a rather strong relation between satisfaction with care and the utilisation of dental services. As satisfaction with dental care increased utilisation of services also increased. Some reasons given for non-utilisation of dental services were also reflected in the reasons given for dissatisfaction with the care (N=40).

Attitudes and beliefs regarding good dental health do not precede but rather are formed by experience with health behaviours and interactions with the health care system (Douglass 1979).

A survey was conducted in 1980 on 581 15-50 years Finns. The results may indicate once the accessibility and financial barriers to utilisation of dental services are overcome the character of the treatment itself should not greatly hinder regular visits (Murtomaa, Masalin 1982).

From a study in England, Kent (1984) found dental patients' satisfaction with their care was related to their utilisation of dental services and their intention to stay with a particular dentist should they move

further away (N=80).

In a survey on 94 patients visiting the University of Connecticut dental clinics in Finland, Alvesalo and Uusi-Heikkila (1984) found there was a positive and significant correlation between degree of utilisation and satisfaction with care.

2.2.2.3. Delivery systems/Alternatives to traditional care

The emergence of delivery systems alternative to traditional care, and changing payment arrangements following in the wake of changes in prepayment and insurance clearly may have an impact on the utilisation of services and the potential removal of some barriers to care.

In the U.S.A., the traditional and predominant manner of delivering dental care is through a fee-for-service private practice system. Alternative dental care delivery systems include department store practices, hospital dental services, health maintenance organisations, the independent practice of dental hygiene, and denturism. To draw final conclusions about the efficacy and effectiveness of these systems require further research efforts. The system which best control costs, increase accessibility, and enhance quality will gain the competitive edge (Rovin, Nash 1982).

In the U.S.A., only 2% of the population had any private dental coverage in 1967. By 1981, 38% had private dental coverage (Manning, Benjamin, Bailit, Newhouse 1985).

From a study on 4,815 dentate people between ages 6 and 61 years in the U.S.A., Bailit, Newhouse, Brook, Duan, Goldberg, Hanley, Kambery, Spolsky, Black and Lohr (1985) found the dramatic increase in coverage had led to the use of more services as well as a more expensive mix of services for those who visited the dentist.

From a study in the United States, insurance appeared to stimulate the utilisation of dental services above national norms. The major beneficiary appeared to be children from low-income families and/or who had parents with little formal education (N=1.2 million) (Grembowski, Conrad, Milgrom 1985).

One strategy for enhancing oral health behaviours of older people is to provide alternative dental care delivery systems such as satellite clinics in areas with high concentrations of elderly, establishing specialised geriatric clinics or integrating dental with medical clinics for older people, or developing mobile dental units (Kiyak 1989).

From a study in the U.S.A., Handelsman, Fan-Hsu and Proskin (1990) found although private practices were the

most favourably perceived, alternative types of practice were also highly rated and met specific patient needs (N=526).

In the U.S.A., the 1986 data showed 70.1% of those with private dental insurance visited a dentist within the last year, compared to 49.9% of those without. Prepayment and insurance in the dental delivery system may have an impact on the utilisation of services and can substantially reduce the financial burden of dental care (Burt, Eklund 1992).

Since the mid-1960s, there has been a significant increase in dental insurance coverage in the United States. In 1984, 102 million people were covered with dental insurance through their workplace. This is over a twentyfold increase in dental insurance coverage since 1967. By 1987, however, the trend of increasing dental insurance ended. The number of people with dental insurance in 1987 declined to 95.6 million. An additional 15-20 million are covered to some extent by state Medicaid programs. The remaining approximately 120 million Americans are without any dental coverage. The drop in dental benefits has been attributed to: a decline in jobs that traditionally provided dental insurance; increases in the cost of health insurance that have caused some employers to drop dental insurance; and cafeteria plans (flexible benefits) have allowed

employees to switch to other benefits such as day care in place of dental insurance. The recent decline in dental coverage indicates it is unlikely that dental benefits will be expanded to a majority of Americans through their workplace (Damiano, Shugars, Johnson 1992).

2.2.2.4 Access to dental service

The literature indicates that improved access to dental services increases utilisation. A greater concentration of dentists is associated with dental service utilisation (Gift 1984).

In the U.S.A., Kegeles and Arbor (1963) reported the distance a person had to travel to get care was found to influence the frequency of preventively oriented dental visits made (N=430).

Travel time, especially in rural areas, has not been important if the need perceived by people impels them to attend care facilities (Cohen 1978).

Access to dental care is not limited to a measure of the distance from the patient to the dentist, but includes the time costs of waiting time for an appointment, the availability of a dentist who will agree to special financial arrangements for certain patients, and the convenience of keeping the appointment, which is also closely related to socioeconomic level. The lower social

level person is more likely paid by hourly wages, whereas the higher level professional is usually paid by salary and has more freedom to set his own work time. It is more costly for the lower socioeconomic level person to take time off for a dental appointment, more complicated since he must request leave and may experience greater transportation problems (Douglass, Cole 1979).

In the U.S.A., Avery, Moore and Berry (1980) found the location of dental care had a marked influence on utilisation of services. The higher number of visits reported when dental care was rendered on-centre against off-centre probably resulted from both the greater accessibility and the lower cost/visit to the program as transportation difficulties were eliminated and waiting time was reduced.

From a study in the U.S.A., Avery, Moore and Hamby (1982) found utilisation of onsite dental care was greater than offsite dental care. The number of routine dental visits per person per year was more than twice as great when services were available onsite.

Lack of access is one of the barriers to oral health care. Problems of access exist even in countries with abundant resources for oral health care. To improve access, non-ambulatory, homebound and institutionalised patients may need portable dentistry programs and

treatment facilities inside institutions. Dental associations should encourage professional institutions to remove barriers caused by uneven distribution of dentists, such as professional placement programmes. Public health authorities should provide increased support for oral health facilities suitable to local conditions particularly in remote areas (FDI 1986).

2.2.2.5 Having a regular source of care

Young people are most likely to report a regular dental source. Having a regular source of care is also found to be related to continuity with utilisation (Gift 1984).

The literature on medical health services utilisation underscores two primary reasons for the importance of the regular source of care: quality of health care, and the issue of cost to patients and to the health care system as a whole. Studies consistently note the importance of regular source of care in facilitating access to health services and in determining the frequency of contact with providers (Aday, Andersen 1984).

A regular source of care serves as an entry point to the complex and bureaucratic health care system and provides a link to the more specialised forms of care. It also facilitates timely and continuous treatment and contributes to better health (Lewin-Epstein 1991).

From a study by examining data from a statewide sample of 1,329 Rhode Island residents in 1974, Kronenfeld (1979) found there was a strong relationship between having a regular source and actually visiting a dentist at least once in the past year. As education and income increased, the percentage of people who reported a regular source of dental care also increased. Although women were more likely to report a regular source of dental care than men, the difference was not significant. Young people from 15 to 29 were most likely to report a regular dental source.

In a survey on 883 persons aged 62 and older in Seattle, Evashwick, Conrad and Lee (1982) found regular source of care had a negative relationship with delay and a positive relationship with number of dental visits per year.

2.2.2.6 Prepayment and financial assistance

Generally speaking, prepayment does appear to increase the proportion of persons visiting the dentist. The largest impact is on those who are already regular or irregular users of dental services rather than non-users (Gift 1984).

Persons who generally do not use the dentist, except when they perceive need or feel pain, may go to the dentist immediately after the introduction of a prepayment plan,

causing an initial surge in visits, but do not appear to continue the pattern of high utilisation. The largest utilisation increases are seen among professionals and executives, those with high incomes, and the well-educated. Low utilisation persists in certain plans for non-dentally oriented groups and gaps in utilisation pattern persist in lower income groups even with added insurance coverage. 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. The source and level of payment will have to be more systematically examined to completely understand its role in utilisation (Gift 1984).

From a study in New York City, U.S.A., Nikias (1968) found large differences in utilisation of prepaid dental service according to social class. The higher the occupational level, the greater the utilisation. The transition from low to high utilisation was not gradual and smooth. There was a quantum jump between the blue-collar category and the skilled and white-collar occupations. The elimination or reduction of economic barriers via prepayment did not appear per se to result in equity of use of dental services. The greater part of the dental care given to the lower classes was emergency care. Dental needs of lower socioeconomic groups may not be met, despite prepayment, through underutilisation. It

is unlikely that existing socioeconomic differences in the use of dental care can be eliminated by eliminating the cost barrier alone (N=5,980).

Since Massachusetts instituted its Medicaid Programs, more low-income families were receiving regular dental care and going to private practitioners. When compared with 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 (N=336) (Leverett, Jong 1970).

In the U.S.A., Morehead, Donaldson and Zanes (1971) found members of the Teamster Comprehensive Care Program, which provided free medical and dental care, reported receiving more dental services in the program than they had received before it started.

Donabedian summarised that barriers are not only financial, they are also psychological, social, organisational, and of many other kinds (Donabedian 1972).

In the U.S.A., among employees and dependants eligible for a broad-benefit, commercially insured plan providing dental care, Mulvihill, Bear, Dunning and Giddon (1972) reported that, for unknown reasons, a constant low utilisation of about 20% was found compared with the

United States population.

The first year consequences of national dental insurance, introduced in Sweden in 1974, was examined. Fewer people visited the dentist after the implementation of the insurance. Edentulous persons received more treatment. As there are many factors associated with access, a change in one factor may not immediately be followed by great changes in gaining access. The introduction of dental insurance does not guarantee the desired changes occur rapidly. The removal of financial barriers is a necessary but not sufficient prerequisite for gaining "better" equity of access to dental services (Barenthin 1976).

In the U.S.A., Legler, Hughes and Bradley (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, other factors such as psychological factors, patient busyness, and lack of perceived needs may also be important determinants in the utilisation of prepaid dental care.

In the U.S.A., Grembowski, Conrad and Milgrom (1985) found annual dental insurance increased dental service utilisation above national norms for most socio-demographic group. The major beneficiary appeared to be children from low-income families and/or those who had

parents with little formal education (N=1.2 million).

In the U.S.A., Manning, Benjamin, Bailit and Newhouse (1985) found reducing the level of cost sharing increased demand for dental services. 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.

The barriers to oral health care can be classified according to whether they refer primarily to the individuals, the dental profession or the society. Barriers referring to individuals include lack of perceived need, anxiety and fear, and lack of access apart from financial considerations. Barriers referring to 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 include insufficient public support of attitudes conducive to health, inadequate oral health care facilities, inadequate oral health manpower planning, and insufficient support for research (FDI 1986).

2.2.3 SOCIO-CULTURAL FACTORS

Medical sociologists have suggested that the particular symptoms acted upon are defined by the culture, ethnic or reference group and that the structure of the group and the health orientation and value system plays an important role in defining utilisation behaviour. (Sheiham 1981).

2.2.3.1 Orientation of parents

Both the early socialisation of the child regarding oral health care, visiting the dentist, and the orientation of parents, have been shown to affect adult and child utilisation behaviour. Research suggests that changes in behaviours also impact on attitudes and, ultimately, on values (Gift 1984).

In a survey on 1,862 adults in the United States, Kriesberg and Treiman (1960) found the upper class people more likely to have gone to the dentist when they were young and persons in all classes who went at an early age were more likely to go to the dentist for preventive services as adults.

Kreisberg and Treiman (1962), in respect to dental health practices, suggested that beliefs and attitudes among adults follow, rather than motivate, the practice of going to dentist preventively.

In a nationwide survey in the U.S.A., Metz and Richards (1967) reported more children of parents who went to the dentist preventively made preventive visits themselves compared with children of parents who did not go to the dentist for preventive visits. The influences of parents' practices on children's practices appeared to be stronger than either income or education of parents (N=1,862).

From a survey in Buffalo, New York, U.S.A., it was found regardless of social class, education of mothers to provide good examples seemed to be the key to changing children's dental health practices. Methods of adult education can be designed to change behaviour first rather than attitudes and promote regular and good dental practices whether or not the desire to brush or visit the dentist is strong (Rayner 1970) (N=472).

