The dental health needs of individuals living in areas of multiple deprivation in Glasgow

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To Mary, Socrates and Dimitrios

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LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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SUMMARY

The relationship between general health and socio-economic environment is well documented. Dental disease has also been reported to be influenced by socio-economic factors. The study reported in this thesis examined the effect of social environment on dental health attitudes, beliefs and behaviours, by using an area deprivation classification. The relationship of all parameters to the level of oral health of adult populations was investigated by employing multi-layer modelling techniques. By examining personal and environmental factors alongside the availability of the dental services, the study aimed to determine the major influences on oral health.

Both qualitative and quantitative research methodologies were used. The questionnaire which was used in the main survey was developed from group discussions, thus ensuring that researcher bias was minimised. In total, 852 subjects randomly selected from the areas under study, aged 16 to 65 years, took part in the survey. Of them 512 (60.1%) were examined clinically. All dental services in the areas of interest were visited for collection of the relevant information. Bivariate and multivariate analyses examined the separate and the combined effect of behavioural / attitudinal and service availability variables on dental health and dental behaviours.

The study showed that dental health is related to social deprivation. The effect of deprivation on dental health was strong, even after controlling for differences in dental attitudes and behaviours, and availability and accessibility of dental services. Deprived populations were found to exhibit substantially higher levels of caries and periodontal disease, as well as overall treatment needs. Differing dental health behaviours were found to account for a considerable proportion of the differences in the oral health needs of affluent and deprived groups. However, complex interactions between personal attributes, social environment, behaviours and oral health were detected.

Dental anxiety was a major barrier to attendance, particularly among deprived populations. Fear of the cost for dental treatment also appeared to be a barrier, and to a certain extent this seemed to stem from a poor dentist - patient communication. Efforts to reinforce healthy dental behaviours should tackle this problem, and furthermore, should be based on the dental health value system of the targeted populations.

The dental health services were perceived by the populations to be available, and seemed to be sufficient for the current levels of demand for care, in both deprived and affluent population groups. However, if unmet needs were to be translated into demand

for dental care amongst the deprived populations, additional dental services in these areas would be required.

Areas of deprivation are areas of greater dental needs and should be targeted by health promotion interventions. However, such efforts alone, according to the results presented in this thesis, are unlikely to solve the problem of social inequalities in oral health. Parallel efforts by the state are also required in order to improve the prevailing social and economic situation in such areas, before oral health can become an attainable goal.

CHAPTER 1 : INTRODUCTION

1. INTRODUCTION

1.1 THE PATTERN OF DENTAL DISEASE IN SCOTLAND AND GLASGOW

The pattern of decreasing dental caries prevalence in the Western world is now documented and widely accepted[1-4], and in the United Kingdom, considerable improvements in the level of adult dental health have been revealed[2]. Total tooth loss has decreased from 37% in 1968, to 29% in 1978, and to 20% in 1988. The mean number of missing teeth of British dentate adults decreased from 9.0 in 1978, to 7.8 in 1988, and the mean number of decayed teeth decreased from 1.9 in 1978, to 1.1 in 1988. In Scotland, however, even though a similar pattern of improvement has been found, higher levels of dental disease are evident compared both to the U.K. as a whole, and to England and Wales. Thus, while total tooth loss, mean number of missing teeth and mean number of decayed teeth were 20%, 7.6 and 1.0 respectively for England and Wales in 1988, the corresponding figures for Scotland were 26%, 8.9 and 1.2.

Children's dental health has also improved[5], the proportions of children in the UK with active decay in the permanent dentition having declined for all age groups over such a time scale. In the 1993 child dental health survey, the proportion of 5 year olds estimated to have had at least one decayed deciduous tooth in the UK as a whole fell to 47% from 52% in 1983. Among 14 year olds, the drop was from 39% in 1983 to 29% in 1993, while for 15 year olds the proportion with active decay reduced from 42% to 30%. However, a north / south difference was still present in the levels of children's dental health in 1993, the proportion of 14 year olds with active decay being 27% in England and Wales, and 42% in Scotland. At age 15, 27% of English children and 32% of Welsh children had active decay, compared to 46% in Scotland. The proportions of children with filled permanent teeth, with extractions of permanent teeth, and with some decay experience (DMF>0) have all fallen in the 10 year period, but still they remain higher in Scotland, as compared to England, and the average figures of the UK as a whole. Preliminary analysis regarding the deciduous teeth of those aged 5 years showed that while there has been some improvement since 1983, this has not been substantial. Much greater improvements were found in Wales, Scotland and Northern Ireland than in England, where levels of disease were little different in 1993 than in 1983.

These findings are supported by the results of the caries prevalence epidemiological surveys co-ordinated by the British Association for the Study of Community Dentistry (BASCD). These surveys were carried out from 1985 to 1992 at 2-year intervals for 5-

year-olds, and 4-year intervals for 12- and 14-year-olds. Although a general caries decline was evident for the older children, it was found to be much slower for 12-year-olds, and also slower than their rate for the previous 4 years. However, for 5-year-olds, overall, the general decline in caries experience was found to have ceased. Nonetheless, wide geographic variation was also evident, the north / south pattern again being present consistently, with higher levels towards the north[6].

Thus, the caries prevalence pattern indicates that Scotland suffers highest levels. However, there is also an east / west variation within Scotland, the west exhibiting the higher levels[7-9]. Unfortunately, published data for Glasgow adults do not exist, the literature covering only Glasgow children and adolescents.

Recent data from the Scottish Health Boards Dental Epidemiological Programme (SHBDEP) for 14-year-olds in 1990-91[7], 5-year-olds in 1991-92[8], and for 12-year-olds in 1992-93[9], showed that Greater Glasgow had consistently higher mean indices of dental disease than the mean values for Scotland. While for 14-year-olds the mean DMFT, D, M, and F values for Scotland were 3.55, 0.59, 0.37 and 2.59 respectively, for Greater Glasgow the corresponding figures were 3.89, 0.66, 0.43, and 2.80[7]. Similarly, for 5-year-olds, the mean dmft, d, m, and f values for Scotland were 2.88, 1.94, 0.54, and 0.40 respectively, the corresponding means for Greater Glasgow were 3.22, 2.05, 0.76, and 0.41[8]. Likewise, regarding 12-year-olds the Greater Glasgow mean DMFT, D, M, and F scores (2.70, 1.19, 0.36, and 1.15 respectively) were higher than the means for Scotland (2.08, 0.87, 0.19, and 1.01 respectively). When further analysis was carried out for this age group (12 years) about the 97th centile of the distribution of D, F and DF surfaces (this index being used as an indicator of the severity of disease), Greater Glasgow was found to exhibit the highest 97th centile for all three measures (11,11 and 18 respectively)[9].

High levels of dental disease had also been reported previously[10] for Glasgow 15 year olds. However, the important finding here was, that within the Greater Glasgow Health Board area, there existed variation in the levels of dental disease in relation to the particular socio-economic profile of the study areas. When the sample was split into five groups representing the catchment areas of the five districts, it was found that the highest DMFT score (8.62) was recorded for the zone with the lowest profile indicative of deprivation, where the socio-economic profile was assessed in terms of housing tenure and car ownership.

A three year follow-up of that study[11] showed that, in accordance with the national trend of declining caries, there was an improvement in the caries prevalence of young Glaswegians. A DMFT reduction of 38% was recorded for 12-year-olds, and of 30% for 15-year-olds. However, again, the gap between the two socio-economic groupings was noticeable, the dental health improvement being found mainly in the higher socio-economic group. Here, the percent reductions of the DMFT scores were 50.6% and 49.9% for 12 and 15-year olds respectively, while for the low socio-economic group the corresponding reductions were much less, i.e. 26.8% and 14.3% respectively.

Significant differences in the dental health status between 15-year-old males living in an affluent, as compared to a deprived area of Glasgow, have been reported more recently[12]. The schoolchildren in the deprived area were found to have significantly higher numbers of decayed and filled teeth, and DMFT scores. Also, they had cleaner mouths and noticeably less gingivitis.

Hence, it would seem that Glasgow exhibits higher levels of dental disease compared to the whole of Scotland. However, when analysis is carried out for smaller areas, great variations are evident, with higher disease levels being found for populations residing in areas of low social and economic profile.

The above mentioned higher levels of dental disease have financial implications which are reflected in the figures published by the Scottish Dental Practice Board on dental treatment expenditure[13]. While the expenditure per capita for Scotland in 1992/93 was £20, the corresponding figure for Greater Glasgow was £24, i.e. higher than the year before (£23), and the highest of all Scottish health boards in both years. Also, Greater Glasgow had a greater number of treatment courses per 1000 population than the average for Scotland as a whole, for fillings (Scotland=442; Glasgow=491), root canal treatments (Scotland=29.6; Glasgow=37.2), dentures (Scotland=33; Glasgow=42) and extractions (Scotland=100; Glasgow=117).

1.2 HEALTH AND DEPRIVATION IN GLASGOW

The differences in the levels of dental disease between Glasgow and the rest of Scotland, and within Glasgow, are paralleled with very similar differences in the levels of general health and of deprivation.

Compared with Scotland as a whole, Glasgow has an accumulation of the most unfavourable social circumstances. Of all the most deprived postcode sectors in

Scotland, 80% are within the Greater Glasgow Health Board area[14], and in terms of population, of all Scots who live in the most deprived postcode sectors, 84% live within Greater Glasgow[15]. Its population has higher proportions of children living in single parent families, of people living alone, of people in social classes IV and V, of overcrowded households, and of households without a car. Also, it has smaller proportions of persons in tertiary education, in social classes I and II, of owner-occupied houses, of households with two or more cars and of ethnic minority groups[16].

When a deprivation score (based on lack of car, male unemployment, low social class and overcrowding) was calculated for all postcode sectors for Scotland[14], it was found that Greater Glasgow had the highest score of all Health Boards of Scotland. When the scores of the five local government districts which fall within the boundaries of Greater Glasgow were calculated, Glasgow City had the highest score in Scotland, while Eastwood and Bearsden & Milngavie had scores which were the lowest in Scotland.

In terms of health indicators, higher mortality and morbidity have been reported in the Greater Glasgow Health Board area as compared to Scotland[14]. Overall (i.e. all ages) and premature (i.e. 0-64 years) mortality from all causes has been found to be the highest of any health board in Scotland. Greater Glasgow also exhibits the highest mortality values for cancer of the lung, chronic rheumatic heart disease, hypertensive disease, pneumonia, bronchitis, and liver disease/cirrhosis. However, when the figures at Local Government District levels were examined, it was found that there was great variation among the five districts which comprise the Greater Glasgow area. Mortality for Glasgow City was found to be the highest, while for Eastwood and Bearsden & Milngavie, their data were the lowest of all local government districts in Scotland.

In terms of cancer morbidity, cancer registration ratios were highest in Glasgow and Lothian, but registrations by cause, revealed that Glasgow repeatedly had higher overall rates with respect to cancer of those sites which have association with deprivation. Again the differences within the Greater Glasgow area were large. For example, while lung cancer registration for Glasgow City was the highest of the five districts comprising Greater Glasgow, for Eastwood it was lowest. In contrast, registrations of skin and breast cancer were highest for Bearsden & Milngavie, and much lower in Glasgow City.

Thus, Glasgow is not only the most deprived area of Scotland, with a very bad health record, but it seems to be a city of great contrasts, as, within the Greater Glasgow boundaries, both the most deprived and unhealthy, and the most affluent and healthy areas and populations of Scotland can be found.

1.3 HEALTH INITIATIVES IN GLASGOW

The document "Scottish health priorities for the eighties"[17] identified the need to strengthen health services for the deprived as a major goal, and the Royal Commission on the NHS[18] stated that "new initiatives are required to improve dental health care in areas of deprivation". Both the general health and the dental health profile of Glasgow, particularly in its areas of deprivation, make Glasgow an area of priority, targeted by such new initiatives for health promotion. Indeed, over the ten past years, a considerable number of such initiatives have been undertaken in order to address the city's health problems[19]. Thus, in 1988, Glasgow became a member of the WHO European Healthy Cities Project via which the Women's Health Policy for Glasgow was developed, in parallel with various community health initiatives. In Greater Glasgow Health Board an Environment Group was established, and the Health Promotion Department was restructured and re-organised, setting up several health promotion and health education campaigns like the "Get up and Glasgow" campaign, or the "Glasgow 2000" project, this being an example of an interdisciplinary approach to health promotion.

For dental health, Greater Glasgow Health Board have formulated their short- and long-term targets, and an attempt was made to introduce water fluoridation, as this was considered to be necessary if the targets were to be met[15]. An earlier initiative was a preventive dentistry programme which ran in seven Glasgow health centres[20]. However, this community-based caries prevention regime was found to be substantially less effective than the clinical programme from which it originated. Furthermore, social class analysis of the participants showed that the majority belonged to the three higher social classes, while the programme targeted mainly deprived populations.

Given the above findings, and the critical role of the preventive health behaviour factor in the success of any health-promoting initiative, it was deemed necessary to investigate the differing health behaviours and their determinants observed among affluent and deprived populations. For these reasons, the present study was set up. Furthermore, insight into the dental health behaviours, beliefs, and attitudes of populations at a local level, would enable the formulation of programmes and initiatives which might respond truly to the needs (both normative and perceived) of these populations and thus be most appropriate, acceptable, and possibly effective.

1.4 HEALTH BEHAVIOUR

Levels of dental health are known to depend upon the preceding behaviours of the individuals concerned. Several investigators have tried to explain or predict these behaviours, and several theories and models of health behaviour have been developed[21].

A model which has received a great deal of attention, and has been the basis for many health education and promotion interventions and evaluations, is the Health Belief Model[22]. According to this, individuals would take up a preventive behaviour if (a) they felt that they were susceptible to the disease in question, (b) they felt that the disease would interfere with some aspect of their life, and (c) they felt that the benefits of any actions were worth the costs (psychological or economic). Also, 'cues' like mass media campaigns, advice from others, or illness of a family member or friend, would act as triggers to action. Another separate individual variable was later incorporated[23] - self-efficacy - which refers to expectancies about one's own competence to perform the behaviour needed to influence outcomes.

However, the importance of 'cues' to action within this theoretical framework has been challenged by Antonovsky & Kats[24], who claim that a 'cue' would simply raise the perception of susceptibility. Thus, it would not be the 'cue' which directly prompts one to take action, but the belief that one is susceptible. They suggest an interactional model, not very dissimilar from the Health Belief Model, which builds on the axiom that all behaviour is motivated, i.e. that it is goal directed. It is therefore, three sets of variables, effective motivation, blockage variables (e.g. knowledge, anxiety or fear), and conditioning variables (e.g. feeling susceptible, educational level, socio-economic status, passive orientation and rejection of preventability of disease), which interact and lead to a preventive behaviour.

A model which examines the passive or active orientation of the individual as to who controls health, is the Health Locus of Control model[25]. It measures the extent to which individuals believe that their health is influenced either by their own behaviour, or by external forces not controlled by themselves, like powerful others, or chance. The concept of Health Locus of Control relates to the concept of self-efficacy. However, locus of control is a generalised perception of who or what controls one's health, while self-efficacy is situation specific, and concentrates on beliefs about one's personal abilities in specific settings. In this view Health Locus of Control relates more to outcome expectations than to efficacy expectations.

Fear arousal, which relies on intrinsic motivation, has been examined as to how it relates to health behaviour. However, results have been inconsistent or inconclusive. Fear can produce emotions which may influence behaviour[26], but social class and environment determine the threshold necessary for fear to influence behaviour. However, fear messages do not always raise anxiety and do not result in behavioural change[27].

Studies which have used these models of health behaviour, have not always been successful in explaining oral health behaviour. The health belief model was not found to predict children's dental visiting behaviour[28], participation in a preventive programme[29], or adherence with home mouth rinsing practices[30,31]. Neither was it found to be successful in predicting compliance with dental appointments of adolescents[32]. The health beliefs were not significantly associated with the gingival health status of adult patients, even though they were highly motivated, concerned with their susceptibility to, the seriousness of, and the benefits of periodontal treatment, and were also stimulated to take action by a cue, (bleeding gums)[33].

Health Locus of Control (HLC) has not been found to be associated with adolescents' compliance with dental appointments[32], or periodontal disease[34], or oral hygiene skill and plaque score[35]. In contrast, Galgut *et al.*[36] reported significant correlations (after the subjects participated in a plaque control programme) between powerful others HLC and plaque and plaque change, and between internal HLC and gingivitis, plaque change and gingivitis change. However, the sample comprised of employees of a firm which was promoting preventive dental health practices, and who were on a dental waiting list for self-requested routine treatment. As correlations were not consistent, the authors suggested further confirmatory investigation of these indicative results. In a more recent study of the relationship of dental coping beliefs and oral hygiene, the external Health Locus of Control constituent of the Dental Coping Beliefs Scale was found to correlate positively with the plaque index score[37]. However, the generalizability of the study was restricted, as the sample comprised of male US veterans, who had met certain exclusion criteria, and who were volunteers.

Thus, current models do not seem to be completely successful in explaining the complex practices of health behaviours. Most of the health behaviour models are individualistic in concept, that is, they are based on the assumption that the ultimate success of a preventive regime depends on an individual's willingness to adopt the behaviour. They have been accused of placing the responsibility for health on the individual[38]. However, health behaviour does not occur in a social vacuum, the major determinants of health being the socio-economic and environmental conditions under which people live.

It is the effect of this social environment on the dental health attitudes, beliefs and behaviours that the present study will examine, as well as how these relate to the level of dental health of the populations under study. In order to examine the effect of social environment, the population had to be heterogeneous in respect to this attribute. Thus, the sample was drawn from the adult population of the most deprived and the most affluent areas of Glasgow.

Since dental health is dictated by behaviour and is therefore influenced by social values and norms, it is important that relevant data are collected at a local level rather than by extrapolating findings of other studies. Although the National Dental Surveys[2,3] provide useful data concerning attitudes to dental health, questionnaire research often tends to examine the issues judged to be important by the investigator. In this study the ethnographic, qualitative design has been combined with the epidemiological methodology, in order to give respondents the opportunity to specify their own priorities, so that both the clinical dental needs and the real and apparent barriers to care experienced by the socially deprived, as compared to less disadvantaged groups can be clarified and quantified.

CHAPTER 2 : AIMS AND OBJECTIVES

2. AIMS AND OBJECTIVES

2.1 AIMS

The aim of the present study is to examine the relationship between four variables, i.e. place of residence, dental health status, dental health attitudes / beliefs / behaviours, and availability / accessibility of dental health services.

By doing so, the barriers, either structural-organisational or behavioural-attitudinal, which prevent people from making use of the available dental services will be enumerated.

2.2 OBJECTIVES

The above general aims give rise to the following research questions :

1. a. What is the dental health status of the population under study?
   b. How does the dental health status and treatment needs of the residents of affluent areas compare to that of the residents of the deprived areas?
   c. How does the dental health status and treatment needs of regular attenders compare to the dental health status of irregular dental attenders?
   d. How does the dental health status of the population under study compare to the dental health profile found in the National Dental Health Surveys?

2. What is the difference in the dental health behaviours between affluent and socially deprived groups?

3. What is the dental health attitudinal profile of the population groups under study?

4. To what extent do these differing attitudes act as barriers to the adoption of preventive dental behaviours?

5. What other barriers (structural/ organisational) prevent affluent and deprived populations from making use of the available dental services?

6. How are the available dental services perceived by the population under study, and to what extent does this influence the use of these services?

- and -

7. What is the actual availability and accessibility of the dental services, and how does this relate to attitudes and behaviours of the population groups?

CHAPTER 3 : LITERATURE REVIEW

3. LITERATURE REVIEW

3.1 INTRODUCTION

Deprivation, as a term, has been used extensively and a wide variety of definitions can be found in the literature[39,40,41,42], which suggests that no clear-cut and universally accepted definition exists. What is evident from these definitions is that it is recognised there is no single state of deprivation or disadvantage. Deprivation covers a collection of states i.e. income deprivation, housing deprivation, employment deprivation, education deprivation, health deprivation, and so on.

Townsend[40], in his massive work on Poverty in the United Kingdom, found a close relationship between income and deprivation. As income diminished from the highest levels, so deprivation steadily increased, and below a certain level of income (the deprivation threshold), deprivation increased swiftly. He also found a steep increase in poverty in relation to descending occupational class.

While in the social science arena there is debate regarding the theoretical approach to the concept of deprivation, in the field of health research, whenever a measure of deprivation is required, the indices used reflect the access people have to material resources. Census data are used as they provide a source of objective and uniform data for the entire population. Since measurement of access to material resources is constrained by the data available from that source, there is debate about the appropriate composition of a deprivation measure. The composition of a number of deprivation measures which have achieved some prominence following the UK 1981 census, all of which use the census as their source of data, exemplify the lack of consistency which exists[14]. Some of these have been specifically defined in relation to health, and others, while designed in a different context, have been used in the health field.

In the literature there are numerous studies which examine certain health measures (either mortality or morbidity measures) in relation to some state of deprivation, namely housing deprivation, employment, income, educational attainment, and so on. Within the scope of the present thesis, and for illustrative purposes, only three studies which examine the relationship of deprivation (as measured by a composite index) and general health, are reviewed. Then, follows the review of the dental literature. This covers studies which, irrespective of their objectives, give information on oral health and oral health attitudes, beliefs and behaviours of adult populations, in relation to some aspect of social inequality, be it social class, income, education, or area of residence.

3.2 DEPRIVATION AND HEALTH

The Black Report[43] on class inequalities in health accepted that cultural and genetic factors play an important role, but concluded that material deprivation was the predominant factor in explaining such problems. They identified the need to develop the knowledge on deprivation's form and impact, and called for development of indicators of area social conditions and health.

Blaxter[44], after reviewing twenty longitudinal studies relating to inequalities in health, suggested that occupational social class, as a compressed indicator, conceals wide differences and lacks in predictive or explanatory power. Thus, she noted that there was a need to develop new indicators of both social inequality and of health status.

The deprivation index suggested by Carstairs[45] in her Glasgow and Edinburgh study, consisted of seven items, namely, overcrowding, lack of amenities, percentage in social class V, male unemployment or sick males, lack of car, 1-3 room households, and percentage of population economically active. In the more recent study of deprivation and health in Scotland, Carstairs & Morris[14] used four variables (overcrowding, male unemployment, low social class, and lack of car) to form the deprivation index. Townsend *et al.*[46], in their study of deprivation and health in the North of England, constructed an Overall Deprivation index, using unemployment, car ownership, home ownership and overcrowding to describe deprivation, and not social class. They did not include social class, as Townsend[40] had suggested that there should be a distinction between actual measures of states of deprivation, and of measures of groups of people at risk of being deprived, like social class groups.

Various health indicators were used in these studies, like mortality, discharges, bed-days, mental hospital admissions, low birthweight, perinatal, post-neonatal and infant mortality[45], or deaths, perinatal/infant deaths, general hospital discharges and bed-days, births, mental hospital admissions, cancer registrations, temporary sick and permanent sick[14]. Townsend *et al.*[46] used premature mortality, permanent sickness and disablement, and low birthweight to construct an Overall Health index.

Significant and strong correlations between the deprivation measures and the health indices were reported in all three studies. For example, Carstairs[45] reported correlations with the deprivation score of 0.758 for deaths, 0.613 for discharges and 0.647 for bed-days (for all causes and ages 0-64 years). Data for the whole of Scotland[14] showed that mortality (for the period 1980-85) and deprivation were strongly associated, the correlations being 0.72 at all ages, 0.75 at 0-64 years, and 0.53 at 65 years and over. Death rates at 0-64 years were found to be more than twice as high in the most deprived areas when compared to the most affluent. Data for the Northern region of England[46] showed a correlation of 0.82 between the Overall Health and the Overall Deprivation index.

In the latter study[46], where social class was not included in the deprivation index, standardisation for national social class mortality trends showed an 'excess' number of deaths not accounted for by social class. Furthermore, while the four-item overall deprivation index explained 65% of the variance of overall health, a manual social class variable and a Class IV+V variable explained only 48% and 32%, respectively. Thus, the four items relating to access to material resources, were more powerful in detecting health and deprivation associations than social class alone.

The authors of all three studies concluded that deprivation and health were closely related. Across the spectrum of wards in the Northern Region of England, variations in health tended to correspond closely with variations in material deprivation or affluence. Even in the middle ranges of the regional distribution it was apparent that slight variations in social and economic well-being had parallels in slight variation in health[46]. Occupational class alone, did not uniformly reflect the distribution of mortality. Furthermore, it was suggested that more favourable health was enjoyed by people living in affluent areas, and that the adverse health experience of those living in deprived areas started with the risks associated with birth, followed by morbidity in the population of working age, and in the population in general, and culminated at life's termination with the gradients in mortality being steepest in younger adults but nevertheless continuing into older ages[14].

3.3 SOCIAL INEQUALITIES AND ORAL HEALTH

3.3.1 Social inequalities and dental health

The Adult Dental Health survey of 1988[2] showed that there has been an improvement in the level of dental health enjoyed by the adult population in the United Kingdom. These findings have been described as 'gratifying'[47]. However, the figures reveal that the improvement found has not been equally enjoyed by all social classes. Social class differences in the level of dental health of adults persist, and the gap between the higher and the lower social classes does not appear to have decreased.

Total tooth loss has been found to be more prevalent amongst lower social classes, who were also found to have higher mean numbers of sound, decayed, and missing teeth, and lower mean numbers of filled teeth than their higher social class counterparts. Furthermore, there are social class differentials in the rate of improvement in the 10 year period between the two national surveys of 1978 and 1988 (Table 3.1). While the rates of improvement for the ABC1's for sound, decayed and missing teeth were 19%, 50% and 14% respectively, the corresponding rates for the DE's were 10%, 38% and 10%. For filled teeth, the inverse was found. While the mean number of filled teeth increased at a rate of 10% in the last ten years for the DE's, for the ABC1's, the rate was only 4%.

Data in Table 3.2 show the gap in disease experience between higher and lower social classes. The class differences in the numbers of decayed and missing teeth appear to have increased in the ten-year period, while for the sound-and-untreated and for filled teeth, differences appear to have decreased. In the Adult Dental Health survey no test of statistical significance of these differences was undertaken, so it cannot be claimed with any certainty that the gap in the dental health experience between higher and lower social classes has increased in statistical terms. However, it can be claimed that it certainly has not decreased, in other words that social inequalities in the dental health of the adult population of Britain persist.

Social inequalities in dental health are reported in several studies from different countries. A number of these are reviewed here and are shown in Table 3.3.

Ahlqwist *et al.*[48] have reported a correlation between edentulousness and socio-economic status and between edentulousness and education among women aged 50 years. A remarkable improvement in edentulousness among the lower socio-economic and education groups in the following 12 years, resulted in a subsequent lack of any such correlation. For a younger age group (38 years), consistent correlations of education with numbers of remaining teeth at both time points were found.

Another study[49] which also involved women, but at the age of retirement (63- to 65-years-old), showed the number of remaining teeth to be related to professional status and a prosperity index. Women in subordinate positions, and those with low prosperity indices, were more often edentulous than those in other groups. Also, the mean numbers of decayed and filled teeth (DFT) and surfaces (DFS) were significantly related to professional position and the prosperity index.

Table 3.1 : Mean numbers of sound and untreated, decayed, missing and filled teeth, for 1978 and 1988, by social class, and percentage improvements. Figures from the Adult Dental Health Survey 1988.

Social	SOUND AND UNTREATED			DECAYED			MISSING			FILLED		
class	1978	1988	% Improvement	1978	1988	% Improvement	1978	1988	% Improvement	1978	1988	% Improvement
ABC1	12.1	14.4	19	1.6	0.8	50	8.4	7.2	14	9.9	9.5	4
C2	13.4	14.7	10	2.1	1.2	43	9.2	8.4	9	7.3	7.7	5
DE	14.0	15.4	10	2.4	1.5	38	9.6	8.6	10	5.9	6.5	10

Table 3.2 : Mean numbers of sound and untreated, decayed, missing and filled teeth, for 1978 and 1988, for ABC1 and DE social class, and percentage differences between them. Figures from the Adult Dental Health Survey 1988.

	SOUND AND UNTREATED		DECAYED		MISSING		FILLED	
Social class	1978	1988	1978	1988	1978	1988	1978	1988
ABC1	12.1	14.4	1.6	0.8	8.4	7.2	9.9	9.5
DE	14.0	15.4	2.4	1.5	9.6	8.6	5.9	6.5
% difference	16	7	50	88	14	19	40	32

Table 3.3 : Studies reporting associations between dental health and social and economic variables

Author	Sample	Age	Dental indicators	Socio-economic indicators
Ahlqwist *et al.*[48]	356 109 390 321 in 1968 in 1980	38 50	Remaining teeth, edentulousness	Education, SES
Norlen *et al.*[49]	116	63-65	Remaining teeth, edentulousness,DFT,DFS	Professional status, prosperity index
Osterberg *et al.*[50]	11,582 in 1975 14,964 in 1981	16-74 16-84	Reported dental status	Urbanisation, income, education, occupation
Antoft *et al.*[51]	1,719 in 1972 1,442 in 1982	19-21	DT, MT, FT	Social class
Petersen[52]	5,151	20-69	Reported: remaining teeth,cavities/fillings, denture-wearing	Social class
Eklund & Burt[53]	Various samples	25-74	Reported edentulousness (incidence)	Income, education
Nikias *et al.*[54]	1,058	19+	Edentulousness, D, M, F	Poverty
Nikias *et al.*[55]	873	19+	Periodontal health, M, D/DF, F/DF	Income, education
Gilbert[56]	4,652	20-64	Self-assessed problems, satisfaction	Education, income
Heloe *et al.*[57]	1,500 in 1973 1,500 in 1985	15+	Reported: edentulousness, remaining teeth	Income, urbanisation
Kalsbeek *et al.*[58] Willemsen *et al.*[59]	3,526	15-74	Edentulousness, DMFT	SES
WHO International Collaborative Study[60]	8,401	35-45	DMFT, F/DMF	Educational social position
Marcenes & Sheiham[61]	164 families	35-44	DMFT, DMFS, D,M,F, FS, T-Health	SES, education, income, area of residence
Turunen *et al.*[62]	909	35-64	Discomfort, edetnulousness, high intensity of disease	Income, education
Locker & Leake[63]	907	50+	Reported edentulousness, D,M,F, subjective indicators	Income
Locker[64]	907	50+	Edentulousness, M, Functional units, Subjective measures	Income, education
Locker & Ford[65]	1,404	50+	Reported edentulousness, subjective measures	Income, area of residence

Contrary to the above studies which reported clinical data, Osterberg *et al.*[50] examined reported edentulousness, and he also showed associations between that variable and social indicators. In both adult men and women, low education, low status occupation and low level of urbanisation, were related to higher reported edentulousness rates. Similar multivariate analysis for income, showed a significant association only for older women. These differences in edentulousness rates were evident in both samples of 1975 and 1981.

In another study which examined dental health improvements over a ten year period[51], differences were found in relation to social class. The pattern of the differences was that in 1972 lower social groups had higher numbers of decayed (DT) and missing teeth (MT), and lower numbers of filled teeth (FT) than their higher social class counterparts. In 1982, lower social groups had higher DT, MT and FT than their higher social status counterparts.

In contrast to the previous study which used clinically assessed measures of dental health, Petersen[52] reported associations between reported measures of dental health and social class. More persons in the lower social group claimed to have few or no teeth left. More than twice as many in the two higher social groups as in the lowest social group reported that they had their own teeth and had few cavities or fillings. In all age groups, most denture wearers were found in the lowest social group, and there were relatively few denture wearers in the two higher social groups.

Reported edentulousness was also used by Eklund & Burt[53] who examined risk factors for tooth loss among various national USA samples. Income and education at baseline were consistently found to be related to the 10-year incidence of reported edentulousness. The trend was that lower income and lower education groups were more likely to become edentulous. However, in multivariate analysis for the identification of risk factors, associations were not consistent for all samples. While income and education were significant for a 25-59-years sample, in another sample these two variables failed to be significant.

In contrast to the traditionally used social indicators, Nikias *et al.*[54] defined poverty in relation to family size and income, and examined differences in the dental status among poverty and non-poverty groups. Clinically assessed edentulousness was found to differ between the two groups, the poverty group being twice as likely as the non-poverty to be edentulous in both jaws. Differences were also found for the number of decayed, missing and filled teeth. The pattern was that poverty groups had more decayed and missing teeth, and less filled than their non-poverty counterparts. Also, dental problems requiring early care were more prevalent amongst the poverty, than among the non-poverty group.

Further analysis of the effect of income and education on oral health[55] showed that when economic status was controlled, there were differences between the educational groups in the number of missing teeth, in periodontal problems and oral hygiene, but no differences were detected in the ratios of decayed : decayed+filled teeth, and filled : decayed+filled teeth. In contrast, when education was controlled, the differences detected were between the economic status groups in the ratios of decayed : decayed+filled teeth, and filled : decayed+filled teeth, and not in the number of missing teeth, nor in periodontal problems, nor in oral hygiene. Thus, education had its strongest association with gingival and periodontal conditions, oral hygiene and missing teeth, while economic status had its strongest association with levels of untreated decay and restored teeth.