From a study in Israel, Shuval (1970) found early experience with good, preventive dental practice in childhood was associated with greater preventive behaviour in adult life. The lower-class subgroup which experienced good childhood practices showed the highest frequency of preventive dental behaviour found in a lower-class segment of the population (N=2,013).

Patterns of behaviour learnt during early childhood are deeply ingrained and resistant to change and mothers have a primary role in this situation (Baric, Blinkhorn,

MacArthur 1974).

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).

2.2.4 SOCIAL-PSYCHOLOGICAL FACTORS

It has been observed that some people attend regularly for preventive and therapeutic care before symptoms appear while others attend only when they experience pain or discomfort. Social-psychological explanations have been proposed to explain some of the variation in utilisation (Sheiham 1981).

2.2.4.1 Presence or absence of dental symptoms/ perception of need

There are two levels of measurement in the presence of dental symptoms: those which are clinically observed and measured and those which are perceived and self-reported. Many studies support the association between perception of need and recognition of symptoms and the utilisation of services (Gift 1984).

In the U.S.A., Kegeles and Arbor (1963) found more people who believed themselves highly susceptible to dental problems made preventive dental visits than those who believed themselves barely susceptible. More people who believed dental problems which they had not experienced would be serious if they occurred made preventive dental visits than those who did not hold this belief. More people who believed they would take generally beneficial actions against dental problems made preventive dental visits than those who either did not know of such actions or who did not believe that the actions would be

beneficial (N=430).

From a study in Norway, Baerum and Arnljot (1976) found 23% of the metropolitan male students, contrasted with 12% of non-metropolitan females, said they had postponed visiting a dentist in the past because they thought the symptoms would cease spontaneously (N=1,008).

In a 1973 survey on 988 children in Sydney, Australia, it was found 45% of the sample last visited the dentist for reasons other than the presence of symptoms. The remaining 55% said they visited either because of symptoms or a combination of symptomatic and asymptomatic reasons (Barnard, Clements 1976).

In a survey on 405 non-edentulous elderly persons in Quebec, Canada, it was found although 96.4% of the persons examined needed treatment, only 58.2% said they had dental problems. The average amount of time since the last utilisation of services was greater when no problem was perceived. The perception/diagnosis variable was the determining factor for the amount of time between visits (Bordeur et al 1988).

2.2.4.2 Attitudes towards oral health, money and the value of teeth

General attitudes towards the value of teeth and aesthetics and the priority of expenditure on oral health have been suggested as important variables and have been found to be related to the use of services (Gift 1984).

Jenny and Frazier (1974) found parents of 5th grade children thought dental care was a very salient issue, but may not act on this belief (a major problem being cost of care).

Improvement of physical function is not the primary motivation of many persons who receive orthodontic care. The need and desire of members of a society to achieve a culturally acceptable body image constitutes neither frivolity nor luxury. The response of families to socio-cultural expectations and pressures produces a culturally valid need for orthodontic intervention. Other relevant social factors are socio-economic, desire for upward social mobility, social change with regard to public attitudes toward the availability of dental health services and the increasing removal of financial barriers (Jenny 1975).

Miller and Kiyak (1980) found no difference between utilisers and non-utilisers in fear or locus-of-control measures. They found use more related to the respondent's

value system than to his personality type.

In Iowa, Beck, Cons and Ettinger et al (1981) found attitude variables were better predictors than the traditional socioeconomic indicators in utilisation.

From a survey on 50 Caucasians and 46 Pacific Asians in Seattle, U.S.A., Kiyak (1981) found fear of painful, socially unacceptable and unattractive consequences could be a greater motivator of self care behaviour in dental health than was the knowledge of how one could prevent dental disease.

In a survey on 438 25-year olds in Amsterdam, Schuurs, Duivenvoorden and Thoden Van Velzen (1984) found regular dental attenders, compared to irregulars, gave a higher priority to retention of the teeth than to other items, were willing to spend a larger amount of money to prevent loss of the teeth, and had a greater aversion to full dentures at both the present age and when 50 year old.

2.2.4.3 Preventive knowledge and behaviour

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

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).

From a study in New York City, Suchman and Rothman (1969) found among those who scored high in preventive behaviour, twice as many sought dental care as among those who scored low regardless of the individual's socioeconomic status, attesting to the importance of a positive health orientation in the seeking of dental care (N = almost 2,000).

Tash, O'Shea and Cohen (1969) hypothesised that persons who had relatively more knowledge of dental health would be more likely to seek preventive dental care than persons who had relatively less knowledge of dental health. They found 8% of those in the low knowledge group were preventively oriented while 44% of those in the high knowledge category were preventively oriented.

From a study in Seattle, U.S.A., Kiyak (1981) found significant cultural differences emerged in dental knowledge, behaviours and health status. Knowledge alone did not predict dental behaviour. A fear of painful, socially unacceptable and unattractive consequences could

be a greater motivator of self care behaviour in dental health than was the knowledge of how one could prevent dental disease (N=96).

2.2.4.4 Attitudes towards dentists and dental care

The patients' attitudes toward the skills and competence of the dentist, in combination with their orientation towards the value of oral health care have been found to be related to utilisation (Gift 1984).

Kriesberg and Treiman (1962) found that the public's chief concerns were with the dentist's responsibility and his skills in minimising pain and fear of what could happen.

From a survey in the Washington D.C. area, U.S.A., it was found 59% of the parents mentioned some aspects of the dentist's personality as the most important feature of the ideal dentist. Fifty eight percent referred to his professional ability, while the dentist's ability to reduce fear and pain was considered important by 41%, followed by emphasis placed upon the dentist's professional attitudes (39%) (McKeithen 1966) (N=400).

From a study in the U.S.A., Jenny, Frazier, Bagramian and Proshek (1973) found professional competence, relationship with children, and personal characteristics were the reasons most often cited to describe

satisfaction with the child's dentists. High socioeconomic status parents were more likely to cite professional competence as the reason for satisfaction, whereas low socioeconomic status parents more often cited relationship with the dentist as their reason (N=838).

In a survey in the U.S.A., expectations of and orientations towards the importance of dental care were found discongruent between the provider dentists and low socioeconomic consumers. The psychological cost to a patient of seeking care in inhospitable settings could act as a major barrier to utilisation (Frazier, Jenny, Bagramian, Robinson 1977) (N=78).

From a study in Baltimore, U.S.A., Soble (1979) found those completing dental treatment were most satisfied, those who terminated while in the treatment process were most dissatisfied. Patient satisfaction needs to be high at points of entry so patients remain in the health service and are more satisfied with their future encounters in the system. Satisfaction with care lead to completed treatment (N=782).

In the U.S.A., Davies and Ware (1981) developed a self administered Dental Satisfaction Questionnaire for measuring major sources of satisfaction and dissatisfaction with dental care providers and services.

In a study among 25-year-old inhabitants of Amsterdam, the Netherlands, Schuurs, Duivenvoorden, Thoden Van Velzen, and Verhage (1984) found that dental anxiety, although of importance, could not account for an adequate differentiation between regular and irregular attenders for dental service (N=438).

In a study on 258 18 to 72 years old dental patients with a median age of 34 years in the U.S.A., Rankin and Harris (1985) found patients seemed to like having the dentist explain the treatment fully, explain the use of the equipment, explain how to act, and be truthful about the amount of discomfort to expect. Patients reported disliking having a dentist start treatment without explanations, tell them that a procedure that is actually painful will not hurt, and scold them for poor oral hygiene or fail to comment on their cooperativeness.

In a survey comprising 620 30-40-year-old inhabitants of a Dutch town, Schuurs, Duivenvoorden, Thoden Van Velzen, Verhage, Eijkman and Makkes (1985) found women reported higher dental anxiety levels than men, with the exception of body damage anticipation anxiety. A lower level of education, irregular dental attendance, and edentulousness appeared to be associated with a higher level of dental anxiety.

In a survey on 524 14 to 16 year old children in England,

it was found the trouble-only attenders for dental service believed that dentists were less likely to prevent pain and less likely to enable them to keep their teeth; they put less value on keeping their teeth and on having their teeth checked by a dentist. The trouble-only attenders evaluated spending time at the dentist and the dentist hurting them as more unpleasant than did the regular attenders. The trouble-only attenders believed they were more likely to be bored at the dentist than the regular attenders (Woolgrove, Cumberbatch, Gelbier 1987).

In a study on 415 college students aged 18-22 year in Japan, it was found more than 80% of those surveyed reported some dental fear. Six to 14% of the students reported extreme fear of the dentist. The majority of the subjects admitted that they delayed making dental appointments due to fear. The dental drill and needle were the most fear-provoking stimuli (Domoto, Weinstein, Melnick, Ohmura, Uchida, Ohmachi, Hori, Okazaki, Shimamoto, Matsumura, Shimonono 1988).

In a survey in U.S.A., patient satisfaction was related to: dentist, staff, efficiency, time-cost, and accessibility. It was found respondents receiving care in private practices rated all factors with the exception of accessibility most favourably. Respondents receiving care in a large group practice in a shopping center responded most favourably to factor described as accessibility.

Respondents receiving care in a hospital dental service tended to rate satisfaction least favourably for most factors. Respondents receiving care in a neighbourhood health centre, the majority of which were on Medicaid, responded most favourably in a statement related to cost. Satisfaction was greater for older patients, patients with less education, and for white compared with black and Hispanics patients (Handelman, Fan-Hsu, Proskin 1990) (N=526).

In a study on a nationwide sample representative for the Dutch population of 16 years and older in the Netherlands, Stouthard and Hoogstraten (1990) found that about 40% of the Dutch population experienced a considerable degree of anxiety about dental treatment, and more than half of them could be considered as highly anxious. Dental anxiety was related to sex, age, and oral health status. Individuals most prone to experience dental anxiety were women between 26 and 35 years of age who did not visit a dentist regularly, lived in one of the big cities, had a moderate or high educational level, were Public Health Insurance (Ziekenfonds) patients with a minimum income, judged their oral health as bad, and did not attach much importance to the preservation of their teeth (N=648).

In a survey in Canada on 580 people aged between 50 and 89 years, it was found there were no differences in mean

DAS (Corah's Dental Anxiety Scale) scores by sex but significant differences by age, with younger individuals having higher scores ($p < 0.0001$). The edentulous had significantly higher scores than the dentate ($p < 0.001$). Scores on the SIADF (Structured Interview for Assessing Dental Fear) scale were higher among younger individuals ($p < 0.0001$), the edentulous ($p < 0.01$) and women ($p < 0.05$). Older adults who were dentally anxious were less likely to report a regular source of dental care and a dental visit in the previous year and more likely to report having avoided or delayed dental treatment (Locker, Liddell, Burman 1991).

In a study on a group of Scottish secondary schoolchildren with a mean age of 14 years and 7.1% prevalence of high dental anxiety, it was found children with high self reported dental anxiety were more likely to defer, cancel or not turn up for dental appointments. For this group the last dental visit was more likely to be as a result of pain and less likely to have been for a dental examination only ($N=1,103$) (Bedi, Sutcliffe, Donnan, Barrett, McConnachie 1992).

In a study on 620 adult residents of the city of Gothenburg, Sweden, it was found females were significantly more likely to report a high dental anxiety compared with males. The distribution of high dental anxiety and age showed a clearly and significantly higher

portion of dental anxiety in the age group 20-39 years compared to both younger and older groups. Subjects who reported high dental anxiety more often had not seen a dentist in the last 2 years or more compared with people reporting a low dental anxiety. No significant correlation was found between dental anxiety and educational level or income (Hakeberg, Berggren, Carlsson 1992).

In a survey on lay people and dentists in the Kuopio and North Karelia provinces of Finland, it was found there was great agreement among dentists and patients about the statements and between the factors about the ideal dentist. Behavioural components of the dentists' professional competence, such as communication and supportiveness, were considered the most important. Occupational and professional aspects, such as technical competence, were less important (N=1,043: 198 dentists, 845 patients) (Lahti, Tuutti, Hausen, Kaariainen 1992).