Income and education have also been reported, in another study[56], to be associated with dental health, but as assessed by subjective measures of complaints with teeth and gums, and satisfaction with appearance of teeth. The lower the educational level and the income, the higher the percentage of identification that "there is something wrong with teeth". The pattern of satisfaction with the appearance of teeth was similar.

Income and urbanisation were the background variables employed in the analysis of reported edentulousness and number of remaining teeth reported by Heloe *et al.*[57]. Income was found to be related to reported edentulousness and reported number of teeth present in both 1973 and 1985. Furthermore, over a 12-year period, the high income group experienced a greater decrease in reported edentulousness, and greater increase of the proportion of people with 20 or more teeth, than the low income group. The level of urbanisation was also found to be related to edentulousness and number of remaining teeth. In both 1973 and 1985, rural areas had higher reported edentulousness rates and lower percentages of people retaining 20 or more teeth.

Kalsbeek *et al.*[58] and Willemsen *et al.*[59] reported clinically assessed findings from the adult Dutch National Dental Survey of tooth loss and dental caries. Significant differences were found between low and high socio-economic groups in the percentage of the population who were edentulous. In the low socio-economic group, edentulousness was found to be twice as high as in the high socio-economic group. In contrast, the differences in the DMFT score between these groups were not consistent.

Similar lack of consistency in the relationship between the DMFT index and social position was reported in the WHO's international collaborative study on oral health care systems[60]. Analyses of the DMF by social position (based on education) were not conclusive, as in some areas lower social status was associated with higher DMFT, and in others the opposite was evident. However, the F/DMF ratio was found to be higher among the adults of a high social status when compared to their lower social status counterparts.

As the composite DMFT index was found to conceal differences in disease levels among different groups, Marcenes & Sheiham[61] suggested the examination of the separate components of the DMFT score, as well as the number of functioning teeth (FS-T: filled and sound teeth), and the number of the sound equivalent teeth (T-Health indicator). The sound equivalent teeth indicator was defined as a weighted average of sound teeth, filled (otherwise sound) teeth, and teeth with some decay. In their study they examined these indicators of dental health, and the DMFS index, in relation to education, income, socio-economic group and area of residence. For all indices apart from the DMFT, significant correlations were found with social and economic factors. The patterns were that the lower socio-economic groups were associated with more decayed teeth, more missing teeth and higher DMFS score, and fewer filled teeth, fewer functioning teeth (FS-T) and fewer sound equivalent teeth. For the low income and low education groups, the pattern of dental disease was the same, with the exception of the DMFS which was found to be higher among the higher educational group.

Both clinical and self-assessed measures, and their relationship to income and education, were reported in another study[62] of poor dental health and its determinants. The indices used were discomfort, impairment and intensity of disease, in an attempt to overcome the limitations of the traditional DMFT index. Criteria for "poor dental health" were: dissatisfaction with dental appearance or function as regards "discomfort"; edentulousness as regards "impairment"; and with respect to "high intensity of disease", three or more carious teeth and periodontal disease in all existing sextants. In bivariate analyses, low family income was associated with a high intensity of dental disease and edentulousness. Low educational level was associated with all three variables i.e. high intensity of disease, edentulousness, and dissatisfaction. However, the association with dissatisfaction differed, higher levels of education being associated with higher levels of dissatisfaction regarding the appearance or function of teeth. Logistic analysis with the measures of poor dental health as dependent variables, showed that education was the only variable which consistently appeared in the models.

Social inequalities in oral health have been found in the Ontario Study of Oral Health of Older Adults[63,64,65]. Analyses revealed a significant inverse relationship between reported edentulousness and income, higher rates being recorded for the lowest income group. Income was also related to the number of decayed, the number of missing and the number of filled teeth. The associations between these variables and income was stronger for the younger age group. Income was also related to certain subjective indicators of oral health used, like chewing problems, pain, behavioural impacts, and to rating of health as fair or poor. For the older age group, no such association was recorded between income and chewing problems. However, in contrast to the clinical assessment, for the subjective measures of oral health, the associations were stronger for the older age group.

Apart from income, education was also found to be associated with clinically assessed edentulousness, numbers of missing teeth, numbers of functional units, pain, limitation in chewing capacity, and dissatisfaction with oral health[64]. The lower the educational level, the higher the edentulousness rate, the more the number of missing teeth, the less the number of functional units, the more prevalent the problems with chewing capacity, the pain, and the dissatisfaction with oral health.

Analysis of the same data in relation to an area-based measure[65] revealed an association of area deprivation-affluence and edentulousness, chewing capacity, rating of oral health, dental visiting and having some form of insurance. The patterns of the association were that in deprived areas there was a higher edentulousness rate, higher percentages of respondents reporting chewing problems, higher percentages of respondents reporting fair or poor oral health, a lower percentage reporting a visit to the dentist in previous year, and a lower percentage reporting having some form of health insurance. Analysis examining the effect of both income and area showed that the area classification had significant independent effect after controlling for income. For example, low income subjects living in high status areas were found to be less likely to be edentulous and more likely to have visited a dentist in the previous year, than those low income living in the lower status areas.

To conclude, evidence from the above literature suggests there is an association between social factors and dental disease. The main factors to reflect social inequality found in the literature are income, education, and social class or socio-economic status.

Although there is an interaction among these variables, separate examinations of their individual effect on oral health give different insights, as the data measure different aspects of lifestyle. This is exemplified by the different patterns of associations of income and education with oral health, reported by Nikias *et al.*[55]. High economic status implies greater ability to purchase, and this may be the reason for the stronger association between income and decayed teeth ratios and restorative care levels, than between these variables and education. Greater education implies greater knowledge and awareness of appropriate oral care practices, as well as socialisation experiences and life-styles conducive to home oral hygiene practices. Thus, these facts may explain the stronger association between education and tooth loss, periodontal conditions and oral hygiene status, than between these variables and income.

Although income, education, and social class or socio-economic status have been found to be powerful predictors of oral health, there are certain theoretical and methodological problems associated with them[66]. For example, certain social groups like the elderly, married women, the unemployed or single parents are difficult to classify to a social class based on occupational criteria, and income information can also be difficult to collect. Given that health does not exist in a social vacuum but is considered to be a product of the social environment[67], area-based measures, apart from giving spatial information which helps to direct resources, can explain health inequalities separately from the effect of income. As Locker & Ford[65] reported, although income had a stronger effect on dentate or edentate status, the area-based deprivation classification they used, had a significant independent effect after controlling for income.

A relevant area-based classification developed in Britain is the ACORN (A Classification Of Residential Neighbourhoods) system. It has been used in dental studies[68,69], where area classification has been found to be related to dental health and dental health behaviours. The samples used were from child and adolescent populations.

Dental health indicators have either been reported or clinically assessed. The DMFT has been extensively used in the dental literature although its abilities to compare the dental health status of different populations have been criticised[70]. Social status indicators have not been found to be consistently associated with the composite DMF index[58-60], in contrast to its separate D, M, F, and DMFS, or indicators such as functioning units, or sound equivalent teeth, suggested as more sensitive alternatives[2,49,51,54,55,61,63].

Social inequality measures have been consistently found to be associated with edentulousness, both as assessed clinically[2,48,49,54], and as self-reported[50,52,53,57-59].

Reported measures of dental health like reported edentulousness or reported denture wearing have been found to correspond well with their clinically assessed relevant measures[71,72].

Social inequality measures like income, education or social positions, have consistently been found to be associated with self-assessed and self-perceived alternative measures of oral health[52,56,62-65]. In conclusion, social inequalities in dental health do seem to exist, irrespective of the way dental health or social inequality are measured.

3.3.2 Social inequalities and periodontal health

In the Adult Dental Health Survey 1988[2], some social variation in the periodontal health of the British adults was found. A higher proportion of subjects with no signs of periodontal disease was found amongst the higher social classes (ABC1) than among the low social class groups (DE). Bleeding was more prevalent among the DE's than the ABC1 subjects. However, the differences were not dramatic.

In Table 3.4, other studies which have reported associations of periodontal health with social and economic variables, are listed.

Similar to the UK national findings were the findings of an earlier study by Sheiham[73] who reported some social variation in the level of periodontal disease in males only, with social class A exhibiting the lowest mean Periodontal Index score, while males of social classes D and E exhibited the highest. However, no consistent tendency for periodontal disease to be less severe in the higher social class females was reported. In contrast, a clear and strong tendency for upper social class individuals to have better oral cleanliness was evident.

Of the studies reviewed in the previous section on social inequalities in dental health, three studies[54,60,63] examined periodontal health. Nikias *et al.*[54], found that for all ages and both sexes, the poverty group had worse oral hygiene. As far as gingival health was concerned, significantly more participants in the poverty group had high levels of gingival disease. When analysis was carried out in relation to income and education level[55], they found that the relationship of oral hygiene and gingival health was inconsistently related to income. In contrast, there was strong association with education, individuals of low educational levels exhibiting worse oral hygiene and gingival health.

Table 3.4 : Studies reporting associations between periodontal health and social and economic variables

Author	Sample	Age	Periodontal indicators	Socio-economic indicators
Nikias *et al.*[54]	1,058	19+	Oral cleanliness (OHI), gingival health	Poverty
WHO International Collaborative Study[60]	8,401	35-45	Periodontal Index	Educational social position
Locker[64] Locker & Leake[74]	907	50+	Attachment loss	Income, education
Sheiham[73]	1,624	15-65	Oral cleanliness, Periodontal Index	Social class, area of residence
Markkanen *et al.*[75]	7,162	30+	PTNS	Education
Cushing & Sheiham[77]	448	20-60	CPITN	Occupation
Markkanen[78]	254	adults	PTNS	Income
Beck *et al.*[79]	935	5+	PTNS	Income
Plasschaert[80]	1,337	15+	Calculus, gingivitis, number of pockets	Education
Ismail *et al.*[81]	165	33+	Attachment loss	Education
Beck[82]	452	65+	Attachment loss	Education, SES, financial situation
Ismail *et al.*[83]	1,976 in 1958 372 in 1984	17-64 27-74	Attachment loss	Education

In the WHO's international collaborative study on oral health care systems[60] the periodontal health of the sample was assessed by the modified Periodontal Index. For both sexes educational social position was related to the PI score, low social position being associated with higher mean values of PI.

Locker & Leake[63], in their study of older adults in Ontario, failed to detect a significant difference in periodontal health between income groups when they used the CPITN index. However, when periodontal attachment loss was analysed in relation to education and income[64], highly significant associations were found. Both low income and low educational level were associated with higher mean periodontal attachment loss. Similarly, both education and income were found to be significantly associated with the proportion of sites with 2mm or more attachment loss, and the proportion of subjects with severe attachment loss (loss of 3.83mm or more)[74]. In multivariate analysis, income was not found to be a significant predictor of attachment loss. In contrast, education was a significant predictor.

Another study[75] which estimated the periodontal treatment needs (PTNS scoring system) in terms of time[76] reported similar findings. Education was a significant predictor of the periodontal treatment needs, while income was not. Lower education was related to higher periodontal treatment needs.

Cushing & Sheiham[77] used the CPITN index, with the same timings for the estimation of the treatment needs, as in the previous study. In their analysis it was found that the percentage of subjects requiring a treatment time of 2 hours or more, was greater in manual employees than in their non-manual counterparts. This relationship was consistent for both males and females.

In another Finnish study[78] of periodontal treatment need, the treatment times were modified according to the findings of a postal questionnaire survey of Finnish dentists. Analyses of the treatment needs of the sample by education, type of employment, shift-work, and income, revealed only one significant difference. For the individuals with 4 dentate jaw segments, the highest income group had lowest treatment need.

The PTNS, WHO criteria and recommended times for treatment needs were also used in the Iowa Study[79] of non-institutionalised children and adults. Analysis of periodontal health in relation to income failed to reveal any significant differences for gingival bleeding, presence of calculus and pockets of 3-6 mm. For the group with deep pockets (6+ mm) and thus with complex treatment required, the small sample size prohibited statistical testing. However, it seemed that the highest income group was at high risk of needing complex periodontal treatment. Routine periodontal treatment need was not related to income either, while a need for oral hygiene instruction was. If subjects had treatment needs, people of the lower half of the income groups needed more than just oral hygiene instruction.

Level of education was the background variable examined by Plasschaert *et al.*[80] who reported levels of periodontal health. A gradient was evident in relation to severity of periodontal disease, the lower the educational level, the higher the scores for calculus, gingivitis, and numbers of pockets per person.

In another study of periodontal disease in adults, Ismail *et al.*[81] reported findings on loss of periodontal attachment (LPA) over a period of 28 years (1959-1987). A low level of education was found to be associated with elevated risk of a high LPA increase. In contrast, low income was not proven to be associated with risk for LPA increase.

Attachment loss was also examined in the Piedmont 65+ Dental Study[82]. Dental findings have been reported from the examination of 234 black and 218 white participants, over a 36-month period. Low education and socio-economic status were found as risk indicators for serious periodontal disease for the black population. For the white population, low education and a poor financial situation were found to be risk indicators. In a longitudinal analysis, when serious periodontal disease was defined as '3 mm or more of attachment loss over 3 years', only a poor financial situation for the whites was confirmed as a risk factor.

Prevalence of advanced loss of periodontal attachment was also examined in two separate studies[83]. The 1958-59 study revealed that those with 8 years or less of education had a significantly higher prevalence of advanced attachment loss when compared to those with more education. The 1984 study showed similar results, that those with low education had a significantly higher prevalence of 4-6 mm and 7+ mm attachment loss than those of a higher educational level.

The findings of the reviewed studies suggest that there are some differences in periodontal disease experience in relation to certain social factors. In particular, levels of education have consistently been found to be related to level of periodontal disease[55,60,64,74,80-83] or treatment needs[75].

Income also appears to be related to periodontal disease[64,78,82], although not always consistently[74,75,79,82]. It appears that it is not as strongly related as education[55]. For example, poor financial situation, a risk indicator of high attachment loss in a bivariate analyses, was found subsequently to be able to satisfy the criteria for becoming a risk factor only in the white subjects of the study[82].

Differences in the periodontal health were also found in relation to social class[2,73], although in one British study[73] the differences were consistent only for males.

In interpreting the results of studies of social inequalities in periodontal health, it must be remembered that the overall prevalence of periodontal conditions is affected by the patterns of tooth loss in the population. If dentate adults lose teeth which are prone to periodontal conditions, then their periodontal health may appear to be improved.

3.4 SOCIAL INEQUALITIES AND DENTAL VISITING BEHAVIOUR

Social class variation in the reported dental visiting behaviour of the British adults was documented in the Adult Dental Health Survey 1988[2]. Higher proportions of ABC1's reported that their last visit to the dentist was within the previous year, when compared to C2's and DE's. Similarly, ABC1's were more likely than C2's and DE's to report themselves to be regular attenders. Also, there were differences in the type of treatment received, with ABC1's and regular attenders being more likely to report treatment other than fillings or extractions, compared to C2's and DE's, and those who reported that they go to the dentist only when having trouble.

The UK Adult Dental Survey 1978[84], had previously reported similar findings. However, reported attendance does not seem to be an accurate measure of actual dental attendance. Eddie[85] examined the utilisation of the General Dental Service over five years in a sub-sample from the 1978 Adult Dental Health Survey. It was found that, of 283 dentate adults who had claimed to seek regular check-ups, only 87 attended approximately yearly over the following five-year period.

In a subsequent study, Eddie & Davies[86] examined the effect of social class on the actual dental attendance and treatment received, in a sub-sample of dentate Scots who had participated in the 1978 Adult Dental Health Survey, and who allowed their treatment records to be monitored for the following five years. It was found that as social class decreased so there was a much greater chance of a person not attending a dentist. Among people who did attend, those in the higher social classes were more likely to attend frequently than those in the lower social classes. When the mean number of the different types of treatment received by the participants were examined in relation to social class, it was found that the ABC1's had received a higher mean number of scalings than the C2DE's. For fillings, crowns, dentures and extractions and cost of treatment, no significant differences could be found.

In Table 3.5, studies which have reported associations of dental visiting and social and economic variables, are listed.

A social class gradient in dental visiting has also been reported by Craft & Croucher[87] in their UK study of young adults (16-20). For both males and females, respondents of a non-manual social background were more likely to report that they had last visited the dentist within the previous 6 to 12 months, when compared to their manual social class counterparts. Also, respondents in non-manual social classes were more likely to report that, 'in general' they go to the dentist for regular check-up, than their counterparts with manual occupations.

The relationship of social class and vertical social mobility by marriage with dental attitudes and behaviours was examined in another British study reported by Beal & Dickson[88]. Married women in the lower social classes (DE, as assessed by husband's occupation) were less likely to report that they attended the dentist each year, than their higher class (ABC) counterparts. When their social mobility was examined, there was a tendency for upward social mobility to be associated with more favourable replies and downward social mobility with less favourable replies.

Of the studies reviewed in the two previous sections, five[52,54,57,60,65] have reported dental visiting behaviour of adult samples.

Differences in the reported attendance rates between urban and rural areas, and the higher and lower social classes were found in a national survey on living conditions of the adult Danish population[52]. While the attendance rates for the residents of urban areas was 60%, for the residents of rural areas it was 50%. In the higher social classes (I and II) twice as many as in social class V reported that they were regular attenders. The differences according to social classes were present within all age groups, but were larger in the older age groups. In multivariate analysis, nine variables were found to explain 46% of the variability of dental visiting behaviour. These results suggested that, with other factors being equal, living in a rural area, being male, older, with few or no teeth left, having lower educational level, lower social class background, lower income

Table 3.5 : Studies reporting associations between dental visiting pattern and social and economic variables

Author	Sample	Age	Dental visiting	Socio-economic indicators
Petersen[52]	5,151	20-69	Reported regular attendance	Social class
Nikias *et al.*[54]	1,058	19+	Reported recency of visit, and reason	Poverty
Heloe *et al.*[57]	1,500 in 1973 1,500 in 1985	15+	Reported regular attendance	Income, urbanisation
WHO International Collaborative Study[60]	8,401	35-45	Reported regular attendance, recency of visit, reason	Educational social position, urbanisation
Locker & Ford[65]	1,404	50+	Reported attendance	Income, area of residence
Eddie & Davies[86]	720	25-54	Use of services (patients' records)	Social class
Craft & Croucher[87]	690	16-20	Reported regular attendance, recency of visit	Social class
Beal & Dickson[88]	367	adults	Reported regular attendance	Social class
Scwartz & Hansen[89]	1,600	15+	Reported regular attendance	Occupation, urbanisation
Antoft[90]	1,655	16-22	Use of services (patients'records)	Social class
Murtomaa *et al.*[91]	957	15+	Reported attendance, reason	Education
Murtomaa & Metsaniity[92]	829 in 1971 853 in 1990	15+	Reported recency of visit	Education
Holst[93]	11,014	16+	Reported regular attendance	Education
Holst[94]	258	16-18	Reported attendance	Social class
Eriksen & Hakansson[95]	1,302	20-60	Use of services (patients' records)	Income, urbanisation
Srikandi *et al.*[96]	642	25-44	Reported regular attendance	Income, occupation
Lind *et al.*[97]	1,239	15-19 35-44	Recency of visit, reason	Income
Lang *et al.*[98]	319	18+	Reported regular attendance	Income, education

and working in a physically exhausting job, were associated with irregular dental visiting pattern. However, it was noteworthy that persons claiming psychological problems, had more regular dental visiting pattern.

In another study which examined poverty in relation to the reported recency of last visit, the last preventive visit, and the last symptomatic visit to the dentist, significant associations were found[54]. Persons in the non-poverty group were more likely to report a visit to the dentist, and more likely to report a visit 'only for check-up or cleaning' within the previous year, than the subjects of the poverty group. The trend in relation to symptomatic last visit to the dentist was similar. Thus, even as a response to dental symptoms, the poverty group was found to seek dental care at lower rates than the non-poverty group. The results of this study suggested that both preventive dental care and reparative treatment were strongly related to measures of socio-economic status and the non-poor were more likely than the poor to have received both types of care.

Similar associations of income and reported regular attendance have been reported by Heloe *et al.*[57] , who defined regular attendance as having 'teeth checked regularly (at least annually) during the last 5 years'. In 1973, the high income group were more likely to report that they attended the dentist regularly, when compared to the medium and low income groups. Over the twelve year period which the study examined, the regularity of attendance improved substantially. The regular attendance rates increased for all age groups, and more in the high and low income groups than in the medium group. However, the differences between the income groups persisted in 1985. Regular attendance was also found to differ in relation to region of residence. In both 1973 and 1985, higher regular dental attendance rates were recorded for those residing in the more urbanised than in the more rural areas. Differences were also identified between the income groups in relation to type of treatment subjects had received at their last dental visit. High income groups were more likely to report removal of tartar or plaque, and fillings, while low income earners were more likely to report extractions and denture services.

In the WHO's international collaborative study on oral health care systems[60], adults of a high educational social position reported visiting the dentist within the previous year more often than did their low social position counterparts. When the reason for the last visit was investigated, it was found that in all countries, adults with a high educational social position consistently visited dentists more often for asymptomatic reasons than adults with a lower social position. In terms of area of residence, with the exception of

Baltimore and Dublin, higher attendance rates within the previous year were recorded for the metropolitan than for the nonmetropolitan areas.

Locker & Ford[65], in the Ontario Study of Oral Health of Older Adults, examined reported regular attendance in relation to both income and an area-based measure of deprivation-affluence. Highly significant associations between the percentage of respondents reporting one or more dental visits in the previous year and area of residence and income were found. Higher dental visiting percentages were recorded for residents of affluent areas and high income earners. Analysis of the association of dental visiting with area of residence after controlling for income showed that low income subjects living in high status areas were more likely to have visited a dentist within the previous year than those with a low income who were living in low status areas. Thus, the area of residence had a significant effect after controlling for income. However, the odds ratios suggested that household income had a stronger effect on dental visiting than area of residence.

In the study by Schwarz & Hansen[89], area of residence was examined in relation to level of urbanisation and was also found to be associated with reported regular attendance, as was occupational social class. Metropolitan and provincial dwellers were found to be more likely than rural dwellers to report regular dental attendance. Farmers and unskilled workers reported much lower frequencies of regular attendance than did white collar employees. When the type of dental treatment received at the last dental visit was examined, differences were found in relation to dental attendance pattern. Regular attenders tended to have received check-up/cleaning and fillings, while irregular or non-attenders tended to have received extractions and denture work.

In another Danish study, Antoft[90] defined as regular users of the public dental services those 22-year-olds who had been continuously enrolled and using the scheme since the age of 16 years. Amongst both the 16-18 and 20-22 age groups, the lowest social group showed the lowest enrolment rate. The largest number of constant users were found in higher social groups (II and III) and the smallest in the lower groups (V and VI).

The dental health practices of a Finnish sample were investigated in another study[91]. When dental visiting was analysed in relation to education, those with only elementary education had the lowest dental attendance rate within the previous year. Furthermore, level of education was found to be associated with the frequency of reporting of routine examination as the reason for the last dental visit. Those with elementary education only were less likely to report that they had attended for routine examination. In contrast, higher percentages among the low educational group than among the high educational group reported toothache, prosthetic treatment and tooth extraction as reasons for their last visit.

A similar association between education and recency of last dental visit has also been reported by Murtomaa & Metsaniity[92] in a recent Finnish study of a representative sample of 853 subjects aged 15 years and over.

An association between regular dental visiting and education was also reported by Holst[93], who defined regular attendance as visiting the dentist at least once a year for the last 3 years. A high level of education was associated with more regular demand for dental services.

The same author, in another study[94], reported an association between occupational social class and regular attendance. Young adults of a low social background were more likely to be irregular dental attenders than their counterparts of a middle or high social class.

Contrary to the studies which examined reported dental attendance, Eriksen & Hakansson[95] examined the dental care records of their sample. Multivariate analysis of the treatment frequency data showed that the higher the income, the higher the number of courses of treatment in the three year period. Higher treatment frequency was recorded for women, for those who had reported an earlier high frequency of dental visits, for those who had reported to have been called in to a dentist for a check-up, for those who had better knowledge of dental care matters, for those who used oral hygiene aids at least once a day, and for the residents of urban areas.

Another study[96] examined both reported recency of last dental visit and reported regular attendance in relation to age, sex, occupation, income and education. No significant associations could be detected between these variables and recency of last dental visit. In contrast, when reported regular attendance was analysed in relation to the same variables, for income and occupation significant associations were found. Higher occupational and income groups were found to report significantly higher regular attendance rates.

In contrast to the above findings, recency of last visit was indeed found to be associated with household income, as reported by Lind *et al.*[97]. For both age groups (15-19-year-olds and 35-44-year-olds) respondents of the low income group were less likely to report that their last visit to the dentist was within the previous year, and less likely to report that they had gone to the dentist for a check-up.

Significant associations of dental visiting behaviour and certain socio-demographic variables have recently been reported[98]. In this study, yearly check-ups demonstrated a statistically significant relation with every demographic and socio-economic characteristic. The individuals most likely to report a yearly check-up were subjects aged 30 to 54 years, females, whites, those with higher incomes and more education, and those covered by dental insurance.

In conclusion, the studies reviewed suggest that social inequalities are related to the utilisation of dental services and dental visiting patterns. Social class[2,52,84-90,94,97] and social mobility[88], income[52,57,65,95-98] and poverty as defined by income[54], education[52,60,91-93,98], level of urbanisation[52,57,60,89,95] and type of area of residence (affluent - deprived)[65], have been reported to be associated with dental visiting behaviour and use of dental services.

Dental visiting behaviour in almost all of the studies was measured by the responses of the interviewees themselves and thus it was a 'reported' measure. In the three of the studies[85,86,95] where it was not a reported measure, the dental records over three and five years were used to assess utilisation. In these studies, frequency of treatments per year was used as the measure of utilisation, and was analysed in relation to income and social class. Studies which use dental records overcome the problem of over-reporting of regular attendance[85], and in terms of services planning give a more accurate estimate. However, when considering the investigation of social inequalities and dental visiting, reported measures appear to give consistent results.

The reported recency of the last dental visit, using the cut-off point of one year, is a common measure of dental visiting behaviour[54,60,65,87,91,92,96,97], as is the reason for last visit[54,60,91]. In other studies, visits within the year previous to the research were used as a measure of dental visiting behaviour[88,96-98]. In other studies stricter criteria have been used, i.e. at least yearly reported attendance over five[57,89] or three years[93], or, as judged from dental records, enrolment and continuous use of a service scheme for 4 to 5 years[90].

Irrespective of the definition of regular attendance a consistent finding is that higher social class, income or education, and affluent or urban area of residence are associated with more prevention-orientated dental visiting behaviour. In only one study[96], no association between reported recency of last visit and income and occupation was found. However, when reported regular visiting was examined, significant associations with income and occupation were revealed.

3.5 SOCIAL INEQUALITIES AND ORAL HYGIENE BEHAVIOUR

In the UK Adult Dental Health 1988[2] survey, the oral hygiene practices of British adults were analysed in relation to social class. Higher proportions of dentate ABC1's reported that they brushed their teeth twice a day or more, when compared to their C2 and DE counterparts. Similarly, regular attenders were more likely to brush their teeth twice a day or more, than those who attended at the dentist only when in trouble. Furthermore, differences in the reported use of items available for dental hygiene were found in relation to social class. Lower social class individuals were more likely to report that they used just toothpaste, while higher social groups were more likely to use dental floss and toothpicks.

In Table 3.6, studies which examined associations between oral hygiene behaviour and social and economic variables, are listed.

Personal oral care in relation to educational social position was also examined in the WHO's international collaborative study[60]. Both males and females of a high educational social position reported more often that they had brushed their teeth the previous day.

In contrast, poverty has been reported not to be associated with oral health care practices[54]. Toothbrushing frequency of twice a day or more was reported by 62% of the poverty group and 61% of the non-poverty group.

Lang *et al.*[98], recently reported toothbrushing and flossing behaviours in relation to certain socio-demographic variables. In this study, acceptable toothbrushing behaviour was defined as 1) brushing at least daily for the last year, 2) brushing all teeth, and 3) brushing teeth that usually do not show when smiling. Acceptable flossing behaviour was defined as 1) flossing at least once daily for the last year, and 2) usually flossing all teeth. Some variation in relation to income and education was found, the trend being for the high income and education individuals to report more often an acceptable brushing and flossing behaviour. However, the differences did not reach statistical significance.

Table 3.6 : Studies reporting associations between oral hygiene behaviour and social and economic variables

Author	Sample	Age	Oral hygiene behaviour	Socio-economic indicators
Nikias *et al.*[54]	1,058	19+	Toothbrushing frequency	No association with poverty
WHO International Collaborative Study[60]	8,401	35-45	Brushed previous day	Educational social position
Murtomaa *et al.*[91]	957	15+	Toothbrushing frequency, interdental cleaning	Education
Murtomaa & Metsaniity[92]	853	15+	Toothbrushing frequency	Education
Lind *et al.*[97]	1,239	15-19 35-44	Toothbrushing	Income, education
Lang *et al.*[98]	319	18+	"Acceptable" tootbrushing and flossing	Income, education: differences evident, but not significant
Heloe[99]	1,511	16-79	Index of self-care behaviour	Education, income
Traeen & Rise[100]	3,339	13-14, 23-24, 35-54	Toothbrushing, interdental cleaning	Education
Murtomaa[101]	829	15+	Toothbrushing, and reasons	Education, urbanisation
Honkala *et al.*[102]	2,832 in 1977 4,273 in 1979 4,140 in 1981	12, 14, 16, 18	Daily toothbrushing, sporadic flossing	Occupational class, education, urbanisation

In another study of oral health practices[99], a five item index of dental health behaviour was constructed, from the responses to questions examining daily use of fluoridated dentifrice, daily use of toothpicks, weekly use of dental floss, use of fluoride tablets or mouthwash, and restriction of sugar consumption. Frequency of use of fluoridated dentifrice was found to correlate with frequency of regular dental visits. The dental health behaviour index was found to correlate with age, education and income. Multivariate analysis confirmed the correlation results, and suggested that favourable dental behaviour decreased with increasing age, and increased with increasing education and income.

Another Norwegian survey[100] examined brushing, interdental cleaning, and sugar consumption behaviour. Educational social background was a significant predictor of toothbrushing behaviour among 23-24-year-olds and 45-54-year-olds, and residence (urban - rural areas) was a significant predictor among the 35-44- and 45-54-year-olds. Finally, family dental norms (parents controlling toothbrushing and sugar consumption at age 10) was a significant predictor for the 23-24 -year-olds. Interdental cleaning behaviour was predicted by dental health behaviour at the age of 10 and gender for the 23-24-year-olds, and by gender, educational social background and oral hygiene advice for the remaining two older age groups. For sugar consumption behaviour, educational social background was the only significant predictor for the 23-24-year-olds. For the other age groups no model could be formed.

Dental health practices analysed in relation to education have also been reported in the study by Murtomaa *et al.*[91]. Those of the highest education group were more likely to report that they brushed their teeth once a day or more often, when compared to those of the lowest education. Similarly, interdental cleaning increased significantly with increasing level of education.

In accordance with the previous study, an earlier study by Murtomaa[101] had reported a strong positive correlation between toothbrushing and both level of education and region of residence. When reasons for toothbrushing were investigated, it was found that significantly higher proportions of the low educational level group and of residents of rural areas reported that they brushed their teeth to prevent staining or to whiten their teeth. In contrast, significantly higher proportions of the high educational group reported that they brushed because it was a childhood habit.

Nineteen years later, Murtomaa & Metsaniity[92] carried out a study comparable to the previous one. The most distinct positive change over this period was found among the young, particularly those with only elementary education and those living in rural areas. However, differences still persisted, the most frequent brushing being reported by women, the youngest age group and those with the highest educational background.

In another Finnish study, Honkala *et al.*[102] reported trends in the development of oral hygiene habits in adolescents from 1977 to 1981. Oral hygiene habits were found to be strongly correlated with socio-economic determinants, and the differences were not reduced during the 4 year period of the study. Toothbrushing and flossing behaviour of 16- and 18-year-olds by school career showed that higher proportions of those who were at high school reported daily toothbrushing or sporadic flossing when compared to those who were either at some other type of school or not at school. Oral hygiene behaviour in relation to occupational class was reported for all age groups. A trend was evident according to which, higher proportions of adolescents in the higher occupational classes, reported daily toothbrushing and sporadic flossing, when compared to their counterparts of a lower occupational class. Furthermore, adolescents residing in urban areas with parents of higher educational status were more likely to report daily toothbrushing and sporadic flossing, when compared to their counterparts from rural areas or with parents of a lower educational status.

Lind *et al.*[97], in their study of the Hong Kong Adult Dental Health, found that toothbrushing was practised by the vast majority of their respondents, and that household income and level of education appeared to influence the use of dental floss, disclosing tablets, and fluoridated toothpaste strongly.

From the above studies it appears that oral hygiene measures are not equally practised by all adult population social groups. Toothbrushing is related to social class[2,102], education[60,92,97,100-102], and level of urbanisation[100-102]. Interdental cleaning also appears to be related to social class[2,102], education[91,97,100,102], and urbanisation[102]. When a composite dental health behaviour index was used[99], including brushing, interdental cleaning and sugar consumption, significant correlations with education and income were found.