2.2.5 REASONS FOR NOT USING SERVICES

Many researchers have examined the stated reasons which people give for not going to a dentist. Available research indicates that the reasons given most often for not visiting a dentist include:

- feeling no need to go
- access problems e.g. travel time, waiting time, inconvenience of appointment times etc.
- lack of knowledge about the system e.g. not knowing a dentist
- fear and anxiety
- being too busy
- problems related to work i.e. losing wages
- the opinion that the cost is too high for the return
- a generally low priority given to visiting the dentist (Gift 1984).

In Israel, Shuval (1970) found it was apparent that dental care had a very low priority for those people who did not go and they perceived other, or "better" ways to spend their time and money (N=2,013).

In a survey on 1,632 Norwegians aged 15 and above, it was found: 58% stated having visited a dentist during the year prior to the interview; 16% had not consulted a dentist for at least 5 years. Forty one percent reported wearing a denture/has no teeth as reason for not seeing a dentist regularly during the last five years; 17%

reported anxiety; 12% unanswered; 9% teeth are good, treatment is pointless; 8% poor economy. Also, school dental treatment was the strongest predictor of treatment attendance in later youth, which reflects the effect of childhood experience and learned behaviour. This effect seems far more marked in youth than later in life; which may indicate that the strength of socialisation diminished with the years (Holoe, Tronstad 1975).

In a survey on 302 students at the Australian National University, Australia, it was found 60% of students thought they did not require dental treatment, although 75% of student were found to require some treatment. Some 23% of students positively avoided treatment at a time when they thought they needed it. The reasons given were: could not afford; lack of time; expected that trouble could disappear; fear of pain; other reasons (Barnard, Boyles 1976).

From a survey of the dentist-patient relationship in Melbourne, Australia, it was found "fear" and dislike of the dentist, "low" confidence in the dentist and a poor dentist attitude to the patient were all associated with poor dental attendance. "Dislike" was a stronger deterrent than "fear", although "fear" was more common. There was a high association between high confidence in the dentist and a dentist "being interested" in his patients and regular attendance (N=541) (Biro, Hewson

1976).

In a study on 1,600 adult Danes (aged 15 and above), it was found: 58% reported dental visits the last year; 32% had not seen a dentist or only when in pain; and 10% went irregularly. Sixty three percent of those who had not seen a dentist reported bad teeth or were edentulous with or without dentures, 10% reported fear, 9% had good teeth and 5% reported economic difficulties (Schwarz, Hansen 1976).

In a survey on 254 elderly people in Nottingham, U.K., It was found 78% of the sample were clinically judged as needing dental treatment, mainly some form of prosthetic treatment. Wide discrepancy existed between the normative and perceived needs. Only 42% of those clinically assessed as needing treatment felt they required it and only 19% had actually tried to obtain it. Many of the elderly mentioned barriers to obtaining dental care including the cost of the treatment, fear of the dentist, immobility and the feeling that they should not 'bother' the dentist (Smith, Sheiham 1980).

In a 1978 survey on 1,588 first year students at the University of Sydney, Australia, It was found: the most common reason for not obtaining dental care within previous 12 months was given as "nothing wrong, no reason to go" (49%) followed by; "was too busy, or didn't get

around to it" (26%); "afraid, or don't like dentists" (9%); "can't afford it, cost too much" (6%); "didn't want to spend money on dental care" (2%); "no service available" (1%); "other reason" (1%); and "don't know" (6%) (Barnard 1981).

In a study on 642 South Australian industrial employees, it was found the reasons given for not seeing the dentist in the past year were: "nothing wrong" (60.2%); "too busy or could not be bothered" (16.4%); "fear of the dentist" and "cost" each accounted for approximately 8%; and miscellaneous explanations made up the remaining 7.2%. A large majority of the group surveyed were unaware of the presence of periodontal disease or the need for its treatment, despite the high prevalence in all subgroups (Srikandi, Carey, Clarke 1983).

Across cultures, lack of perception of need persists in being the most frequent reason for not going to the dentist. In those cultures having a structured delivery system, high utilisation rates exist among the low income and education groups, but these rates tend to fall when the structured system is removed in adulthood and the open market forces are in place (Gift 1984).

In a study on 142 non users of dental care over age 60 in the Seattle/King County area in the U.S.A., it was found only 3.5% of the non users reported fear or anxiety as

their reason for not seeking dental care, although fear and perceived cost have been cited frequently as barriers to the use of dental services. Another 3% noted problems with transportation, while 13% mentioned concerns about cost. The overwhelming majority (71%) said they did not go to a dentist because they felt no need for care (Kiyak 1986).

In a study on 160 Pakistani immigrants in Norway, it was found the main reason for not having been to the dentist was the perception that nothing was wrong with the teeth (80.9%), 11% had difficulties obtaining dental appointments, while 5.6% thought it was too expensive (Selikowitz, Holst 1986).

In a survey on 405 non-edentulous elderly persons in Quebec, Canada, it was found although 96.4% of the persons examined needed treatment, only 58.2% said that they had dental problems. Participants who had not made use of dental services in the previous 5 years were asked why they had not used these services. In 73.4% of the cases, the main reason given was "no need" (Bordeur et al 1988).

In a survey on 437 persons over 75 year of age in England, it was found three-quarters of the sample reported they had not been to a dentist recently because there was nothing wrong with their mouths, while only a

small proportion (3%) identified either fear, transport, or expense as barriers to treatment (MacEntee, Dowell, Scully 1988).

In the U.S.A., Hayward et al (1989) found among those without a dental visit within the past year, a financial barrier to receiving such care was reported by 12% of those surveyed, compared to 37% reported in 1976 (N=9,352).

In a survey in Oulu, Finland, on 390 young and middle-aged patients, it was found for those with a longer period since their last visit to a dentist had more barriers which related to daily brushing, unpleasant experiences of dental care and laziness. The more educated the participants were, the fewer barriers they had in relation to the factors appreciation, unpleasant experiences and daily brushing (Syrjala, Knnuttila, Syrjala 1992).

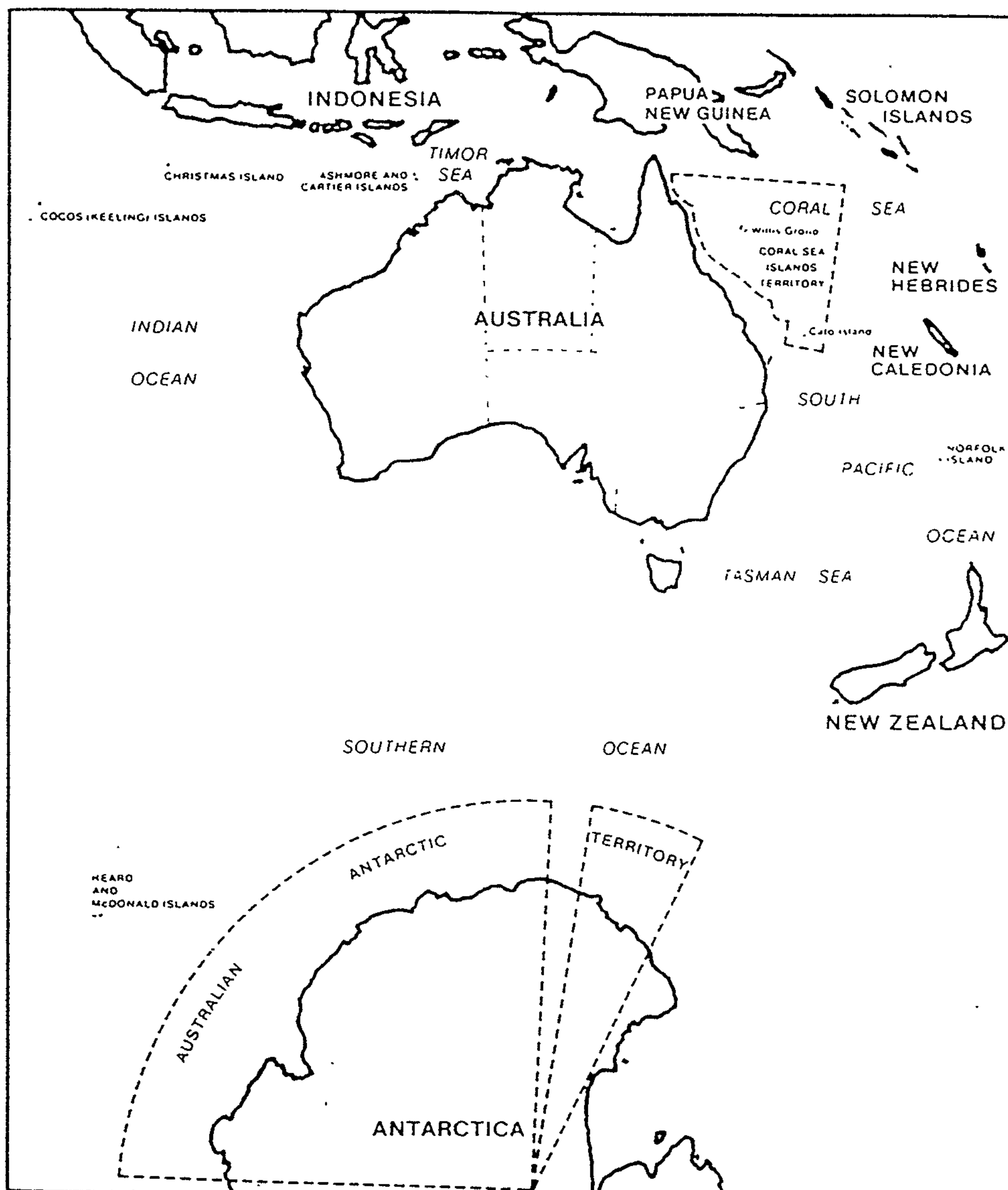
3 AUSTRALIA - GENERAL PROFILE

3.1 AUSTRALIA

3.1.1 Geography of Australia

Australia comprises a land area of 7,682,300 square kilometres. The land lies between latitudes $10^{\circ}41'S$ (South Cape, Tasmania) and between longitudes $113^{\circ}09'E$ (Steep Point) and $153^{\circ}39'E$ (Cape Byron). The latitudinal distance between Cape York and South Point is about 3,180 Kilometres, while the latitudinal distance between Cape York and South East Cape, Tasmania, is 3,680 Kilometres. The longitudinal distance between Steep Point and Cape Byron is about 4,000 Kilometres. The area of Australia is almost as great as that of the United states of America (excluding Alaska), about 50 percent greater than Europe (excluding USSR) and 32 times greater than the United Kingdom. A map of Australia is shown in Figure 1 (ABS 1992).

Figure 1. Map of Australia.



Source:

Australian Bureau of Statistics (1988).

Yearbook Australia 1988 p.924.

ABS Catalogue No. 1300.0.

3.1.2 Climate

The island continent of Australia features a wide range of climatic zones, from the tropical regions of the north, the arid expanses of the interior, to the temperate regions of the south. Although the climate can be described as predominantly continental, the insular nature of the land mass produces modifications to the general continental pattern (ABS 1992).

3.1.3 Political background

The Commonwealth of Australia was established in 1901. There are three levels of Government. Politically, the country is a federation of six states and two territories: New South Wales (NSW), Victoria (VIC), Queensland (QLD), South Australia (SA), Western Australia (WA), Tasmania (TAS), Northern Territories (NT) and the Australian Capital Territory (ACT) (ABS 1992).

When the Australian constitution was adopted early this century, most of the functions of government were left with the States, the areas such as defence, postal services, communications, and foreign affairs were transferred to the Federal Government. Health services, education and agriculture remained with the States although the Federal Government is able, through the control of the bulk of governmental incomes, to influence policies within the states in a number of areas,

including health (WHO 1985).

3.1.4 Economic activity

Japan remains Australia's largest trading partner, with a two-way trade in 1990 of \$22.7 billions-over 20 percent of Australia's total trade. Tourism has also expanded rapidly in recent years. Japan remains the primary source of foreign investment, largely in mining, agriculture and tourism. Australia is also aiming to attract more foreign investment to the manufacturing sector (ABS 1992).