However, one study[54] which examined toothbrushing in relation to poverty status, showed no statistically significant differences between the groups. In another study[98] of the relationship of oral hygiene practices to periodontal health, the trend was that higher proportions of high income earners and high educational level individuals reported acceptable toothbrushing and flossing behaviour, but the differences did not reach a significance level. However, the criteria of acceptable toothbrushing and flossing were stricter than in the other studies reviewed. Also the authors of both studies noted that toothbrushing was an 'almost ubiquitous behaviour'[98], and that 'only negligible proportions did not brush their teeth'[54], suggesting that in samples where toothbrushing is a norm, no socio-economic differences can be detected.

3.6 SOCIAL INEQUALITIES AND BARRIERS TO DENTAL CARE

Evidence from the literature which suggests that there are unmet needs in dental care, highlights the necessity to investigate the possible barriers which prevent people from making use of available services. Potential barriers may relate to attitudinal factors, to financial considerations, or to availability and accessibility of dental services.

Lay people's perceptions of dental health issues which may act as barriers to dental care have been investigated by Blinkhorn *et al.*[103] and Finch *et al.*[104] who used a qualitative research methodology in the form of in-depth group discussions[103,104] and interviews[104].

In the former study[103], which involved 16- to 24-year-olds from a manual social background, respondents were classified according to their attendance pattern. Susceptibility to dental disease and perceptions of long-term benefits from dental care were found to differ between attenders and non-attenders. Fear and cost were given as reasons for non-attendance, but these appeared to be rationalisations of non-attendance, the fundamental reasons being the value attached to teeth, which were rated at a lower priority than other health issues. The image of the dentist also differed between the two groups.

Respondents in the study by Finch *et al.*[104] were selected to emphasise the views of irregular attenders, younger age groups and lower socio-economic groups. Anxiety and cost were found to be significant barriers to the receipt of dental care. As in the study by Blinkhorn *et al.*[103], for some of the respondents these two barriers appeared to be rationalisations. Perceived need for treatment was found to overcome barriers of anxiety and cost. The image of the dentist, feelings of vulnerability arising from the environment of the surgery, noises, smell, instruments, and fear of edentulousness were also issues raised by respondents.

In the following sections, the literature reviewed refers to studies which have examined anxiety, attitudes to dentists/dentistry and to cost of treatment, and availability and accessibility of services in relation to some socio-economic variable (social class, income, education), which have involved adult populations, and which have used quantitative methodologies.

3.6.1 Social inequalities and dental anxiety

In the Adult Dental Health Survey 1988[2], dentate respondents were asked to define the extent to which they identified themselves with five statements relating to fear of dental treatment, anxiety about going to the dentist, avoidance of dental care even if in pain, dislike of appointment system, and of waiting to see the dentist. Some differences were identified in relation to sex, social class, and reported dental attendance pattern. Significantly more women than men agreed with the statements showing anxiety about going to the dentist, dental treatment, and waiting. Dentate adults from non-manual (ABC1) social classes were less likely to identify with the anxiety statements when compared to their manual (C2 and DE) counterparts. Also, occasional dental attenders or those who reported that they attended only when in trouble, were more likely to identify with the statements relating to fear. When the number of fear-related statements with which dentate adults definitely agreed was examined, women, C2's and DE's, and irregular attenders identified with more fear-related statements than men, the ABC1's and the C2's, and the occasional or regular attenders.

In Table 3.7, studies which have examined the associations of dental anxiety with social and economic variables are listed.

In the WHO's international collaborative study[60], females consistently tended to report that they had postponed or avoided dental visits due to fear of pain, more often than men. Generally, adults with a high educational position tended to report this avoidance behaviour less often. Furthermore, an association between avoidance and dental visiting was evident. Higher proportions of respondents who had not avoided a dental visit due to fear of pain reported that they had visited the dentist within the previous year, as compared to those who reported that they had avoided the dental visit due to fear of pain.

A similar association between gender and dental anxiety has been reported by Kleinknecht *et al.*[105] in their study of students. Females exhibited significantly higher levels of anxiety than males. The highest fear ratings were given to the sight of the syringe, the sensation of anaesthetic injection and the drill. Females were also significantly more fearful of dentistry in general than men. Analysis in relation to

Table 3.7 : Studies examining associations between dental anxiety and social and economic variables

Author	Sample	Age	Dental anxiety indicators	Socio-economic indicators
WHO International Collaborative Study[60]	8,401	35-45	Avoidance due to fear of pain	Educational social position
Kleinknecht *et al.*[105]	487	students	Avoidance, physiological arousal, general fear of dentistry	No consistent association
Berggren & Meynert[106]	160	adults, at dental fear clinic	Avoidance, dental anxiety, general fear	Low SES : majority
Schuurs *et al.*[107]	438	25	Psychophysiologic reactions prior to appointment	Education was not a strong discriminator
Green & Green[108]	752	adults	Reported anxiety	Social class (bivariate analysis). In multivariate, association not confirmed
Schuurs *et al.*[109]	620	30-40	Dental anxiety, anticipated anxiety, general dental anxiety, psychophysiologic reactions prior to appointment	Education
Milgrom *et al.*[110]	1,019	adults	Fear of dental treatment	No association with income, race, education
Stouthard & Hoogstraten[111]	648	16+	Apprehension of dental treatment, duration of these feelings	Education, income, urbanisation
Locker & Liddell[112]	580	50+	Dental anxiety, general fearfulness	No association with income, education, employment
Hakeberg *et al.*[113]	620	15+	General dental anxiety	No association with income, education
Mellor[114]	255	17-64	Dental anxiety	No association with manual / non-manual ocuupation
Moore *et al.*[115]	565	16-96	Prevalence, characteristics, consequences of dental anxiety	Income, education

educational level (junior high school, high school, and college) showed that the high school group (intermediate educational level) scored highest, followed by college students. The junior high school group reported the least responsiveness and fear of dentistry.

In another study[106], the causes, symptoms and consequences of dental fear and avoidance were examined in a sample of adult patients who were referred to a university dental fear clinic, due to their inability to tolerate conventional dental treatment, resulting in avoidance behaviour. The majority of the subjects were females (63%), and most patients were 20- to 40-years-old. Class distribution was skewed with 88.6% belonging to the lowest socio-economic class. The number of those unemployed and receiving pension was high (7.5% and 14.4% respectively). The most feared dental procedures were drilling, receiving an anaesthetic, extraction, and anticipation of treatment.

Schuurs *et al.*[107] examined the relationship between dental anxiety and regularity of dental attendance of respondents and their parents, dental upbringing, level of education, and gender. Multivariate analysis showed that higher levels of dental anxiety were associated with irregular dental attendance. Also, regular attenders were more likely to have been sent to the dentist as children. Regular attendance was also associated with being female, a high level of education in combination with low level of dental anxiety, and with a high level of education in combination with a positive upbringing. However, education alone was not a very useful discriminating factor. When the beta coefficients were used to indicate the relative effects on dental attendance, dental anxiety was found to have the highest contribution, followed by sex, upbringing, and the combined effect of education and anxiety.

The significant association between dental anxiety and reported regular attendance has also been reported in a British study[108], where, additionally, the effect of social class was examined. The very anxious group tended to be younger, female, and coming from a lower social class background (manual classes C2DE). A multiple regression analysis examining the effects of these three variables on anxiety confirmed the significant effects of age and sex, but indicated that the effect of social class *per se* was not significant. Subjects of the very anxious group were more likely to report toothache as the reason for their last visit to the dentist. Of all respondents 75% regarded their own past experience as being the major factor determining their attitude to dentistry. The effect of past experience was highest among the very relaxed and lowest for the very anxious groups. Pain, injections and drilling were most feared by the respondents.

In another study[109], which examined sociodemographic correlates of dental anxiety, women scored substantially higher than men on all anxiety measurements except for anxiety caused by anticipation of body damage. Birth rank order was not found to have any influence on anxiety. In contrast, marital status had some effect, divorced men and women having higher anxiety levels. A lower level of education also appeared to be associated with greater anxiety. With regard to dental attendance and dental status, it was found that irregularity and edentulousness were both associated with higher anxiety levels.

In contrast to the previous study, Milgrom *et al.*[110] failed to detect any significant differences in dental fear levels in relation to income, race, education or marital status. Females and respondents younger than 40 years of age were significantly more likely to report dental fear than males and older individuals. There was a significant association between levels of dental fear and recency of last dental visit, high fear individuals being less likely to report a dental visit within the previous year, and more likely not to have seen a dentist for more than 2 years, when compared to their low fear counterparts. Dental fear related to injections, drilling and prophylaxis. Furthermore, high fear subjects were significantly more likely to perceive themselves in poor dental health, were less likely to be satisfied with the appearance of their teeth, were more likely to be edentulous, and had experienced more dental symptoms within the previous year.

Stouthard & Hoogstraten[111] defined dental anxiety as the degree to which a person was apprehensive of dental treatment, and the duration of and the reactions to these feelings. They showed that the persons most prone to dental anxiety were women, those aged 26 to 35 years, irregular attenders, those who lived in urban areas, those with a relatively high educational background, those who had public insurance, those with a minimum income, those who judged their oral health as poor, and those who did not attach much importance to the preservation of their teeth. However, the explanatory power of the discriminating variables was not strong.

In another study of older adults[112], a significant association of dental anxiety with age and marital status was reported, younger subjects and those who were separated or divorced being more likely to be dentally anxious. No significant associations were detected between dental anxiety and education, income, employment status, place of birth, or general health status. Higher levels of dental anxiety were found among those who had not seen the dentist in more than five years, among those without regular source of dental care, and among those reporting avoidance of dental treatment in the past. Furthermore, higher levels of dental anxiety were reported among the edentulous, those perceiving need for treatment, and those rating their oral health as poor. Levels of dental anxiety were also significantly associated with general fearfulness.

A similar lack of association between level of dental anxiety and educational level or income has been reported by Hakeberg *et al.*[113]. In this study, females were significantly more likely to report high fear, as were the 20-39 age groups. Responses to the question 'how afraid are you of going to the dentist?' were significantly related to regularity of dental attendance. Highly and moderately anxious patients were more likely not to have seen a dentist for more than two years.

In accordance with these findings, a study of employees in North-west of England[114] has found significantly higher levels of dental anxiety among females and irregular attenders. In contrast, no such differences between the manual and non-manual social classes could be detected. The prospect of drilling and of local anaesthetic injection produced highest levels of dental anxiety.

Income and education were the socio-economic variables used by Moore *et al.*[115] in their study of dental anxiety. Persons with highest income showed significantly less anxiety, and persons with lowest education showed significantly more anxiety. However, multivariate analysis suggested that having a high income was a factor predicting decreased risk of having moderate, but not extreme dental anxiety in dentate subjects. As in other studies, women were more likely to report high fear than men. However, there was no significant difference in relation to age groups. Furthermore, high dental fear was significantly associated with avoidance of dental care. High anxiety subjects tended not to have sought dental care in the last 2 years, to hesitate in making dental appointments, and to skip or cancel them. Extreme dental fear was significantly related to increased reports of oral health symptoms, but was not associated with edentulousness.

From the studies which have been reviewed, it is evident that dental anxiety is a significant barrier to seeking dental treatment. Only one study[105] did not examine the association between dental anxiety with dental attendance. In all the others, significant associations were found between dental anxiety and either reported regular attendance or reported recency of last dental visit.

Gender has consistently appeared to be associated with dental anxiety[2,60,105,108-111,113-115], females consistently being more anxious than men. In the study of dental fear clinic patients[106], the majority of the patients were females, and in only one study, was gender not significantly associated with dental anxiety[112], but this study did not include younger adults. This may have influenced the findings, as age has been shown to be significantly associated with dental anxiety[106,108,110-113], the trend being that younger age groups (usually younger than 40 years old) exhibit higher levels of dental anxiety than older subjects. However, in two studies[2,115], age was not found to be significantly associated with dental anxiety.

Social class has been found to be significantly associated with dental anxiety[2,108] but this finding was from univariate analysis. Further examination of this relationship[108] with multivariate analysis, did not confirm social class to be *per se* a significant predictor of dental anxiety. In a further British study[114] which involved a random sample of all employees of an insurance company, engineering works, and a hospital, social class was again not found to be significantly associated with levels of dental anxiety. However, in a study of dental fear clinic patients, it was found that the majority of them were from a low socioeconomic background, with a high proportion of unemployed people and pensioners. Social background bias could operate in this case, as dentally anxious individuals from a higher socioeconomic background do have the material resources and social support which are needed to overcome dental anxiety problems.

Only one study[115] has reported income to be significantly associated with dental anxiety, in particular moderate dental anxiety. In this study high income individuals were less likely to report moderate dental anxiety. However, no association between moderate levels of dental anxiety and income was found. In two other studies[110,112], where there was no distinction between extreme and moderate anxiety, income failed to be significantly associated with dental anxiety.

Education has been shown to be associated with dental anxiety in three studies[60,109,115], the trend being that lower educational levels are associated with higher levels of dental anxiety. In one study which concerned the prevalence of dental anxiety among a national representative sample[111], education was not found to be associated with dental anxiety in univariate analysis, but in discriminant analysis was found to be a discriminating factor for high and low dental anxiety. However, the power of the model was very weak. In two other studies[110,112], education failed to show significant associations with dental anxiety.

Marital status has been found to be associated with dental anxiety in two studies[109,112], with divorced individuals having higher levels of anxiety. However, another study[110], failed to demonstrate an association between dental anxiety and marital status.

Edentulousness was found to be associated with dental anxiety in four studies[109-112], three studies reporting higher levels of dental anxiety among the edentulous than among the dentate. However, in one study[111], the inverse relationship was found, the edentulous exhibiting lower anxiety levels than the dentate. In another study[115], edentulousness failed to show significant association with extreme dental fear.

In conclusion, consistent associations with dental anxiety concern mainly age, sex and regular attendance, and to a lesser extent edentulousness and marital status. Although not always consistent, significant associations between dental anxiety and social class, education, and income have been reported. Also, it is notable that there is considerable variation in the measurement tools (questionnaires) used to define and quantify dental anxiety. Some of the variations in the findings may be attributed to this.

3.6.2 Social inequalities and dental attitudes and beliefs

In the Adult Dental Health Survey 1998[2] of the UK, respondents were asked about their level of agreement with five statements relating to attitudes to dentists and the surgery. These were *'I'd like to know more about what the dentist is going to do and why'*, *'I don't want fancy treatment'*, *'I don't like lying flat in the dental chair'*, *'dental receptionists are not very helpful or welcoming'*, and *'going to the dentist is like being processed on a conveyor belt'*. Dentate adults from non-manual social backgrounds (ABC1's) were less likely to identify with the statements. For all statements dentate adults who said that they only visit the dentist when having trouble with their teeth were more likely to identify with the statements, when compared to regular attenders.

In Table 3.8, studies which examine associations of dental attitudes with social and economic variables are listed.

In a study of perceptions about the ideal dentist[116], the most popular attributes of the ideal dentist mentioned by respondents were professional skill, friendliness, reassurance, patience, personal interest in patient, explanation/information, and being careful/painstaking. When responses were analysed in relation to sex, socio-economic status (SES) as based on occupation, education and income, and dental attendance pattern, significant differences emerged, the lower the SES the more frequently

Table 3.8 : Studies examining associations between dental attitudes and social and economic variables

Author	Sample	Age	Dental attitudes	Socio-economic indicators
Van Groenestijn *et al.*[116]	487	15+	Image of ideal dentist	SES
Van Groenestijn *et al.*[117]	487	15+	Confidence in dentists, preventive role of dentistry, dentists as caring persons	SES
Murtomaa & Masalin[118]	581	15-50	Satisfaction with technical competence and personality of dentists, organisation of surgery	Education
Scarrott[119]	258	adults	Attitudes to charges, preservation of teeth, false teeth	Social class
Powell & McEniery[120]	1,691	15+	Attitudes to dentures, treatment preferences	Education, occupation
Schuurs *et al.*[122]	910	18-54	Preference for preservation of teeth	Education (weak association)
Freidson & Feldman[124]	various samples	adults	Importance of regular attendance, attitude to cost	Income, education, occupation
Syrjala *et al.*[125]	390	adults	Attitudes to prevention	No association with education
Syrjala *et al.*[126]	390	adults	Barriers to self-care and to dental attendance	Education
Syrjala *et al.*[127]	390	adults	Motivation - preference for preservation of teeth	Education
O'Shea & Gray[129]	1,520	adults	Importance of preventive behaviour	Income, education
Soderfelt *et al.*[130]	2,382	45-69	Attitudes to appearance Attitudes to function	Education Occupation
Bene *et al.*[131]	1,363	adults	Attitudes to cost, fear of losing teeth	Income

reassurance and friendliness were mentioned. The higher the SES, the more frequently professional skill, and explanation and information were mentioned. Similarly, the irregular dental attenders stressed the attributes of reassurance and friendliness, while the regular attenders most frequently referred to professional skill as an important attribute. Women attached more importance to friendliness and reassurance, while men preferred professional skill. High SES group and those having private treatment, were significantly more likely, compared to low SES and 'sick fund' treatment individuals, to mention that the ideal dentist should not be too expensive.

Attitudes to dental services and the image of the dentist as perceived by the same respondents have been analysed in relation to four scales concerning 'the dentist as a person who cares', 'the dentist is mercenary and remote', 'confidence in dentists', and 'the preventive function of dentistry'[117]. Results suggested that in the population under study, a large proportion denied the curative only function of dentists, that confidence in the dentist was moderate, that, in general, there was no strong impression that the dentist was a caring person, and to many respondents dentists appeared only interested in money. In three of the scales significant differences between the SES groups were found. Low SES groups were more likely than their high SES counterparts to regard the dentist as a caring person, a person in whom they had confidence, and as someone who mainly dealt with symptoms rather than prevention. In all scales regular attenders scored significantly different from irregular. Irregular attenders were more likely than the regular attenders to regard the dentist as a caring person, rather as a mercenary and remote, a person in whom they had little confidence, and as someone who mainly dealt with symptoms rather than prevention. The authors suggested that the first scale measured perception about how caring a dentist is. However, the wording of the two out of the four items which comprised the scale, referred to expectation rather than perception. Thus, it may be that lower SES and irregular attenders <u>expect</u> a caring dentist rather than <u>perceive</u> them to be so.

In another study[118], three dimensions of the image of the last dentist visited were studied. These were technical competence, personality, and organisation of the surgery. Females and those with a higher educational level were significantly more likely to report high levels of satisfaction. The variance in satisfaction was best explained by the character of the visit (pleasant - frightening), whether the dentist was competent, calm, friendly, and young, and whether prosthetic work was undertaken. Negative characteristics were mentioned infrequently, the most common being that the dentist was in a hurry (9%), the equipment was old (7%), the dentist did not care about patient's pain (3%), and was not friendly (3%).

Attitudes to dentists and dentistry have also been reported by Scarrott[119]. As differences emerged between the manual and non-manual social classes in the initial group discussions, she subsequently concentrated on lower social classes (mainly C2 and DE). The great majority of respondents in all social classes believed in the importance of dental visiting for improving dental health, although class differences were found in the reported regularity of attendance. Charges for dental treatment were perceived as discouraging dental attendance by more respondents in DE social classes than in C2. Lower social classes were more likely to prefer extractions than conservation of teeth, and found the idea of getting false teeth as less upsetting than their higher classes counterparts. Injections, pain, noise of drilling, initial probing and inconvenience were equally disliked by all social classes. The sight of the equipment was more often disliked by the lower social classes. Furthermore, only C2 and DE social classes thought that the treatment was impersonal and sometimes unnecessary.

The above studies suggest that individuals from different social class background[2,119], or different socio-economic status[116,117] perceived dentists rather differently. When compared to higher social class persons, lower social class and socio-economic status subjects tended to have a more negative attitude to the dentist[2], and were less likely to consider him as a caring person in whom they could have confidence[117]. They were more likely to consider the treatment as impersonal or even unnecessary[119], and were more likely to perceive the ideal dentist as someone with the attributes of reassurance and friendliness[116]. In contrast, higher socio-economic status individuals were more likely to mention professional skills, and the ability to explain and inform as attributes of the ideal dentist.

Similar differences were found in relation to dental attendance pattern, with irregular attenders exhibiting a more negative attitude to dentists[2,116,117] when compared to regular attenders. Furthermore, irregular attenders were more likely to consider dentists as mercenary persons[117].

Educational background was examined in one study[118], and it was found that individuals with higher education were more likely to be satisfied by their dentist. Satisfaction with the dentist was dependent upon the respondent's view of the dentist's competence, and upon whether the dentist was calm, friendly and young, and whether the visit was pleasant or frightening.

In the study reported by Scarrott[119], social class was a variable which differentiated the preference for treatment. Lower social class individuals were more likely to prefer extraction than conservation.

Treatment preferences of respondents between extractions, fillings and crowns have also been examined in the UK Adult Dental Health Survey[2]. Large variations in treatment preferences were found among people with different social background. Dentate ABC1's were the most likely to prefer restorative treatments (fillings and crowns) and DE's the least likely. Variations in relation to dental attendance patterns were also large. Regular attenders were more likely to prefer to have a back tooth filled or crowned rather than extracted, when compared to those who attended the dentist only when in trouble. Occasional attenders had treatment preferences similar to those of the regular attenders. A variation in treatment preferences was also found between dentate adults with and without dentures. Dentate people reliant on both natural teeth and dentures were more likely to prefer restorative treatment to extractions.

Attitudes to dentures were also examined in the same survey[2]. Partially dentured adults of a manual background (C2 and DE), and occasional dental attenders, or those who attend only when in trouble, were more likely than their non-manual counterparts, and the regular attenders, respectively, to report that they were not at all upset at the thought of having full dentures. Among the dentates who had natural teeth only, no significant variation was found concerning the thought of having partial dentures in relation to social class. However, among the same subjects, the thought of having full dentures was more often found to be upsetting among the ABC1's than among the C2's and DE's. Similarly, regular attenders were the most likely to find both the thoughts of partial and of full dentures very upsetting.

In another study[120], attitudes to dentures and treatment preferences were elicited by the respondents' extent of agreement or disagreement with the statements *'dentures are as good as natural teeth'*, and *'teeth are not worth saving and should be extracted'*. Level of education was related to both attitudes to dentures and treatment preferences, persons of a higher educational background being more likely to disagree or strongly disagree with the statements. Similarly, variation was found in relation to occupation, professional people being more likely to disagree or strongly disagree with the statements than transport workers and tradesmen.

Schuurs *et al.*[121-123] examined the value of teeth and their preservation in three separate studies. Findings from the first study[121] showed that preference for retention of teeth was clearly distinguished from the preference for commercial goods, and regular attenders were significantly more likely to give priority to teeth than irregular attenders. Similarly, regular attenders were willing to spend a larger part of their monthly income in order to retain their teeth, and were more likely to dislike having full dentures. No attempt was made to examine preference for teeth in relation to some socio-economic variables. In the second study[122], the analysis showed the characteristics of a sub-group in the sample who preferred dentures, were irregular attenders, had very poor oral health, had equal fear of preparation of a cavity and of extraction, and were dissatisfied with dental treatment. A weak association with a very low level of education existed.

The third study[123] examined the value attached to teeth. The great majority of respondents valued their teeth highly. They disliked losing front and back teeth, considered teeth as important and abhorred full dentures. Most of them were regular attenders, and perceived their oral health as good. However, the analysis did identify another group who were not interested in their teeth, did not value the retention of teeth, and were not prepared to spend money on teeth. Proportionately few regular attenders were among them, but the majority perceived their oral health to be good. Many of them appeared to be highly anxious about dentistry. A third group was also identified, who were characterised by their ambivalence about their teeth. Their regular attendance was not wholehearted, and appeared to be socially induced. Full dentures were considered acceptable, and they did not particularly dislike losing teeth.

From the above studies it appears that lower social classes are more likely to prefer extraction to conservation of teeth[2,119,120]. Education also seems to be associated with preference for preservation of teeth[120,122], with the lowest educational level being associated with less preference for preservation. However, the association is not always strong[122].

Having greater preference for extraction, the lower social groups, not surprisingly, show a more positive attitude to false teeth and dentures than groups of a higher social background[2,119,120].

Regular attendance appears to be related to preferences for the preservation of teeth[2,121-123], regular attenders being more likely to value their teeth higher. They also dislike losing teeth, as they attach more importance to them, and thus have a more negative attitude to dentures.

Although Scarrott[119] has reported social class differences in the importance attached to teeth and their preservation, no such differences in the perceptions about the importance of dental visiting for improving dental health could be detected. In contrast, in another study of attitudes to dental care[117], low socio-economic groups were found to be more likely to regard dentists as dealing with symptoms rather than with prevention.

Attitudes to dentistry have also been reported in an early study[124], where findings suggested that the general standing of dentists was perceived by the public as being lower than of a physician, but higher than the pharmacist, a nurse and a lawyer or teacher. The cost of dental treatment was often given by respondents as a reason for non-attendance, and this barrier was clearly related to income. Belief in the importance of regular attendance was also related to income, education and occupational status. Furthermore, the discrepancy between belief in the importance of regular attendance and regular attendance was greater among those of lower education and occupational status.

Syrjala *et al.*[125] examined attitudes to preventive dentistry, importance and prevention of gingivitis, and views about the importance of dental check-ups in relation to age, sex, education, and recency of last dental visit. Significant associations were found only in relation to gender, with women exhibiting more positive attitudes than men. When the group of respondents with the most positive attitudes was compared to the group with the least positive attitudes, it was found that those with the most positive attitudes to dental care were more likely to be women, to have visited the dentist within the previous year, and to have participated in oral hygiene instruction.

Barriers preventing regular dental care were subsequently examined[126], and results suggested that those who had visited the dentist more than two years before the study, tended to report more barriers related to daily brushing, unpleasant experiences and laziness than those who had visited within the previous year. The lower the educational level of the respondents, the greater the likelihood was that lack of appreciation of seriousness of dental disease prevented dental visiting and daily toothbrushing. Barriers related to previous unpleasant dental experiences were also found to be related to lower education. Similarly, low education was found to be significantly related to the practical barriers to attendance, i.e. lack of time, difficulty in arranging appointments, cost and restraints due to work.

The study further examined the extent to which respondents agreed with statements relating to motivation towards dental care[127]. Motivation was found to be significantly related to sex, education, and dental attendance. Recency of last dental visit and sex were found to be related to degree of independence and responsibility for dental care, and with preference for preservation of teeth. The more recent the latest visit, the stronger these attitudes. Education was only found to be related to the preference for preservation of teeth, the higher the educational level, the stronger the preference for preserving teeth.

On the basis of their attitudes to dental care, respondents were subsequently classified as being dentally intrinsically or extrinsically motivated[128]. Both in bivariate and multivariate analyses, the items dealing with the lack of effectiveness of toothbrushing, lack of time and lack of interest in toothbrushing, as well as cost of dental care, laziness and lack of perceived seriousness of dental disease, could be shown to differentiate between extrinsically and intrinsically motivated subjects. Extrinsically motivated subjects were more likely to report lack of effectiveness of toothbrushing, lack of time for toothbrushing and lack of interest in oral self-care. Furthermore, they were more likely to consider dental care expensive, to report laziness as reason for non-attendance, and to report a lack of perceived seriousness of dental disease.

Finally, in the study by O'Shea & Gray[129] who examined beliefs and behaviours concerning the prevention of decay and gum disease, income and education were found to be inconsistently related to these beliefs, but those of the lowest income group and the lowest education group, were least likely to believe in the effectiveness of self-care and dental visiting. When respondents were asked how much difference toothbrushing made to the prevention or reduction of tooth decay, women were more likely to believe that it made 'much difference'. Those of the oldest age group, those with least education, and lowest income, were also less likely to believe in the effectiveness of brushing. In relation to gum disease, age and sex had little effect on the importance attached to toothbrushing, education was not consistently related, and those of the higher income groups were only a little more likely to believe that toothbrushing prevented gum disease.

From the above studies it appears that low socio-economic status is related to a concept of dentistry being a curative rather than preventive service[117]. Occupation was found to be related to the paradox between the importance attached to dental visiting and respondents' actual visiting pattern[124]. Thus, a belief in the importance of dental visiting, is more likely to be translated to actual regular attendance among higher occupational groups, than among lower occupational groups.

Income was also found to be related to the importance attached to regular attendance[124], higher income groups attaching more importance to frequent visiting. Furthermore, individuals from the lowest income groups were less likely believe in the importance of toothbrushing for preventing tooth decay than the higher income groups, who were more likely to believe in the importance of toothbrushing in the prevention of gum disease[128].

Education also related to the perceived importance of dental visiting[124], with the less educated individuals attaching less importance to visits to the dentist. The lowest educational groups also tended to be the least likely to believe in the importance of toothbrushing for the prevention of dental disease[129]. Furthermore, lower educational levels have been found to be associated with lack of perception of the seriousness of dental disease, and having less interest in toothbrushing[126]. In contrast, education failed to be significantly associated with attitudes to prevention, perceptions of the importance of, and prevention of, gingivitis, and attitudes to regular check-ups[125].

Educational level has been reported to be related to attitudes to appearance by Soderfelt *et al.*[130]. This study examined attitudes to dental appearance and to dental functioning. Multivariate analyses of these variables in relation to age, gender, marital status, urbanisation of place of residence, education, occupational status, time since last visit to the dentist, satisfaction with teeth and with dental care, and an interaction term of education by occupational status, showed that only education was significantly, but not particularly strongly, related to dental appearance. Lower educational level was related to having a higher interest in dental appearance. In bivariate analysis, attitudes to dental function were found to be significantly related to education, with less emphasis on dental function among the lower educational groups. However, in multivariate analysis, education was not found to be a significant predictor of attitudes to dental function. Only occupational status and the interaction of education with occupation were found to predict these attitudes, but associations were not particularly strong.

The two extreme income and education groups were found to be equally likely to report appearance as reason for attendance[131]. When respondents were asked which factors they considered to be most important when contemplating a dental visit, cost was the most frequent response, the lower income respondents being more likely to consider cost as an important consideration. Apprehension and fear of losing teeth had an inverse relationship with income, the lower the income, the less likely respondents were to report apprehension or fear of losing teeth. Lower income and education groups were more likely to report dental pain, and less likely to report preventive reasons for attending the dentist.

To conclude, from the studies reviewed in this section it seems that the perception of the image of the dentist differs in relation to social class[2,119], socio-economic status[116,117], and regular attendance[2,116,117]. Education appears to be related to satisfaction, as measured by the character of the visit (pleasant - frightening), and to whether the dentist is perceived as competent, calm, friendly, and young[118]. Lower socio-economic and social class groups, irregular attenders and lower educational groups tend to have more negative image of the dentist.

Preferences for treatment also seem to be related to social class[2,119,120], regular attendance[2,120-122], and education[120,122]. In addition, attitudes to dentures appear to be related to social class[2,119,120]. Lower social class subjects and irregular attenders tend to prefer extractions, and lower social class groups have a more positive attitude to dentures than higher class individuals.

Attitudes to dental care and prevention, were found to be related to social class[119], and, socio-economic status[117], and income[124]. People of a higher social and economic status seem to attach more importance to dental care and have a more preventive outlook.

A qualitative study by Blinkhorn *et al.*[103] indicated that dental appearance was a reason for toothbrushing among low social class irregular attenders. However, in two quantitative studies which examined similar variables[130,131], the findings were conflicting. While the two extreme income and education groups were found to be equally likely to report appearance as reason for attendance in one study[131], in the other[130], educational level was found to be related to attitudes to appearance, although not strongly.

3.6.3 Social inequalities and attitudes to cost - Availability and accessibility of dental services

In the studies reviewed in the previous section, cost of dental treatment was a concern among the populations involved[103,104,116,117,119,124,126,131]. Cost was given as a reason for non-attendance in both of the qualitative studies reported by Blinkhorn *et al.*[103] and Finch *et al.*[104], although for some individuals expense appeared to be a rationalisation of non-attendance, rather than a direct cause.

When the attributes of the ideal dentist were described by respondents, those of a high socioeconomic status and those who had private treatment, thought the ideal dentist should not be too expensive[116]. Cost of treatment was found to influence people's confidence in dentists. For example, in Van Groenestijn *et al.*'s study, the scale measuring attitudes in relation to the statement 'dentist is mercenary and remote' correlated with the scale 'confidence in dentist'[117].

Scarrott[119] found that charges appeared to discourage dental care particularly among the lowest social classes. She also noted that only a small proportion of people knew what the dental charges for treatment would actually be, although they had claimed that cost was a deterrent to dental visiting. This could indicate that it may be the perceived cost of treatment which acts as a barrier, rather than the actual cost. However, when respondents were told the actual charges for dentures, respondents of a semi- or unskilled manual background were more likely to consider them to be too high than their higher social class counterparts.

Cost of dental treatment was also given as a reason for non-attendance, and was clearly related to respondents' income, in the study by Freidson & Feldman[124].

Similarly, Syrjala *et al.*[126], in their study of reasons preventing uptake of dental care, found that the item 'dental care is expensive' correlated with other statements sufficiently to enter two scales: the 'practical reasons for non-attendance', and 'unpleasant experiences of dental care'. The latter scale was found to be associated with the level of education, unpleasant experiences increasing with decreasing education.