Australia's major exports for 1990-91 includes coal (to Japan, Republic of Korea and Taiwan), gold (to Singapore, Japan and Switzerland), alumina (no country details available), meat of bovine animals (to USA, Japan and Republic of Korea) and wool (to Italy, Japan and France). Australia's major imports for 1990-91 includes aircraft and associated equipment (from USA, United Kingdom), passenger motor vehicles (from Japan, Germany and Republic of Korea), automatic data processing machines (from USA, Japan, Taiwan and Singapore) and crude petroleum (from Indonesia, United Arab Emirates and Saudi Arabia) (ABS 1992). For the year July 1988 to June 1989, average weekly household income of Australia at national level was A\$636.05 (ABS 1992). The Australian exchange rate with other foreign currency is shown in Table 1.

Table 1. Australian exchange rates on 30 June 1993.

Selling rate of \$A1.00 on 30 June 1993

Currency

\$Australian:	1.0000
\$US	0.6630
Sterling	0.4452
Yen	69.54
D-Mark	1.1247

Source: Westpac Bank

3.1.5 Demography

The estimated resident population at 30 June 1991 was 17.3 millions (ABS 1992). Most of the population is concentrated in coastal regions on the south-east and the south coast. In both coastal regions the population is further concentrated into capital cities, other major cities and towns. In June 1990, 71.2% of the population lived in the combined State and Territory capitals (including national capitals) and six other major cities of 100,000 persons or more. The very low population density figures for Australia as a whole (two persons per square kilometre) mask this pattern of population distribution. Sydney, Australia's dominant population centre, has a population of 3.7 millions in 1990 (ABS 1992). At the 1986 Census, 85.4% of the population lived in urban areas, 14.5% resided in rural areas. On June 30 1987, 65.7% of the Australian population was estimated to be residing in fluoridated areas while 0.9% of population resided in natural fluoride areas with fluoride level of 0.5 ppm and above (Barnard 1989).

The distribution of population in various States and Territories is shown in Table 2. Age distribution of the Australian population is shown in Table 3, and sex ratio of the Australian Population is shown in Table 4.

Table 2. The distribution of population: Estimated resident population of Australia. States and Territories. Year 1991.

N.S.W.	5,901,126
VIC.	4,427,371
QLD.	2,972,004
S.A.	1,456,712
W.A.	1,665,945
TAS.	460,465
N.T.	158,779
ACT.	293,531
Australia (Total)	<u>17,335,933</u>

Source:

Australian Demographic Statistics (3101.0): Estimated resident population by sex and age, States and Territories of Australia. Cited in:

Australian Bureau of Statistics (1992).

Yearbook Australia 1992.

Canberra: ABS Catalogue No. 1301.0. p.150.

Table 3. Age distribution of the Australian population. Years 1971,1981 & 1991

<u>Age in years</u>				
<u>Percent of population aged:</u>				
<u>Year</u>	<u>0-14 years</u>	<u>15-44 years</u>	<u>45-64 years</u>	<u>65+ years</u> <u>median ages (years)</u>
1971	28.7%	43.0%	20.0%	8.3% 27.5
1981	25.0%	46.1%	19.2%	9.7% 29.6
1991	21.8%	47.6%	19.2%	11.4% 32.5

Source:

Adapted from Australian Bureau of Statistics (1992).

Yearbook Australia 1992 p.152.

ABS Catalogue No. 1301.0.

Table 4. Sex ratios of the Australian population

<u>Year</u>	<u>Ages 15-24</u>	<u>Ages 15-44</u>	<u>All ages</u>
1971	103.7	105.6	101.1
1981	103.3	103.4	99.6
1991	104.5	102.6	99.7

Sex ratio: males per 100 females.

Source:

Adapted from Australian Bureau of Statistics (1992).

Yearbook Australia 1992. p.152.

ABS Catalogue No. 1301.0.

3.1.6 Health Status

In 1990, the crude birth rate in Australia was 15.4 per 1,000 population. Total fertility rate was 1.91 per woman. In comparison with other countries, Australia ranks amongst those with the lowest mortality levels and the highest expectations of life. The crude death rate was 7.00 per thousand population. Life expectancy at birth was 73.9 years for males and 80.0 years for females (ABS 1992).

For all ages, the major causes of death in the community were diseases of the circulatory system, (accounting for 45.2%), neoplasms (25.6%), diseases of the respiratory system (7.5%) and accidents, poisonings and violence (6.6%). Fewer than 1% of all deaths were due to infectious and parasitic diseases (ABS 1992).

3.1.7 Medical Health Services

The present medical service system involves seven types of health care institutions. These being: (1) Public hospitals (2) Private hospitals (3) Public nursing homes (4) private nursing homes (5) Mental health institutions (6) Repatriation Department institutions and (7) Other institutions providing personal health care (Dewdney 1972).

Basically, the community health care which comprises personal health services and environmental control is

delivered to the community through 4 types of service, as follows:

- (1) Governmental and semi-governmental agencies
- (2) Private professional practitioners
- (3) Non-government, profit seeking agencies and
- (4) Non-government, non-profit seeking agencies (Dewdney 1972).

At the national level, health services in Australia are administered by the Commonwealth Government. The Commonwealth Government is primarily concerned with the formation of broad national policies, and influences policy making in health services through its financial arrangements with the State and Territory Governments, through the provision of benefits and grants to organisations and individuals, and through the regulation of health insurance (ABS 1992). There is, however, government responsibility for health at the State and local levels. There are constitutional limits on the Commonwealth Government's role in the health care field, and the primary responsibility for planning and provision of health services is with the State and Territory Governments (ABS 1992).

3.1.8 Financing of medical services

Australia has had a system of universal health insurance called Medicare since February 1984. It is based on the principles of universality, equity, simplicity and ease of access. Through Medicare, all Australians are insured for medical services, and by arrangement with the States for public hospital services free at point of delivery. This program is currently financed in part by a 1.25% levy in taxable incomes, and the remainder from several government revenue (Grant, Lapsley 1992). In addition, results of the June 1990 survey showed that 52.0% of the Australian population was covered by private health insurance, with 47.7% covered for hospital expenses and 41.9% for expenses associated with ancillary services such as dental, physiotherapy and ambulance (ABS 1992).

In 1986-87, total health expenditure was \$20,161 million, which was about 7.74% of GDP (Barnard 1989).

Medical services in Australia are generally delivered by either private medical practitioners on a fee-for-service basis or medical practitioners employed in hospitals and community health centres (ABS 1992). Medicare benefits are payable at the rate of 85% of the schedule fee services except those to hospital in-patients and for out-of-hospital general practice attenders (ABS 1992). For medical services rendered to private in-patients in hospitals or day hospital facilities, the level of

Medicare benefit is 75% of the schedule fee for each item with no maximum benefit gap. The private health insurance funds cover the remaining 25% (i.e. up to the level of the schedule fees) for insured patients. Fee-for-service rebates are paid at differential rates if a medical practitioner has been recognised by the Minister for Community Services and Health as a specialist or consultant physician (or psychiatrist) and the patient has been referred by another practitioner. Similar arrangements apply to general practitioners who are vocationally registered (ABS 1992).

3.1.9 Dental Services

In Australia, dental care services are rendered by three types of institutions. These are: (1) Private practitioners (2) Government institutions and (3) Other dental clinic services (Pramono 1989).

For the vast majority of the population in Australia, dental care is provided by dental practitioners in private practice in which patients pay directly on a fee-for service basis for the service required.

In December 1987 there were an estimated 6,950 dentists active (1:2,340 persons) of 9,108 registrations in Australia. Of the active dentists 5,700, or 82%, were in the private practice sector, and about 10% were

specialists (Barnard 1993).

The dental workforce (December 1987) included 2,150 technicians and 9,400 chairside assistants. Training for these auxiliaries has become more formalised through TAFE. Denturist legislation in a number of States allows for their direct services to the public for the provision of full dentures (625 registered, December 1987). There are training facilities in NSW and Victoria.

Facilities for training of school dental therapists have been reduced in number as the dental needs of the school children have been reduced and widespread coverage of children achieved in many States. The number employed by health department was 1,186 in 1979 and 1,109 in 1987.

Dental hygienist training is restricted to South Australia (Technical And Further Education since 1975), and only 180 were working in Australia in 1987. Legislation now exists in most States but there is an under-supply of hygienists for private dentist practices and government services (Barnard 1993).

Expenditure for dentistry in Australia was estimated at \$993 million (1986-87) with 83% spent in private practices as fee for service. Dental expenditure was 4.9% of health care costs and 0.38% of GDP and was equivalent to \$62 per person.

Private dental insurance cover rapidly expanded from 1975 with about 40% of persons covered in 1988.

Even though dentistry is now providing a much wider range of more specialised services the pattern of dental services continues to change towards more diagnostic and preventive procedures with less restorations and extractions being carried out in both private and government sectors (Barnard 1993).

On the government side, the institutions through which the services are delivered are generally public dental hospitals, dental clinics attached to public hospitals, school dental clinics, and some community health centers. Through these institutions, the government provides a free dental service to a limited number and specific populations i.e. armed forces, eligible veterans, the economically underprivileged population, the disadvantaged, pensioners and schoolchildren population up to the age of fifteen (Pramono 1989).

To gain access to a public dental service, a person must be covered by Health Insurance Fringe Benefits which fall into three categories, i.e. Pensioner Health Benefits (PHB), Health Benefits (HB) and Health Care (HC). Therefore, to be eligible, a person must be a current holder of either a PHB card, HB card, or a HC card which are mostly valid for 12 months (Pramono 1989).

Persons eligible for a PHB card are Department of Veterans' Affairs service pensioners, and recipients from the Department of Social Security of an age, invalid, widow's, carer's or sole parent pension or sheltered employment, rehabilitation or widowed person allowance, whose income and assets fall within prescribed limits. At June 1991 there were 1,911,315 social security pensioners with a PHB card entitling them to Commonwealth pensioner fringe benefits. The number of dependent children of those pensioners was 477,669 (Grant, Lapsley 1992).

All sickness beneficiaries are entitled to a HB card regardless of income. The number of sickness beneficiaries eligible for fringe benefits at May 1991 was 72,651. The estimated number of wives and dependent children of these beneficiaries was 46,588 at this date.

Persons issued a HC card are:

- Job search allowance and Newstart allowance recipients and special beneficiaries.
- Family Allowance Supplement recipients.
- Low income earners subject to a special income test.
- Invalid pensioners and sheltered employment allowees on rehabilitation allowees entering the workforce, the card is valid for 12 months.
- Sole Parent's Pensioners who have been on pension for 12 months and who are taking up full-time work; the card is valid for 6 months.

At May 1991, there were 954,504 HC card holders (Grant, Lapsley 1992).

The other Government Dental Benefits included Pensioner Denture Scheme, Royal Flying Doctor Service Dental Plan, Approved Dentist Scheme and Cleft Lip and Palate Scheme (Barnard 1989). The Approved Dentists Scheme covers Medical Benefits for service by dental practitioners. This provides patient access to Medical Benefits and when the service is provided by Approved Dentists, the Cleft Lip and Palate Scheme provides benefits in respect to orthodontic services and some oral surgical services. For schoolchildren under the age of fifteen, the Federal Government established a School Dental Service Scheme in 1973 (Pramono 1989).

Apart from government and private practice, dental service, to a far lesser extent, is provided by organisations, private companies, semi-governmental authorities and private insurance companies to their workers or employees. Some Health Funds (a non-profit insurance company) have clinics that provide direct services for their members (Barnard 1989). This type of service, however, is of less importance since it employs only 0.8% of the total active dentists in the country.

3.1.10 School Dental Service

The School Dental Scheme was initiated in 1973 following agreement between the Commonwealth and the States concerning the Commonwealth's proposal to provide assistance in the development of an Australia - wide Scheme. In April 1981 the Government announced that specific purpose grants by the Commonwealth to States and the Northern Territory in respect of the Scheme would cease and be absorbed within general revenue grants (Commonwealth Department of Health 1981). In line with the changed financial arrangements the Scheme, per se, ceased on 30 June 1981, though of course the individual school dental services continue to be operated by States and Territories (Commonwealth Department of Health 1981).

The Scheme was established to provide free dental care for schoolchildren to the completion of primary education, and thereby in the long term improve the dental health and dental awareness of the community. Prevention and dental health education are fundamental aspects of the services provided and are integrated as far as possible with the treatment program. The service is based on the training and employment of dental therapists working under the general direction and control of dentists (Commonwealth Department of Health 1981).

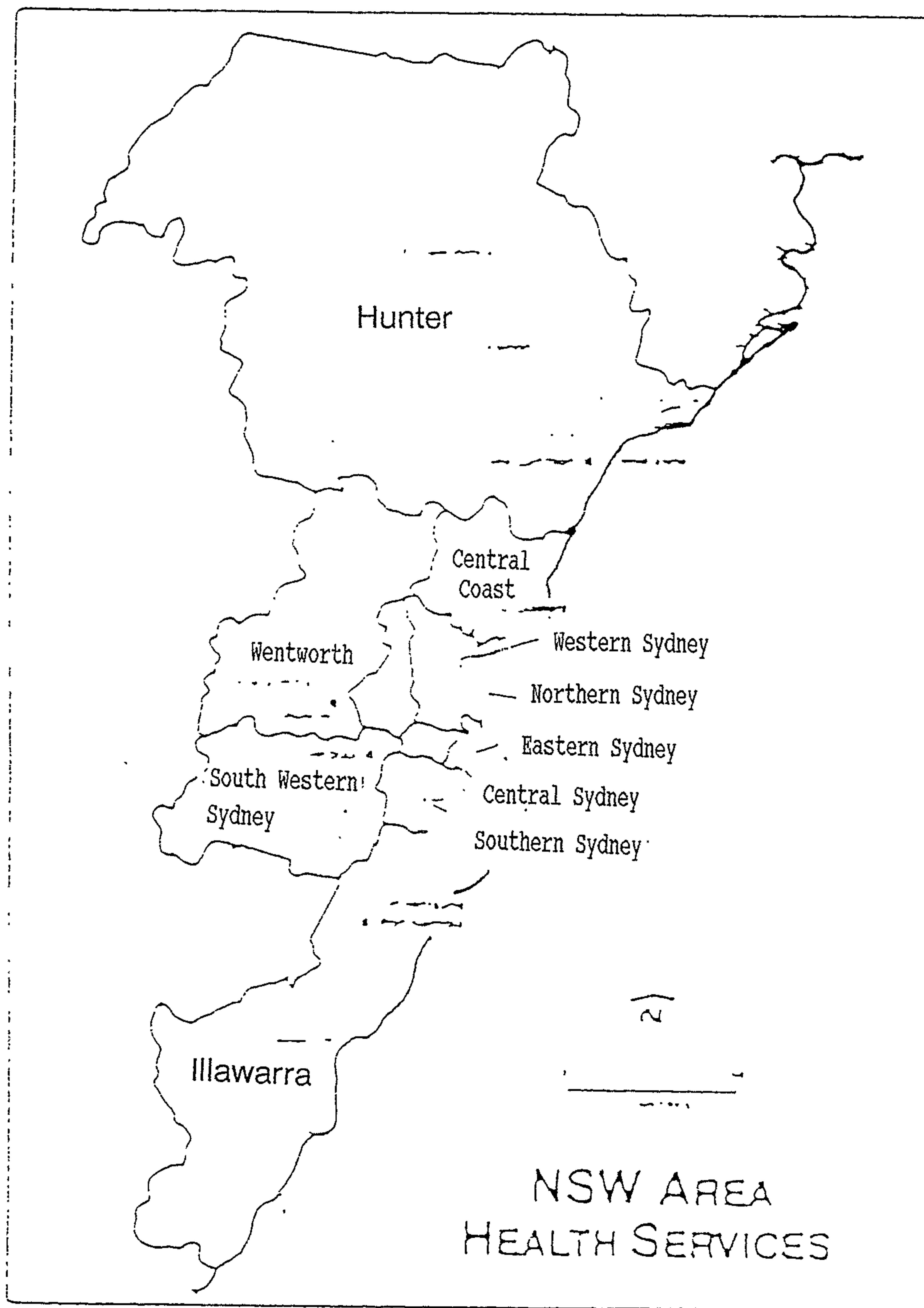
The School Dental Scheme in Australia saw its rapid expansion in the period 1976 to 1980 and resulted in an increased coverage of primary schoolchildren in the States and Territories during these years. On an Australia basis 261,972 schoolchildren were examined in 1976 compared with 720,531 in 1980. In 1987, 56% of school children in Australia (31% of schoolchildren in NSW) had been examined by the School Dental Service (Barnard 1989).

Facilities for training of school dental therapists have been reduced in number as dental needs of schoolchildren have been reduced and widespread coverage achieved by many States in recent years. In Australia, there are six (one in NSW) schools of dental therapy. On 31 December 1987, there were 1,109 school dental therapists employed in Australia (258 employed in NSW) (Barnard 1989).

3.2 N.S.W. HEALTH AREAS

With effect from 1st August 1988, there are ten Area Health Services in N.S.W. and six Health Regions in the country areas of the state. The Area Health Services are: Central Sydney Area Health Service, Eastern Sydney Area Health Service, Northern Sydney Area Health Service, Southern Sydney Area Health Service, Western Sydney Area Health Service, Wentworth Area Health Service, South Western Area Health Service, Illawarra Area Health Service, Central Coast Area Health Service, and Hunter Area Health Service. The Health Regions are: Central West, South West, South East, New England, Orana and Far West, North Coast (Macquarie University Graduate School of Management 1992; Grant, Lapsley 1992). A map of the N.S.W. Area Health Services is shown in Figure 2.

Figure 2. NSW Area Health Services



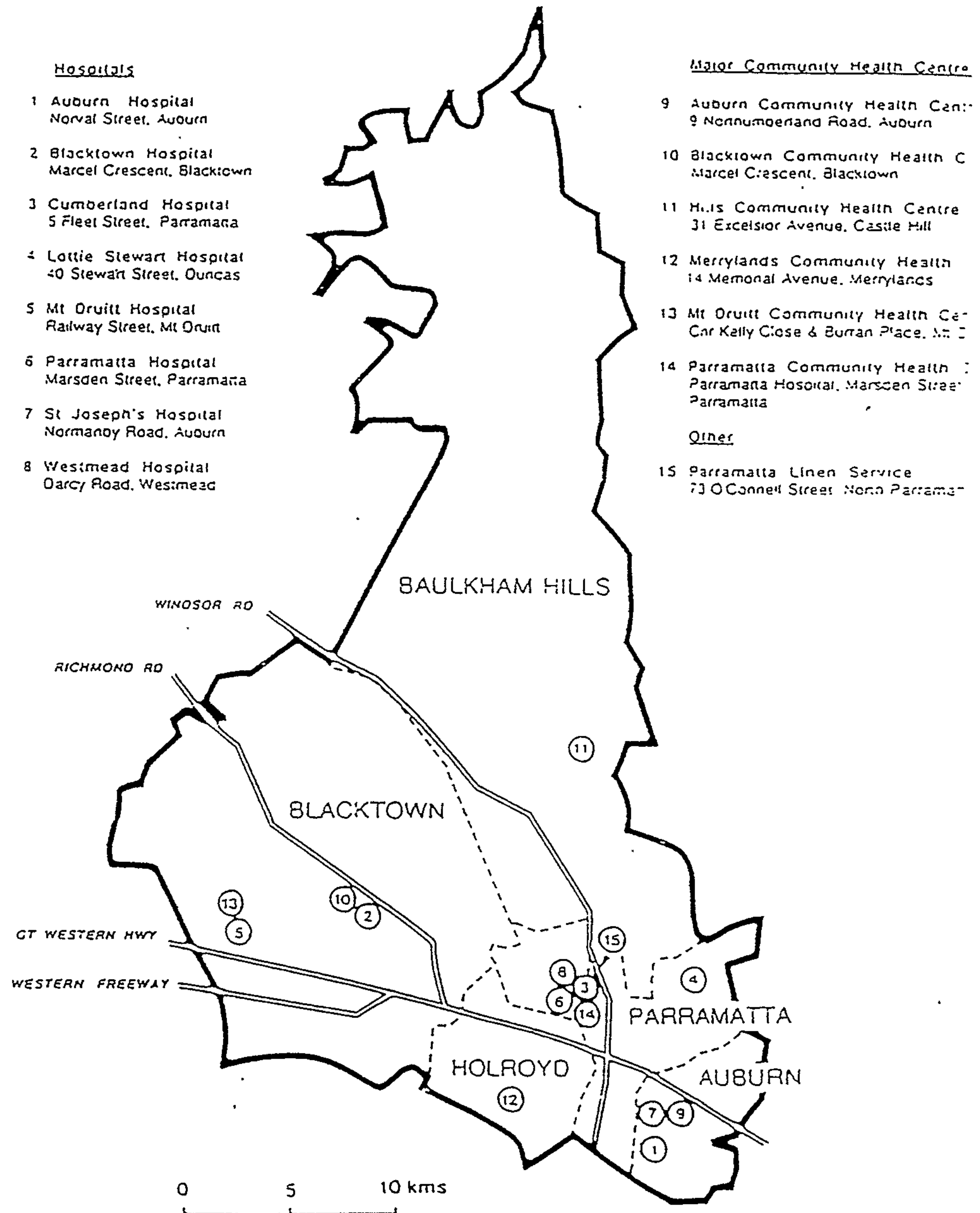
Source:

Macquarie University Graduate School of Management (1992).

Western Sydney Area Health Service - Development of an intra area resource allocation methodology 1992.

Each Area Health Service is directly responsible for the public hospitals and health services in defined Local Government Areas. Western Sydney Area Health Services comprises the public hospitals and health services in the Local Government Areas of Auburn, Baulkham Hills, Blacktown, Holroyd and Parramatta (See Fig. 3). This geographical area contains a predominantly young population with varying health service needs, and there are significant variations in the population's socio-economic well being. The health status of the area's population is considered to be worse than the coastal areas of Sydney due to fewer health care facilities, higher unemployment rates, lower access to higher education and private transport facilities, language difficulties and cultural barriers (Macquarie University Graduate School of Management 1992).

Figure 3. WESTERN SYDNEY
AREA HEALTH SERVICE



Source:

Macquarie University Graduate School of Management
(1992).

Western Sydney Area Health Service - Development of an
intra area resource allocation methodology 1992.