Attitudes to the cost of dental treatment were examined in the UK Adult Dental Health Survey 1988[2], by the extent to which respondents agreed with the statements *'I would like to be given an estimate without commitment', 'I find NHS dental treatment expensive', 'I'd like to be able to pay for my dental treatment by instalments'*, and *'It will cost me less in the long run if I only go to the dentist when I have trouble with my teeth'.* Dentate adults from non-manual social backgrounds identified with significantly fewer cost related statements than dentate adults from both skilled and unskilled manual backgrounds. Regular attendance was also found to be related to attitudes to cost of dental treatment. Dentate adults who reported that they went to the dentist only when having trouble, identified with more cost-related statements than both regular and occasional attenders.

Another study[132] examined the reasons why individuals select dental schools for their treatment. Among the randomly selected sample of 506 subjects aged 15 years and older, the cost factor was the reason most often given for the choice of service. Low fees charged at dental school clinics seemed to be the major reason encouraging their choice.

Cost of dentures was also found to be a major factor deterring people from seeking more regular replacement[133]. The sample of this study consisted of 440 adults. Of those respondents who thought that they needed new dentures, 95% thought that dentistry was too expensive. Furthermore, people with the oldest dentures (11 years or more) were more likely to consider dentistry to be too expensive.

In the study by Bene *et al.*[131] who examined the dental attitudes of 1,363 residents of Alberta, there was a widespread agreement that the cost of dental treatment was high. The lowest income groups were the most likely to consider costs as being too high. As a consequence, lower income groups were more likely to report that they would definitely visit the dentist more often if dental insurance became available.

This result shows that people claim that they would visit the dentist more regularly if they had cover under a dental insurance scheme. Manning *et al.*[134] examined the actual effect of dental insurance on demand for dental care. They reported the findings of the Rand Health Insurance Study (HIS), which was a large-scale randomised control experiment, where families selected at random were allocated to different cost sharing plans. In their analyses they used data from a sample of 5,823 individuals. Their results suggested that utilisation of dental services increased significantly as the generosity of the insurance coverage increased. Participants on an insurance plan which offered free treatment had 34% more visits and 46% higher dental expenses than enrollees on the plan which only covered 5% of the costs. When the effect of income on demand under insurance coverage was examined, they found that use of services increased with higher income. However, the response to cost sharing was much greater for the low income group.

Bailit *et al.*[135] examined the effect of the above experiment on oral health. They showed that on exit from the study, persons on the free plan had fewer decayed teeth than those in the pay plans. Subjects in the least generous plans usually had the highest prevalence of decay. For filled teeth the opposite result was found, persons on the free plan having more filled teeth. For missing teeth no significant differences were found. For all age groups persons in the free plan tended to have better periodontal health than in any of the other plans. When results were analysed in relation to the educational level, it was found that the 12- to 17-year-old participants from families with average or low education who were on the free plan showed significantly improved oral health outcomes. Thus, the authors suggested that insurance with reduced cost sharing for dental services improves dental health for the younger age groups (up to 35 years old) especially among the subgroups with poorest oral health.

Okada & Wan[136] examined the effect of increased access to dental care on dental care utilisation, over a four to six year period, in five urban low-income areas. Baseline dental visit rate, for the combined areas under study, was lower than the national average, but it improved during the study years at a higher rate than the national rate. When the dental visit rate was examined separately for each of the five areas, it was found that with one exception, the dental visit rates had increased from 33% to 80%. Dental utilisation (% population seeing a dentist in the past year) had also improved, and the increase tended to be higher among the poor, the black populations, the children and the elderly. Multivariate analysis examining the effect of age, race, geographic area, source of dental care, and source of payment, on the number of dental visits, showed that source of payment for dental care had the strongest net effect.

Increased access to dental care based on increased availability of dental services was also found to have an effect on the uptake of dental treatment among schoolchildren in England. O'Mullane & Robinson[137] used a sample of 508 14-year-olds, residents of two towns with contrasting dentist : population ratios. The DMFT score and its separate components, as well as the fillings : extractions ratio differed in the two areas under study. When analysis was conducted for the separate social groups, no differences were found between the higher social background children of the two towns. However, differences in oral health between the high and low social groups, was greater in the town which had the unfavourable dentist : population ratio. Thus, greater availability of dental services seemed to reduce the inequalities in the uptake of treatment between the social classes.

The effect of both price and availability of dental services, on their demand and utilisation, has been examined by Grytten[138]. Demand was measured according to whether the individual had visited the dentist during the previous year, and utilisation referred to the quantity of services an individual had received during the previous year. The price of, and demand for dental treatment were negatively associated, but the association was not significant. In contrast, price and quantity of dental services received were significantly associated. The higher the price the lower the utilisation of dental services. The other associations suggested that demand increased with increasing income, and education, and with increasing number of teeth, and decreased with increasing population to dentist ratio. The population to dentist ratio was also negatively and significantly associated with utilisation. The size of the effect of price on the quantity of dental treatment was dependent on the population to dentist ratio and the number of teeth. Thus, the negative effect of price on utilisation of dental services appears to be greatest in areas where the availability of services is low, and where people have few remaining teeth, that is, in areas of greatest need.

Availability of dental services seems to be related to the socio-economic profile of an area, as lower values of population to dentist ratio have been found in areas where the social class profile shows a predominance of lower social groups[139]. However, this difference in the availability of dentists between high and low social class profile areas, was significant for England and Wales, but not for Scotland.

In a study which examined the effect of both availability and patient charges on the demand for dental care in Scotland, Parkin & Yule[140] used data for the period 1962-81. They found that price effects were significant, although rather weak, suggesting that with increasing price of dental treatment, there is a decrease in the utilisation of dental services. Availability of dental services was positively and strongly associated with both demand and utilisation measures, suggesting that the greater the number of dentists per unit population, the greater the demand and utilisation of their services.

Finally, Hay *et al.*[141] also examined the effect of the cost of dental treatment on the demand for dental care. Their sample consisted of 161 randomly selected employees, who were covered by a dental insurance program. The number of annual visits was found to be significantly and positively related to total annual dental expenses and negatively related to out-of-pocket expenses. Thus, high total expenditure relates to more dental visits, while higher out-of-pocket expenditure decreases the demand for dental visits.

To conclude, the costs of dental treatment seem to be an issue for concern among the population. Low dental fees encourage people to attend university clinics[132]. Subjects of manual social classes have more negative attitudes to cost of treatment[2], and the cost of dentures is generally perceived as too high, particularly among lower social classes[119]. This deters people from replacing old dentures[133]. Cost of treatment has been given by respondents as reason for non attendance[103,104,124] and dental charges discourage attendance especially among lower social classes[119] and low income groups[124].

Cost appears to be related to attitudes to unpleasant experiences, the lower the educational level of respondents, the more likely they were to report such unpleasant experiences[126]. Cost is also an issue which influences the confidence people have in their dentist[117], and the image of the ideal dentist suggests that he should not be expensive[116]. The fact that higher socioeconomic groups were more likely to suggest this characteristic for the ideal dentist might be attributed to the fact that they were more likely to have had private treatment. Low income groups were found to be more likely to consider dental costs as too high[131].

The findings of these studies concerning the attitudes to and perception of cost as reported by respondents, appear to be confirmed by studies which examine the effect of price on demand and utilisation of dental services. These suggest that price is negatively related to demand and utilisation[138,140,141], the higher the price of dental treatment, the lower the demand and utilisation of dental services. In particular, this effect is greatest among populations with a low availability of dental services, and those with few teeth remaining[138]. Furthermore, low availability has been found to be related to low social class profile areas[139].

Availability of dental services, in terms of population to dentist ratio, has also been found to influence demand and utilisation of dental services[138,140], the higher the availability, the more the demand and use. Furthermore, good availability decreases the social inequality in the care received and in the differences in the level of oral health between the social classes[137].

Similar differential use of dental services under dental insurance by contrasting income groups has also been found[134]. More generous insurance, and less out-of-pocket dental costs increased demand and utilisation[134,141], particularly among the low income groups[134] and resulted in better oral health[135], especially among the younger ages and those with poorest oral health.

3.7 MULTIVARIATE MODELS OF DENTAL HEALTH AND DENTAL BEHAVIOURS

It is widely accepted that the cost of preventing oral diseases could be greatly reduced and the efficiency of preventive regimes increased, if subjects or groups at greater risk for developing the diseases could be identified in advance. In such a way, programmes of preventive dentistry could be applied selectively rather than given universally to all subjects irrespective of whether they truly need such programmes. The multifactorial nature of dental disease has led researchers to employ multivariate models, where a number of variables are examined simultaneously for their significance in predicting levels of disease.

The methods of identification of high caries risk groups and individuals, as reviewed in a report of the Federation Dentaire International[142], relate to the structure and chemistry of enamel, to biological and biochemical factors in plaque, salivary factors, diet, form and arrangement of teeth, oral hygiene, epidemiology (eg. past caries experience), and demography.

However, studies have used primarily previous caries measures in their models[143,144], others have studied microbiological measures[145], and others have looked at combinations of previous caries and bacterial counts[146]. Fejerskov & Manji[147] have suggested that probably the most effective predictor of future caries activity is past caries experience, which is easy and inexpensive to assess clinically. They further suggested an etiologic model of dental disease, according to which dental plaque is the etiologic factor, with saliva (flow rate, composition), buffer capacity, diet (composition, frequency), sugars' clearance rate, and fluoride being determinants, and education, social class, income, behaviours, attitudes and knowledge being confounders.

For the purposes of predicting individuals or groups at risk, this may hold true. However, the ultimate goal of identifying those at risk is to target them, ideally, with programmes of primary prevention, or at least with programmes of secondary prevention. For such programmes to be successful, the 'confounding' socioeconomic and behavioural factors are upgraded and become determinants.

There is extensive literature concerning the identification of factors and their function in dictating health behaviours, and several theories and models of health behaviours have been proposed[21]. This multiplicity of theories and models confirms the fact that there is no simple answer to the question of why some people chose to care for their health and others do not. The underlying problems appear to be multifaceted and complex.

Cummings *et al.*[148] tried to bring the models together by examining the similarities of a set of 99 variables of 14 models, as judged by the authors of these models. Six sets of factors common to all models were identified: (a) accessibility to health care, (b) evaluation of/attitude to health care, (c) perception of symptoms and threat of disease, (d) social network characteristics, (e) knowledge about disease, and (f) demographic characteristics.

In Table 3.9, studies which have examined models explaining dental health and dental health behaviours, are listed.

A socio-ecologic caries model which combined both biomedical and psychosocial/behavioural philosophies was reported by Bjertness & Eriksen[149]. They used as the basis of their study the 'health field concept' multidisciplinary model. According to this model, the development of dental disease, as based on the host, the substrate and microflora, is influenced by four factors: (a) human biology factors, (b) behavioural factors, (c) environmental factors, and (d) health care organisation factors. In this study, the environmental factor comprised three variables, years at school, social class, and economy. The behavioural factor consisted of ten variables, nutritional status, alcohol problems, exercise, smoking, psychologic status, sugar consumption between meals, oral cleanliness, toothbrushing, interdental cleaning, and use of fluoride. The human biology factor also included ten factors, sex, physical fitness, allergy, weight status, streptococcus mutans counts, saliva buffer capacity, saliva secretion rate, number of missing teeth, chronic disease and medication. The health care organisation factor comprised four variables, current regular dental visiting pattern, regular dental visiting pattern at age 15-25 years, participation in school dental care, and recall system. Multivariate analyses showed the environmental, behavioural, human biology, and the health care organisation factors to explain 5%, 25%, 28%, and 13%, respectively, of the variation in the number of decayed surfaces. When the most important variables of each factor were tested together, it was found that four variables explained 42% of the variation in the number of decayed surfaces. These were alcohol, saliva buffer capacity, gender, and regular dental visiting. Social class and psychologic status were found to be significantly associated in bivariate analysis, but they did not remain significant in multivariate analysis. The combination of the four factors was found to be a more successful model than each of the four factors suggesting the multifactorial nature of dental disease. The authors finally concluded than human biology and behavioural factors appeared to be more important factors in caries development than environment and health care organisation.

Had the dental visiting pattern not been included in the health care organisation factor, but in the behavioural factor, the latter might have proved even more important. The

Table 3.9 : Studies examining models of dental health and dental health behaviours

Author	Sample	Age	Dependent variables	Predictor variables
Bjertness & Eriksen[149]	119	50	Nos. of decayed surfaces	Alcohol consumption,saliva buffer capacity, gender, dental attendance
Bjertness *et al.*[150]	81	50	Nos. of decayed surfaces change over 15 years	Psychologic status, marital status
Beck *et al.*[152]	445	65+	Root caries incidence over18 months	Gingival recession, baseline root and coronal caries, deep pockets, calculus, remaining teeth, stress, smoking, anxiety, social support
Palmqvist *et al.*[153]	2,347	45-69	Edentulousness, denture wearing, complete dental arches	Age, gender, education, income, urbanisation, marital status, attitude to dental appearance
Tervonen *et al.*[154]	1,275	25, 35, 50, 65	Abundant dental caries, periodontal pocketing	Age, gender, education, number of teeth, perception of own dental care, attitude to preservation of teeth, dietary habits, dental visiting, dental knowledge
Maizels *et al.*[155]	350 200	adults	Nos. of filled teeth, regular attendance	Age, social class, dental attendance, satisfaction with teeth, gender, dental history, satisfaction with dentist, dental fear, food preferences, region
Maizels *et al.*[156]	200	adults	Dental status and propensity to adopt preventive behaviour	Age, region, dental history, dental attendance, tooth cleaning efficiency
Petersen & Pedersen[157]	841	adults (males)	Dental visits, dental health	Age, attitude to dental care, past dental care activity, dental visiting, price
Sogaard *et al.*[158]	1,511	16-79	Dental visiting	Age, education, income, use of fluoride, interdental cleaning,dental attitudes, health locus of control, dental knowledge, social network
Lissau *et al.*[159]	552	20-21	Dental visiting	Gender, education, family type, pain tolerance, perceived economic barriers, attitude to dentist and dental services

authors operationalised the health care organisation factor in a way which rather relates to behavioural concepts. This factor included four variables, two of which were current and past dental visiting pattern. While dental visiting may be influenced by the organisation of health services (availability, accessibility), it may as well be influenced by socio-psychological factors which make it an inappropriate proxy measure of health care organisation.

Bjertness *et al.*[150] have used the same 'health field concept' multidisciplinary model to examine the factors associated with changes in dental caries over 15 years. Respondents were classified in relation to decayed surfaces, as showing an improved or stable caries status, or a worsened status. In this study, the behavioural factor, which consisted of the variables psychologic status, use of fluorides, and oral cleanliness, explained 26% of the variation in caries increment. The explanatory powers of the environmental, human biology, and health care organisation factors were negligible. When the independent variables with the highest beta values from each of the four factors were tested, 18% of the variation of the dependent variable was explained by psychologic status and divorce during the last 15 years. The authors concluded that behavioural factors were the most important with regard to changes in dental caries, the psychologic status being the single most important. Fluoride and oral cleanliness (behavioural factor variables) were found to be of importance and exhibited a separate effect independent of other variables. The authors noted the lack of significance of the educational level or social class of the respondents.

However, in the description of the study sample it was reported that many low education respondents were lost during the 15 years of the study. This would make it difficult to detect differences in relation to education. Similarly, dental attendance failed to have a significant association due to the fact that the vast majority had attended the dentist annually. Another issue for consideration is that the variable oral cleanliness (Green & Vermillion simplified oral hygiene index) was considered as a behavioural variable. However, a direct relationship between tooth-brushing (which is the behaviour) and oral hygiene status has not always been found[151].

Beck *et al.*[152] have also used both clinical and behavioural/psychological variables in their study of the identification of high caries risk adults. The clinical/dental independent variables were gingival recession, baseline root and coronal caries, number of teeth with deep periodontal pockets and calculus, and number of remaining teeth. The multiple regression model for males explained 48% of the variation of the root caries incidence. However, the dental predictors explained 39% of the variation. The remaining predictors were stress, smoking behaviour, anxiety and social integration and support. The model for females explained 47% of the variation of root caries incidence, the dental/clinical variables accounting for 44% of the variation. The remaining predictors were stress, social participation, and sugared food consumption. A notable finding was that for both men and women, having 23 or more teeth predicted a low increment of root caries. Thus, it was suggested that people who reached the age of 65 with an almost full dentition were healthy survivors and should not be expected to be at high risk for root caries. Smoking behaviour among adults could suggest ether a direct biochemical linkage, or that such behaviour acts as a proxy measure of other health related behaviours.