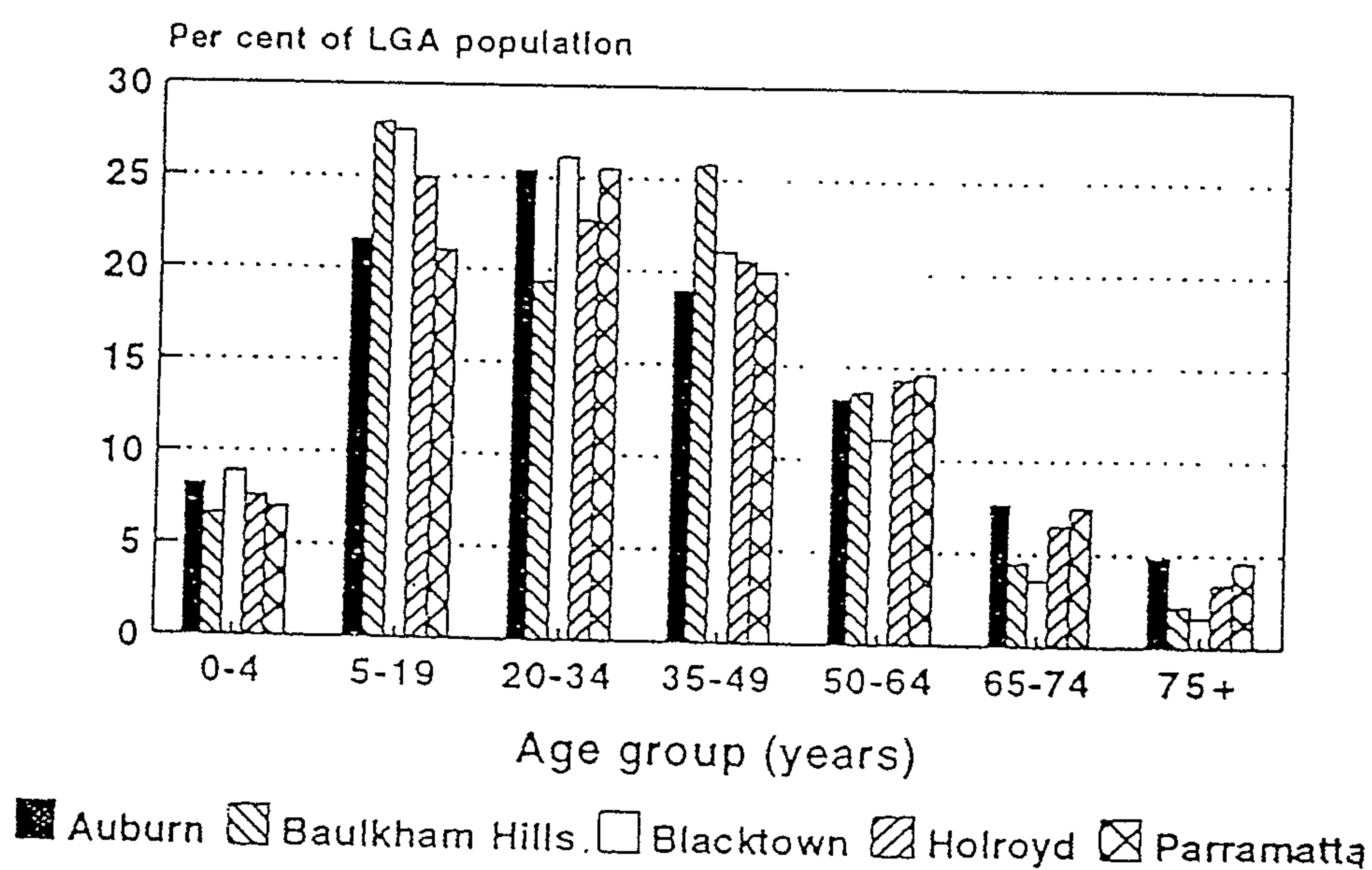
3.3 WESTERN SYDNEY AREA

3.3.1 Demography - Population Characteristics

The population of Western Sydney's Local Government Areas (LGA's) totalled 596,601 in June 1989 (ABS estimate) which represented an increase of 28,051 (or 4.9%) over ABS Census for 1986 totalling 568,550. Blacktown LGA contains the highest proportion of Western Sydney's population with 35.4% of the total, while Auburn LGA contains the lowest proportion with 8.4% of the population. The number of male residents represents 50.2% of the total.

The age structure of this population is dominated by those in the 5-19 age group, with Baulkham Hills and Blacktown LGA's having the highest proportions in this group. Auburn, Parramatta and Holroyd LGA's have the highest proportions in the 65-74, and over 75 age groups. By 2001, Western Sydney's population in the over 65 years group is expected to increase by 50% (Macquarie University Graduate School of Management 1992). The age structure by LGA is illustrated in Figure 4.

Figure 4. **Western Sydney Health Area:**
Age structure, by LGA, 1989



Source:

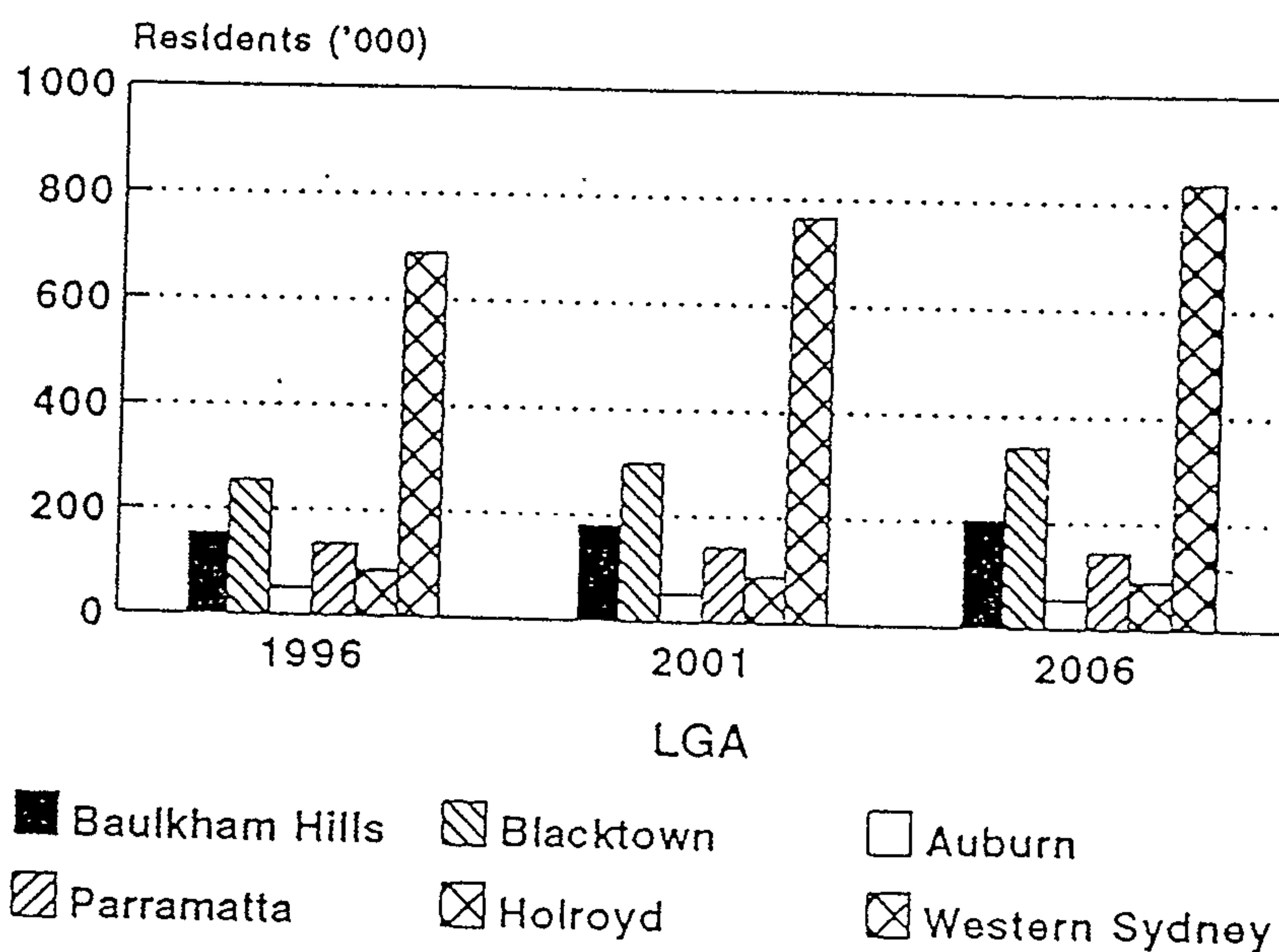
Macquarie University Graduate School of Management
(1992).

Western Sydney Area Health Service - Development of an
intra area resource allocation methodology 1992.

Western Sydney's population is expected to grow rapidly in both Baulkham Hills and Blacktown LGA's as a direct result of the Department of Environment and Planning's staged North West Sector (Rouse Hill and surrounding localities) residential development comprising some 70,000 dwellings and 250,000 people by the Year 2011. These projections may be affected by the current national recession which has caused a significant downturn in the building industry and forced liquidations of several major developers.

Between the years 1991 and 2006, Western Sydney's population is expected to increase by 222,400 (or 36%) from an estimated 615,000 to 837,400. Baulkham Hills and Blacktown LGA's will account for 57% of this increase. Minimal population increases are expected in Auburn, Holroyd and Parramatta LGA's. The population projections for the years 1996-2006 are illustrated in Figure 5 (Macquarie University Graduate School of Management 1992).

Figure 5. **Western Sydney Health Area:**
Population projections, 1996-2006



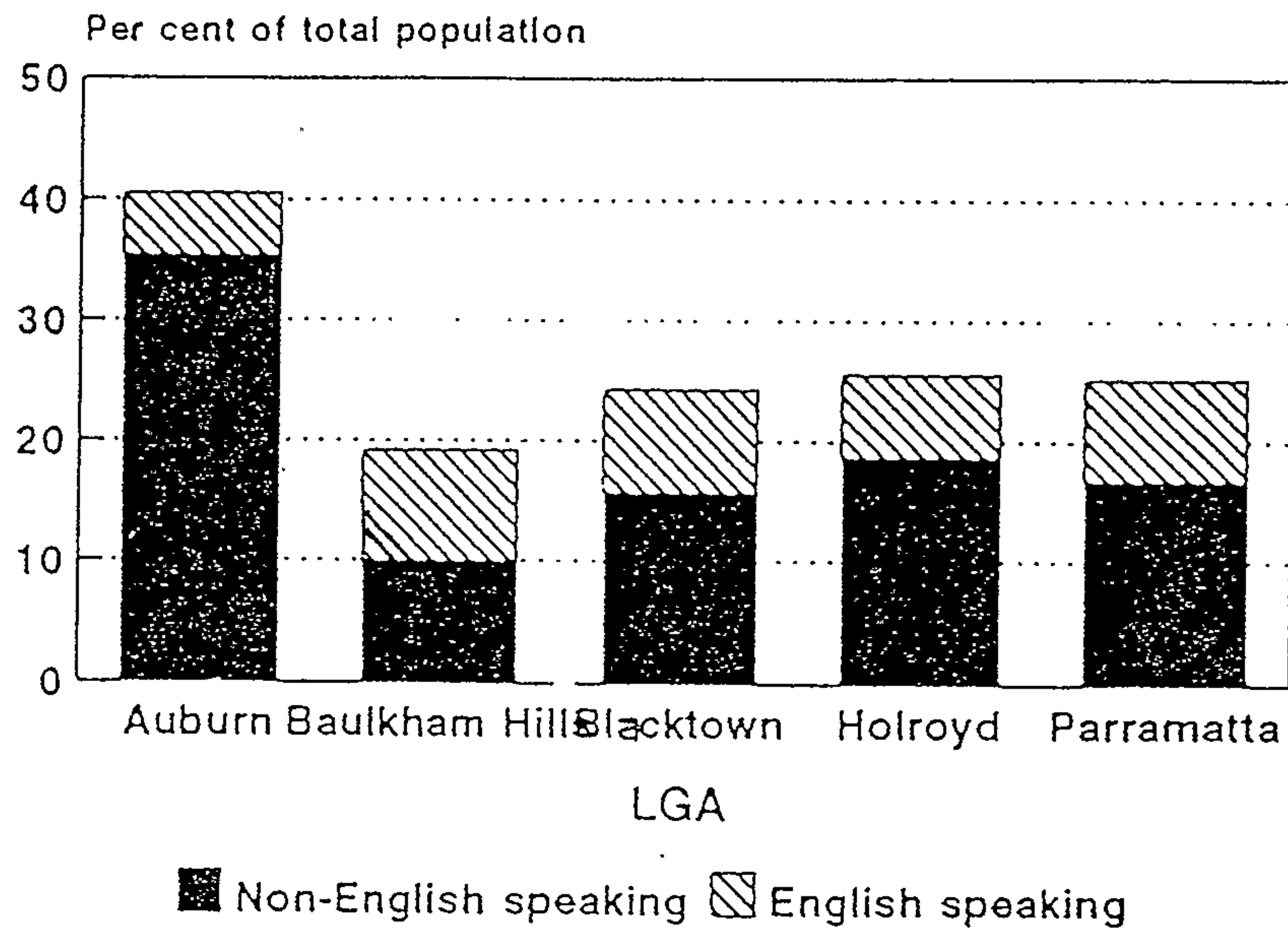
Source:

Macquarie University Graduate School of Management
(1992).

Western Sydney Area Health Service - Development of an
intra area resource allocation methodology 1992.

Almost a quarter of Western Sydney's population is comprised of persons born overseas, and two-thirds of this group come from a non English speaking background. Auburn LGA, which has the highest proportion of persons overseas born, represents 40% of Western Sydney's total. The main language spoken at home by the overseas born residents within Western Sydney varies considerably across a wide cross section of nationalities. The more dominant groups include Arabic (17.4%), Italian (10.1%), Maltese (9.6%), Greek (7.0%), Chinese (7.0%) and Serbian/Croatian (4.9%) (Macquarie University Graduate School of Management 1992). The distribution of overseas born residents within Western Sydney by LGA is illustrated in Figure 6.

Figure 6. Overseas-born residents
Western Sydney Health Area, by LGA, 1986



Source:

Macquarie University Graduate School of Management
(1992).

Western Sydney Area Health Service - Development of an
intra area resource allocation methodology 1992.

3.3.2 Socio-economic Indicators

Variables such as income and unemployment rates, tertiary education, occupations, housing tenure, car ownership etc. are all indicators of the socio-economic status of a community. These indicators are also strongly associated with illness and disease risk factors. Although Western Sydney is ranked overall slightly below the State average for socio-economic advantage, there are large disparities between the LGA's themselves. The socio-economic indicators for the Baulkham Hills favourably ranks this LGA in the top 10% of the State, and which therefore skews the overall index upwards for WSAHS. If Baulkham Hills was not within WSAHS's LGA's, the socio-economic status of the remaining LGA's would rank well below the State average. Within Western Sydney there were over 23,983 single parent families in 1986 with Blacktown LGA recording the highest proportion (11.1%) and Baulkham Hills the lowest (4.9%). Further, WSAHS is ranked sixth (at 8.4%) out of the seven Area Health Services in terms of educational and occupational skill levels, with the remainder of metropolitan Sydney ranked at 7.2 %. High unemployment rates (particularly in the 15-19, 20-24 and over 55 age groups), compared to the rest of Sydney, are evident in all of WSAHS's LGA's, other than Baulkham Hills. The overall crime rate for people residing in WSAHS is lower than the State average, although individually, Blacktown LGA ranks above this average (Macquarie University Graduate School of

Management 1992).

3.3.3 Mortality and Morbidity

Western Sydney has a higher mortality rate for the age profile of the area compared to the rest of the State. Acute myocardial infarction is the leading cause of death representing 29% of the total, while lung cancer (mainly attributed to cigarette smoking) is the leading cause of cancer death. The standardised mortality rate (SMR) for WSAHS compares unfavourably to NSW as a whole, with residents of Auburn and Blacktown recording higher SMR's compared to the other LGA's within WSAHS. Cigarette smoking, excessive unscreened exposure to sunlight, and dietary factors are all preventable lifestyle factors contributing to the development of cancer. WSAHS' lower socio-economic indicators may influence patterns of mortality and morbidity. Deaths from motor vehicle accidents in WSAHS is higher than the State's average. Within WSAHS, Blacktown LGA recorded the highest number of male deaths though motor vehicle accidents during the period 1984-1988, while Holroyd recorded the highest number of female deaths (Macquarie University Graduate School of Management 1992).

3.3.4 Finances on Health

With Gross Operating Payments expenditure (all programmes) totalled \$420.696 million during 1990/91, WSAHS accounted for 11.1% of the State's total expenditure on public health services. Under the Health Department's Resource Allocation Formula (RAF), WSAHS' portion of the State's financial resources is expected to be reduced to a target share of 9.9% by 1998/99. The Department's RAF essentially provides for the redistribution of funds from the inner city Area Health Services and WSAHS, to mainly Central Coast, Wentworth, Southern Sydney and South Western Sydney Area Health Services (Macquarie University Graduate School of Management 1992).

4 STUDY DESIGN AND METHODS

4.1 INTRODUCTION

The Australian Bureau of Statistics had undertaken two children's dental surveys in 1979 and 1983 to provide behavioural information on dental service utilisation by children in Australia. There are no existing data on such behavioural aspects of the population in the Western Sydney area. The information collected in this survey can be used as baseline data for evaluation and planning of dental care services for the area. The two ABS studies formed the main references for questions used in this survey so that direct comparisons can be made. The main reference for the questions relating to occupation of main money earner of the family and ethnicity of the respondents was the Australian Bureau of Statistics (1991): 1991 Census of population and housing - How Australia takes a census. Canberra: ABS Catalogue No. 2903.0.

In designing the study, consideration was given to the fact that Primary schoolchildren are provided with the School Dental Service. They are also more easily accessible than High School students. Year six students were chosen as they were approximately 12 years of age, which fitted in with one of the index ages recommended by the WHO for pathfinder surveys. Also, they were in their final year of primary schooling. In the writer's opinion they should be more mature to answer written

questionnaires than schoolchildren of junior years. This offered obvious advantages as questionnaires were handed out to them to be completed in class.

4.2 PROTOCOL

The protocol developed for the survey was based on methodology presented by the World Health Organisation (WHO) in the publication - Oral Health Surveys: Basic Methods, 3rd edn. (1986); and the FDI Technical Report No. 5.1977 - Recommended outline for a research protocol.

The decision to adopt a FDI protocol and WHO methodology allowed for a systematic approach to data collection, reporting of data and data comparison with future surveys.

4.3 PLANNING OF SURVEY

Planning consisted of first consulting with supervisors P.D. Barnard, and Shanti Sivaneswaran of the University of Sydney, as to the need and appropriateness of the survey. Discussions were held regarding the type of study; the main references for the questions to be asked so that results could be compared with previous studies; sampling methodology; and the statistical analysis of data.

A draft of the questionnaire, the protocol and the core components stating why questions were asked and how information obtained could be used were prepared. The Principal Dental Officer, Western Sydney Area Health Services, was then consulted to discuss questionnaire content and to obtain his approval and suggestions for the research project.

A detailed proposal for the survey was subsequently submitted to the Department of Education, Western Metropolitan area, and also to the Catholic Education Office to obtain written approval.

4.4 BUDGET

The Department of Preventive Dentistry, University of Sydney was responsible for both direct and indirect funding of the survey. A grant of \$600 was allocated for the printing of survey forms, travel expenses and other incidentals.

4.5 SURVEY DESIGN

It was decided that a descriptive behavioural survey could provide important information for evaluating current dental service and assist planning for future dental service without the need for any clinical examination. Students with parental consent were

requested to complete the questionnaires in class as co-operation and compliance from students would be much more likely to be obtained in class than requesting the parents to complete the questionnaires at home. Also, some parents are from a non-English speaking background with limited literacy ability in English.

4.6 SAMPLE SIZE

A survey sample should be large enough to yield sufficiently precise frequency estimates of behavioural assessments with an acceptable sampling error, and offer an acceptable chance of detecting differences between population groups. The survey sample size was also determined based on practical factors such as expenses involved, length of survey period, and minimum possible disruption to class programmes.

Having evaluated the above factors, it was decided that approximately 500 to 600 students should be included in the final sample. It was anticipated that for analysis purpose, the final sample could be divided into 8 cells with cell size approximately 75 each. As response rate of the children returning consent forms would be expected to lie between 40-60%, the rough sample size would be approximately 1,200 to give a final sample in the range of 480 to 720. An estimated number of fifteen schools were proposed. Approximately 30-40 Year six classes were

involved.

4.7 SAMPLE SELECTION

4.7.1 Stratified cluster sampling

Schools were stratified by Government or Catholic schools and also by geographical location. The Education Department and the Catholic Education Office helped with providing information on a number of schools from which the writer determined which schools should be included in the representative sample. All Year six students in chosen schools were invited to participate in the survey. Only students with parental consent were allowed to participate in the survey.

4.7.2 Sample selection of school

The number of government schools in relation to Catholic schools in the Western Sydney region determined the proportion of government schools Year six students in relation to Catholic schools Year six students that should be included in the sample. Distribution of population in the various Local Government areas in Western Sydney area determined the number of Year six students that should be drawn from the different areas. Representative schools were then chosen from the different Local Government Areas in the area. The number of Year six classes and students, sex distribution, government or Catholic school, and geographic location

were all factors involved for consideration before a school was included in the representative sample. An estimated 1,180 students were included in the gross sample. This included 900 students from government schools and 280 students from Catholic schools. As the Education Department and the Catholic Education Office required confidentiality in any reporting of the survey, only minimal information on sample selection would be disclosed so that participating schools could not be identified. Nevertheless, the information provided would be sufficient for reproduction of the survey in future. Table 5 describes the population distribution in different LGA's in 1986, number of schools chosen from each area, and the gross sample drawn from each area.

Table 5. Number of Schools and gross sample of students drawn from each Local Government Area in relation to population distribution in different LGA's.

<u>Local Government Area</u>	<u>Population</u> (1986 population)	<u>Number of school</u> drawn from the area(s)	<u>Gross sample</u> drawn from the area(s)
Auburn Municipality	47,147		
Baulkham Hills Shire	102,804	4*	400*
Blacktown City	192,442	4	390
Holroyd Municipality	73,237	3	200
Parramatta City	<u>130,783</u>	<u>4</u>	<u>190</u>
Total	<u>551,413</u>	<u>15</u>	<u>1,180</u>

101

*Subtotal of 2 LGA's - Auburn Municipality and Baulkham Hills Shire

Source for population distribution in 1986:
 Department of Health, N.S.W. (1988).
 Report of the Western Sydney health taskforce. p. 5.

4.7.3 Selection of schoolchildren

All Year six students in chosen schools with parental consent were included in the study. Students chosen were between 10-14 years old for comparison with previous ABS studies with the same age group. Any students not in this age group were excluded from this study.

4.8 QUESTIONNAIRE DEVELOPMENT AND LAYOUT

As data collection for the survey was by means of Year six students completing questionnaires in class, design of the questionnaires needed particular attention in order to obtain reliable data. A draft of the questionnaire was first designed after very careful consideration. The questions were further rephrased by the Education Department so that Year six students could easily understand the questions and answer them correctly. Questionnaires were given to colleagues' children approximately 11 years of age to complete for pre-testing to see if any further modification was necessary before a final version of the questionnaire was printed.

Responses were sought for:

- age
- date of birth
- sex
- name of school

- government school or private school
- if under private dental insurance
- number of times teeth brushed the day before
- occupation of the main money earner of the family
- birthplace of student
- birthplace of father
- birthplace of mother
- language spoken at home
- if the child saw anyone about his/her teeth in the previous 12 months and number of dental visits in the previous 12 months
- main reason for not seeing anyone about his/her teeth in the previous 12 months
- how long since child last saw anyone about his/her teeth
- if School Dental Service available through school
- if child ever had a checkup or treatment from the School Dental Service
- reason for never using the school Dental Service
- how long since child last used the School Dental Service
- if currently has a dental appointment
- what the current appointment is for
- how often does the child go for checkup
- reason for last dental visit
- place of last dental visit
- type of treatment received at last dental visit
- if child has ever worn any braces/bands

Layout of questionnaire was a double sided white colour A3 size paper folded in the midline to give 4 x A4 size back-to-back pages. The letter to the parents with permission slip to participate in the survey was stapled onto the questionnaire before it was delivered to schools for distribution to parents. A copy of the questionnaire and letter to the parents with parents' permission slip can be seen at appendix 1 and 2 respectively.

4.9 SURVEY DOCUMENTATION

Other survey documents included letters to the principal, and core components on why questions were asked and how information obtained could be used. They can be seen in appendix 3 and 4 respectively.

4.10 SURVEY PERSONNEL

The writer was responsible for co-ordinating and conducting the survey. The writer also presented a talk with video to the Year six students on dental health in general.

4.11 MATERIALS AND EQUIPMENT

Survey forms and letters to the parent with permission slips to participate in the survey were the major materials used for the survey. Other equipment included teaching materials for oral health such as a video cassette on diet and oral health education targeted for teenagers produced by the audio-visual department of Westmead Hospital and some posters for oral health education. The video show and the talk on diet and oral health were given to the Year six students only after the survey questionnaires had been completed and collected to avoid possible bias in completing the questionnaires by the students if they got the oral health messages before the survey. Permission was first sought from Principals of schools to present the educational material to the students.

4.12 CONDUCT OF SURVEY

4.12.1 Organisation

After written approval was granted by the Education Department for the survey to proceed, approval was further sought from the Catholic Education Office so that the writer could enter Catholic schools to conduct the survey to ensure a representative sample.

Letters to the Principal were then sent to the fifteen chosen schools to seek their support. The writer

contacted the Principal of every chosen school to explain the survey project; to answer any question they may have; to ask for co-operation; to explain how teachers and parents could participate; to finalise a convenient survey date; and to arrange the best time for the survey forms and letters to parents to be dropped to individual school.

After the first fifteen invitation letters were sent to the chosen schools, fourteen schools agreed to take part in the survey while one school refused to participate. The writer sent out another invitation letter to invite one more representative school in the same area with similar size of Year six students to participate.

The writer then went to each participating school to deliver the survey forms and letters to the parents with permission slips for participation in the survey. How the teachers and parents could participate in the survey was further explained to the Principal or the designated responsible school personnel. Most forms were delivered to schools approximately seven to ten days before the actual survey was conducted so that the schools had enough time to distribute the questionnaires and letter to the parents and collect parents' permission slips.

4.12.2 Informed consent

Each parent was given a copy of the questionnaire and letter to the parent with permission slip for their child to participate in the survey. Only students who returned the completed permission slips were allowed to participate in the survey. Parents were encouraged to return the blank survey form for completion in class by the students. Parents were also advised to inform their child whether they had private dental insurance coverage as the writer was worried the children might not know how to answer this question.

4.12.3 Scheduling

The decision to carry out the survey project was made in June 1992. Literature review and planning commenced at that time. Collection of data at schools was carried out during period 28 July 1993 to 19 August 1993.

4.12.4 Survey implementation

On the survey day, the writer went to the chosen school booked for the day to conduct the survey. The school Principal, sometimes the teacher, introduced the writer to the students. The writer then collected parents' permission slips; introduced the questionnaire briefly to each class; handed out some spare survey forms to students that had parental consent for participation but forgot to return or lost the blank survey form; answered any questions that would help the students in completing

the questionnaires; and collected the completed questionnaires. No clinical examination or treatment of any kind was given. Students were allowed approximately twenty minutes to complete the questionnaires.

After collecting the data required for the survey, the writer showed a video on diet and oral health education to the students and gave a talk to the Year six students on dental health in general before leaving the school.

4.13 CONFIDENTIALITY

Names of the students were not asked in the questionnaire so that individuals could not be identified. Names of schools involved will not be identified in any reporting of the research.

4.14 CHECKING OF FORMS

A preliminary checking of forms was carried out soon after the questionnaires were completed and collected. The data was finally checked by the writer before it was used for data analysis.

4.15 CLASSIFICATION OF OCCUPATIONS

Occupations of the main money earners of the families were first classified into two digits codes in accordance with the Australian Bureau of Statistics (1992): Australian standard classification of occupations - Keyword index to occupation definitions. 1st Edn. Canberra: ABS Catalogue No. 1229.0. The two digits codes were entered into a database programme. The occupations were then grouped using the first of the 2 digits codes into 8 major groups in accordance with the Australian Bureau of Statistics (1990): Information Paper - Australian standard classification of occupations. Canberra: ABS Catalogue No. 1221.0. For analysis purpose, The major groups of occupations were further grouped into the white collar occupations and the blue collar or nil occupations. The managers and administrators, professionals, para-professionals, clerks, salespersons and personal service workers, and students were classified as white collar occupations. The tradespersons, plant and machine operators, and drivers, and labourers and related workers and the retired, unemployed, not working, on pension or social security were classified as blue collar or nil occupations.

4.16 STATISTICAL ANALYSIS OF DATA

The writer was responsible for entering the collected data into a Excel Database program. Total time spent on entering data was approximately 100 hours. Data cleaning was carried out before SPSS computer analysis which was carried out in consultation with a statistician. The Chi square test was the statistical test used to show whether any difference was significant. The Student's t-test was used to compare the mean values between two groups. The level of significance for both tests was determined at probability level of 0.05 or 5%.

4.17 COMPARISON WITH PREVIOUS STUDIES

Comparison was made with the ABS 1979 and 1983 studies, and also with the National Oral Health Survey of Australia 1987-88. Whenever possible, comparison of results was made with the 10-14 years age group. However, as some results of the 1979 and 1983 ABS studies were published only for the 2 to 14 years age group, comparison with the 10-14 years age group was sometimes not possible. Under those circumstances, comparison with the 2 to 14 years age groups was made. To avoid confusion, the writer has always specified the age group being compared.

4.18 COURTESY REPORTING

A summary of findings was forwarded to the Assistant Director General (Region), and to each participating school.

5 RESULTS

5.1 COST ANALYSIS

The expenses incurred for the survey were as follows:

Actual costs (estimated):

Printing of survey forms	\$300
Cost towards statistical analysis of data	\$100
Travel expenses for survey personnel	\$64
Other expenses	<u>\$136</u>
Total	<u>\$600</u>

5.2 CONDUCT OF SURVEY

On the whole, the survey was conducted successfully. Good co-operation was obtained from schools. More than 99% of the parents who gave permission for their children to participate in the survey returned the survey forms for re-use in class. No major alteration to the original planning was necessary.

5.3 SAMPLE RESPONSE RATE

The total response was 604 out of a gross sample of 1,180. Of the 604 responses, 603 were complete enough for analysis and were reported. One response had to be excluded from final analysis as the student completed

less than half of the questionnaire and had to leave to attend to something urgent.

The overall response rate was 51.1%. The average response rate from government schools was 458 out of 900 (50.9%). The average response rate from Catholic Schools was 145 out of 280 (51.8%). Response rates between individual schools varied from 13.3% to 79.3%. Response rates of individual LGA's varied from 42.8% to 69.0%. The distribution of response rates from different LGA's is shown in Table 6.

Table 6. Distribution of response rates from different LGA's

<u>Local Government Area</u>	<u>Number of students</u>	<u>Response from</u>	<u>Response rate</u>
	<u>drawn from area(s)</u>	<u>area(s)</u>	<u>for area(s)</u>
			(% in final sample)
Auburn Municipality } Baulkham Hills Shire }	400*(33.9%*)	171* (28.3%*)	42.8%
Blacktown City	390 (33.1%)	182 (30.2%)	46.7%
Holroyd Municipality	200 (17.0%)	138 (22.9%)	69.0%
Parramatta City	<u>190 (16.1%)</u>	<u>112 (18.6%)</u>	59.0%
Total	<u>1,180 (100.0%)</u>	<u>603 (100.0%)</u>	

114

*Subtotal of 2 LGA's - Auburn Municipality and Baulkham Hills Shire.

5.4 SUMMARY OF FINDINGS

5.4.1 Male/female distribution

Out of the final sample of 603 students, 44% were male. Fifty six percent were female.

5.4.2 Age distribution

For the whole sample, the mean age was 11.7 years. The median age was 11.7 years. Mean age for the male students was 11.8 years. Mean age for female students was 11.7 years. There was significant difference in the mean age between male and female students ($p < 0.01$). Median age for male students was 11.8 years. Median age for female students was 11.7 years. Age distribution of the sample is shown in Table 7.

Table 7. Age distribution of sample

<u>Age (years last birthday)</u>	<u>% students</u>
10	1.0
11	77.4
12	21.1
13	<u>0.5</u>
Total (N=603)	<u>100.0</u>

5.4.3 Government school/Catholic school

In the final sample, 76% students were from government schools. Twenty four percent were from Catholic schools.

5.4.4 Occupation of the main money earner of the family

Distribution of occupation of the main money earner of the family in the sample is shown in Table 8.

Table 8. Distribution of occupation of the main money earner of the family

<u>Occupation of the main money earner of the family</u>	<u>% students</u>
Managers and administrators	10.8
Professionals	15.3
Para-professionals	6.0
Tradespersons	20.4
Clerks	7.0
Salespersons and personal service workers	6.1
Plant and machine operators, and drivers	6.6
Labourers and related workers	10.5
Studying	0.3
Retired	0.2
Unemployed, not working, on pension, social security	12.1
Do not know	1.6
Not given	3.1
Total (N=603)	100.0

5.4.5 Country of birth of student

For country of birth, 81% of students indicated Australia. Nineteen percent indicated overseas. Distribution of country of birth of student in the sample is shown in Table 9.

Table 9. Distribution of Country of birth of student

<u>Country of birth</u>	<u>% students</u>
Australia	80.6
Overseas	19.4
Total (N=603)	100.0

5.4.6 Country of birth of father

For country of birth of father, 46% of students indicated Australia. Fifty three percent indicated overseas. Distribution of country of birth of father is shown in Table 10.

Table 10. Distribution of country of birth of father

<u>Country of birth of father</u>	<u>% students</u>
Australia	45.8
Overseas	52.6
Deceased	0.1
Do not know	1.3
Not stated	0.2
Total (N=603)	100.0

5.4.7 Country of birth of mother

For country of birth of mother, 50% of students indicated Australia. Fifty percent indicated overseas. Distribution of country of birth of mother is shown in Table 11.

Table 11. Distribution of country of birth of mother

<u>Country of birth of mother</u>	<u>% students</u>
Australia	49.9
Overseas	49.8
Do not know	0.3
Total (N=603)	100.0

5.4.8 Language spoken at home

For language spoken at home, 66% of students indicated they spoke only English at home. Thirty four percent indicated another language.

Detailed distributions of country of birth of student, country of birth of father, country of birth of mother, and language spoken at home are attached and can be seen in Appendix 5,6,7 and 8 respectively.

5.4.9 Private dental insurance

Thirty two percent of students indicated they had private dental insurance. Forty percent indicated they did not have private dental insurance. Twenty eight percent answered 'Don't know'. Distribution of private dental insurance held is shown in Table 12.

Students from Catholic schools, born in Australia, had fathers born in Australia, had mothers born in Australia, spoke only English at home ($p < 0.01$), or whose parents were in the white collar occupations ($p < 0.01$), were variables associated with significantly higher proportion of students who held private dental insurance. There was no significant difference in private dental insurance held by sex.

Table 12. Private dental insurance held

<u>Insurance</u>	<u>% students</u>
Yes	32.3
No	39.7
Do not know	27.7
Not stated	0.3
Total (N=603)	100.0

5.4.10 Frequency of toothbrushing

Ninety three percent of students indicated they had brushed their teeth the previous day and 60% said they had brushed twice. About 7% indicated they did not brush the previous day. The average number of times that students brushed their teeth each day was 1.7. Distribution of frequency of toothbrushing on the previous day is shown in Table 13.

Female students brushed their teeth significantly more frequently ($p < 0.01$) than male students (1.8:1.6). Students born overseas ($p < 0.01$), had fathers born overseas, had mothers born overseas ($p < 0.01$), or spoke another language at home other than English ($p < 0.01$), were variables associated with significantly more frequent toothbrushing. Students in Catholic schools brushed their teeth more frequently than those from government schools (1.8:1.7), although the difference was not significant. There was no significant difference in frequency of toothbrushing by occupation, or by private dental insurance.

Table 13. Number of times teeth brushed on previous day

<u>Frequency</u>	<u>% students</u>
Did not brush	6.6
One	24.9
Two	60.2
Three	7.3
Four times or more	1.0
Total (N=603)	100.0

Mean number of times teeth brushed

- per person	1.71
- per person brushing	1.83

5.4.11 Dental service utilisation in previous 12 months

Seventy one percent of all students indicated they had made a dental visit within the previous 12 months. Distribution of dental service utilisation in the previous 12 months is shown in Table 14.

Students born in Australia ($p < 0.01$), had fathers born in Australia ($p < 0.01$), had mothers born in Australia ($p < 0.01$), spoke only English at home ($p < 0.01$), had private dental insurance, and whose parents were in the high white collar occupations, were variables associated with significantly higher proportion of students who had visited in the previous 12 months. There was no significant difference by sex, or by type of school, in utilisation of dental service in the previous 12 months.