In a study reported by Palmqvist *et al.*[153] models were constructed to examine the relative importance of socio-demographic variables and dental attitudes in the explanation of edentulousness, of denture wearing, and of complete dental arches. The independent variables were age, gender, education, income, residence (urban - rural), marital status, attitude to dental appearance, and attitude to dental function. The model for total edentulousness included the variables age, education, income, residence, and marital status. Gender and attitudes to dental appearance and function did not enter the model. Dental appearance entered the model for the presence of dentures together with age, education, income, marital status, gender, and residence. Finally, the complete dental arches model was constructed by age, education, residence and attitude to dental appearance. Considering dental appearance of limited importance was associated with higher risk of having a removable denture, and with higher risk of not having all teeth remaining, the effect being present after adjusting for socio-economic and demographic variables. However, dental appearance had a lower predictive value, when compared to the social and demographic variables, particularly education, which had a very high predictive value.

Socio-demographic, behavioural and attitudinal variables were examined as potential risk factors of abundant dental caries and periodontal pocketing, in a study by Tervonen *et al.*[154]. The model for dental caries was constructed by three general indicators (age, number of teeth and education), two variables relating to attitudes (poor subjective evaluation of own dental care and negative attitude to preservation of teeth), and two behavioural variables (dietary habits and dental visiting). The model for periodontal pocketing consisted of three general indicators (age, sex, and number of teeth), one variable relating to dental knowledge, and finally the attitude to preservation of teeth. Of all socio-economic variables only education was found to be a discriminating variable in the caries model, while attitudes to the preservation of teeth was a variable that entered both models. Behavioural factors were found to enter the model for dental caries, while a knowledge factor entered the periodontal model. Furthermore, attitude to preservation of teeth had a stronger predictive value for caries than for periodontal health.

While this cross-sectional study exemplified the inter-relationships of dental knowledge, attitudes, and behaviours, and levels of dental health, the variables of the models could be considered as risk indicators rather than risk factors as suggested by the authors. Identification of risk factors would require a prospective follow-up study.

In a study which included two separate samples, Maizels *et al.*[155] reported an interactional model which combined clinical and socio-psychological aspects of dental disease. Three dimensions of the model were defined: (a) the vulnerability dimension relating to antecedent or conditioning variables such as socio-economic background, dental experiences, access to services, (b) the motivational dimension relating to beliefs, attitudes, expectations, and (c) the preventive dimension relating to current dental health practices, like self-care and dental visiting. When the number of filled teeth was used as the dependent variable, the significant variables in the model for the first sample were the frequency of dental visits, age, social group, and satisfaction with teeth. For the second sample, significant variables were the frequency of dental visits, age, region, and social network. When dental visiting was used as a dependent variable, the model explaining its variation comprised gender, dental history, satisfaction with dentist and dental status, fear of dentist, food preferences and region. The results suggested that motivational and vulnerability variables influenced dental visiting behaviour, and were thus indirectly related to the dental outcome. Residence in outer London was found to be related to higher numbers of filled teeth and lower numbers of missing teeth even after adjusting for dental visiting. This suggested that different treatment strategies were pursued in the two areas. Social class appeared to have both a direct effect on the number of filled teeth, and an indirect effect, through dental visiting. This remained true after adjustment for dental visiting. This suggests that there may be a differential pattern of treatment for each social class. Social class was less predictive than dental visiting of the number of filled teeth, but these two variables were equally predictive of numbers of missing teeth.

Although Maizels *et al.*'s[155] findings are important, the selection of the samples precludes generalisation of the results. The social class effect could be detected only in factory employees. The interview sample was homogeneous in relation to the social class attribute. If the samples had been randomly selected, it is possible that the predictive influence of social class would have been even greater.

Further analysis of the data[156] allowed the construction a composite indicator of dental health behaviours. This included five separate actions, that is, whether or not the individual attended a dentist on a regular basis or only when in trouble, the frequency of tooth cleaning, whether or not sugar was taken with tea or coffee, the frequency of eating between meals, and the amount of care taken in looking after teeth. Five variables were found to explain 30% of the variation in preventive dental care behaviour. These were dental beliefs, health beliefs, satisfaction with dental health status and dental health services and fear of dentist. These variables were then used to construct an indicator of propensity to adopt self-care preventive measures. This indicator was then in turn related to clinical indices of dental and periodontal health, and it was found that those respondents with below-average dental status and propensity were more likely to be older, to live in the North, to have unfavourable dental histories, to be irregular attenders and to be less efficient teeth cleaners. Those with a high propensity for preventive dental behaviours, but with poor dental health, tended to be older, to have poor dental histories and tooth cleaning efficiency, but they were regular attenders and tended to live in the South. This work identified population sub-groups with different needs.

Petersen & Pedersen[157] have suggested a socio-economic demand model, where use of dental services and dental health status are assumed to have a reciprocal association. Occupation is assumed to influence time costs and ultimately use of dental services. Use of services is also considered to be influenced by place of residence, price of dental treatment, and income. Dental care activity in the past, which depends on area of residence in childhood, and education, is hypothesised to influence both use of services and dental health status, as does expectations about value of use of services, which, in turn, depends on education and age. Multivariate analyses revealed a strong inter-relationship between dental health status and dental visiting, and an effect of income and price of dental treatment on use of dental services. In contrast, distance and time cost were not related to use of services, neither was occupation with time cost. Education was found to be significantly associated with both dental care activity in the past and expectations about value of dental treatment. Dental care activity in the past was, in turn, associated with the dental health status, and expectations of value of dental treatment was associated with use of dental services.

The conceptual model of this study examines the effect of socio-economic variables, occupation, income, education, and area of residence, as having an indirect effect to dental health status, only through their association with use of dental services. However, they could also have a direct effect on dental status. Similarly, only education is examined as a possible predictor of past dental care activity and expectations about the value of dental treatment, while the other variables could also have a separate effect.

In another study, Sogaard *et al.*[158] examined the determinants of dental visiting behaviour. Analysis showed age, education and income to be significantly related to dental visiting patterns. In relation to behavioural and attitudinal variables, infrequent or no use of fluoride, infrequent use of dental floss and toothpicks, a negative dental attitude, low internal health locus of control, little knowledge, and a weak social network correlated with irregular use of dental services among both men and women. When these indices were used in multivariate analysis together with age, they explained 13% and 24% of the variance in the use of dental services among men and women respectively. When the socio-economic factors were introduced in the analysis, the variance explained by the models increased to 17% and 27% respectively. In subsequent discriminant analysis it was found that for men, education, use of fluoride and a social network had the strongest influence on attendance. In contrast, among women, the strongest factors influencing attendance were interdental hygiene, a social network and attitude to health. The authors suggested that although the socio-demographic variables contributed only moderately to the models, they seemed to act through behavioural and personal factors.

Lissau *et al.*[159] have examined the effect of social environment, the individual and the delivery system on the use of dental services by young adults. Their theoretical frame was a model according to which the behaviour of an individual is determined by three sets of factors: (a) contextual resources (the social environment: parents and school), (b) individual resources (education, age, residence), and (c) structural resources (the delivery system). Contextual variables, i.e. the dental attendance pattern of the respondents' mother, and her perception of economic barriers, were found to be significant predictors of respondents' dental visiting. With regard to the characteristics of the young adult participants, gender, family type, education, pain tolerance, dental anxiety, perceived economic barriers and locus of dental health control were the significant predictors of use of dental services. For the structural determinants (perception of the delivery system), attitudes to general dental practitioners and to the public dental care system were the significant predictors of dental visiting. Multivariate analysis, which examined simultaneously all the variables within the three conceptual factors, showed that none of the contextual variables (mothers' attributes) were significant in predicting participants' dental visiting. The participant's gender, family type, education, pain tolerance, and perception of economic barriers were significant predictors. Of the structural variables (delivery system), the participant's assessment of the dentist and of the delivery system were significant predictors. The conclusions drawn were that although there was a strong association between participants' and their mothers' dental visiting behaviour, the failure of contextual factors to be significant predictors of the participants' dental visiting behaviour in the last model, could be attributed either to the fact that the outreach systematic dental care offered to children and youths outweighed the influence of family, or that mothers' attitude and behaviour were mediated through the participants' individual variables.

In the structural (the delivery system) factor of the model, the authors used variables relating to perception of the delivery system, which is a separate dimension from the actual delivery system itself, and, theoretically, could have a separate effect. However, the extensive state dental care coverage offered to all participants made them homogeneous in relation to this factor. Thus the separate effect of the actual delivery system would be very difficult to detect.

McCaul *et al.*[160] investigated the predictors of preventive self-care behaviours among 77 college students who had reported at least occasional flossing during one month before the investigation. The selection of possible predictor variables was based on social learning theory, according to which environmental and interpersonal (cognitive) influences and the reciprocal interaction of a person with his environment determine the behaviour. Three categories of predictor variables were used: knowledge and skills, expectations, and environmental influences. Significant correlations were found between brushing, and self-efficacy expectations, outcome expectations and dental behaviours of 'significant others'. In addition, barriers to self-care were found to correlate significantly with flossing behaviour. Knowledge and skill in toothbrushing failed to show significant correlations with preventive behaviours. The results suggested that the more certain respondents were that they could perform dental activities, the stronger their belief that brushing and flossing could prevent oral disease. The study also indicated that the better the self-care behaviours of 'significant others', the more likely participants were to brush and floss their teeth. The stronger their belief that various events interfered with flossing, the less likely they were to floss. Thus, for health promotion interventions, precise messages about when to brush or floss could overcome the barrier of forgetfulness, and encouraging successful experiences when carrying out dental hygiene behaviours would be most likely to succeed.

Understanding the determinants of preventive behaviours is a prerequisite for the planning of effective health promotion programmes. However, these determinants may vary among the various subgroups of the populations. The results of McCaul *et al.*'s study cannot be generalised to the entire population, since students who had reported flossing behaviour (more preventive orientated than the general population) were recruited on the basis of incentives offered to them. Also, the analysis did not adjust for intercorrelations among the independent variables.

In the studies which have been reviewed in this section, statistical models have been constructed which examined dental attitudes and behaviours as they related to dental health[149,150,152-155,157], or dental attitudes and beliefs as they related to preventive dental behaviours[155,156-160].

Some of the studies[149,150,152,154,155] included both biomedical (dental/clinical) and socio-behavioural explanatory variables to examine the variance in dental health experience. One[153] examined the effect of only socio-demographic and behavioural variables. In the study by Beck *et al.*[152], the contribution of the dental/clinical variables in explaining the variation in the incidence of root caries was much higher than that of the behavioural variables. However, dental/clinical variables and behavioural variables were reported to be more important than environment and health care organisation variables[149]. A strong association between dental health status and use of services was reported[157], and dental attendance was found to be a predictor of carious teeth[149,154], and missing and filled teeth[155], while dietary habits were found to predict root caries incidence in females[152], and abundant dental caries[154]. Dietary habits were also found to be a predictor of dental visiting[155]. Use of fluorides and use of dental floss/toothpicks were also found to be predictors of dental visiting[158].

Education[149,150,153,154,157-159], social class[149,154,155,157,158], income[153,154,157,158], and area of residence[153,155,157,158] have also been used as explanatory variables for dental health behaviours. Education was found to be a significant variable in explaining both level of dental health[153,154] and dental behaviour[157-159]. It was found to be more important than attitude to dental appearance for explaining the presence of removable dentures and of complete dental arches (no teeth missing)[153]. It was also the strongest factor discriminating regular from irregular male dental attenders[158], in contrast to income which failed to be a significant predictor of dental attendance. Education was also found to be a significant predictor of the expectations of value of dental treatment[157].

Income was found to be a significant predictor of total edentulousness and of the presence of removable dentures[153], but failed to predict abundant dental caries[154]. However, it was found to predict use of services[157].

Social class was found to correlate significantly with the number of carious surfaces, but after adjusting for the other variables in a multivariate analysis its effect was not significant[149]. In contrast, social class was a significant predictor of the number of filled teeth after adjusting for frequency of dental visiting, age and satisfaction with teeth[155]. The effect of social class on the number of filled teeth was somewhat less than the effect of dental visiting. However, the effect of both variables on the number of missing teeth was equal.

A large number of dental attitudes and beliefs were used in the multivariate models, and concerned perception of health, perception services, attitude to dentist, fear of dentist/anxiety, social network and support, psychologic status and stress, dental knowledge, health locus of control and perceived economic barriers. The large variation in the variables used, as well as the variation in the operationalisaton of certain concepts is noteworthy, and it may account for the individual differences in the results of the various models. These differences may also account for the dissimilarities among the various sample population. However, it is from the examination of these differences in the needs of the populations[156] that effective dental health promoting interventions can be planned.

3.8 LITERATURE REVIEW CONCLUSIONS

The variables used by researchers to reflect socio-economic inequalities in dental health status and behaviour were occupational social class, income, education, and socio-economic status. Socio-economic status was usually a composite index, based on income, education, or social class, and represented social differences applicable to the country where the study was carried out. Some studies examined area of residence in relation to the level of urbanisation. It can be concluded from the results of the studies reviewed that dental health is associated with social factors.

The traditional DMF index was not always successful in identifying social differences in disease experience, while its separate components or alternative measures such as functioning teeth were more useful. Self-reported and perceived dental health were also found to be associated with social background variables.

Periodontal health has consistently been found to be related to the level of education, while income and social class associations have also been reported, although not always consistently.

In relation to dental behaviours, both dental visiting and self-care have been found to differ in different subgroups of the populations. Dental visiting was examined in relation to usual reported frequency, recency of last dental visit, reason for last visit, and in some studies of utilisation dental records were examined.

The adoption of oral self-care measures appeared to differ in different social and educational sub-groups of the populations. It has also been suggested that the combined use of toothbrushing and dental floss/toothpick may be related to the differential availability and accessibility of these aids in urban and rural areas have. However, there were indications that in populations where toothbrushing is almost ubiquitous there is an equalisation in oral hygiene practices among the various socio-economic groups.

The differences in the rate of adoption of preventive dental behaviours suggests that different population groups experience different barriers to dental care, or experience the same barriers but with a different intensity. These barriers can prevent individuals from employing practices conducive to the improvement and preservation of oral health.

Dental anxiety is an important barrier to dental health practices, and it appears to be consistently related to age, sex and regular attendance pattern. Although not always consistently, levels and prevalence of dental anxiety have been reported to be associated with social class, education and income.

Dental attitudes may also act as a barrier, and have been found to differ among population sub-groups. Individuals from different social class backgrounds, or socio-economic status seem to have a different perception of the image of the dentist. When compared to higher social class persons, lower social class and socio-economic status subjects tend to have a more negative attitude to the dentist, and appear less likely to consider him as a caring person whom they can trust. They are more likely to consider the treatment as impersonal or even unnecessary, and are more likely to perceive the ideal dentist as someone with the attributes of reassurance and friendliness. In contrast, higher socio-economic status individuals tend to attribute professional skill, and explanation and information to the ideal dentist. Similar differences were found in relation to dental attendance pattern, irregular attenders exhibiting a more negative attitude to dentists when compared to regular attenders, suggesting that attitudes to dentist may indeed act as a barrier to dental attendance.

Attitudes to the preservation of teeth and the value attached to teeth appear to be related to social class. An association with education has also been demonstrated, although it is weak. False teeth seem to be more acceptable among the lower social groups, and similar differences were found in relation to regular attendance pattern.

Attitudes to dental care seem to be related to social class, income and education. Higher social class, income and education appear to be associated with a preventive concept of dentistry, and a greater importance attached to dental visiting and self-care practices for the preservation of dental health.

Attitudes to dental appearance do not seem to be consistently related to income and education, while attitude to dental function appears to be associated with education.

Cost and charges for dental treatment is an issue for concern among the populations, and are frequently given as a reason for non-attendance at the dentist. Attitudes to cost appear to be related to social class and income, and financial issues within the dentist-patient interaction seem to influence the perception of, and attitudes to, dentists. Studies employing econometric models which examined the effect of price and cost of dental treatment, support the finding that cost influences the use and demand for dental services, particularly among lower socio-economic groups, and residents of areas with a low availability of services.

All these issues need to be taken into account when programmes of dental health promotion are planned, if efforts are to be appropriate and acceptable, and thus effective and efficient. Models which have examined the inter-relationships of all the variables mentioned, have shown that there are complex associations among the variables, and various sub-groups seem to have different dental needs, either clinical, behavioural, or attitudinal.

Thus, the conclusions of the review of the literature are as follows:

1. Dental health is associated with social factors.
2. Periodontal health is consistently associated with the level of education.

3. Self-care and dental visiting behaviours differ in the different social sub-groups of the populations.
4. Dental anxiety is a major barrier to dental attendance, and differs in the different sub-groups of populations.
5. Attitudes to dentists, the role of dentistry and attitudes to dental care differ in relation to social factors.
6. Attitudes to the preservation of teeth, to false teeth, and to the value of teeth, also appear related to the social background of individuals.
7. Attitudes to cost and charges for dental treatment appear to be another barrier to attendance, and also seem related to social factors. This finding is supported the econometric models of the relationship of the price of, and demand for, dental treatment.

3.9 SOCIO-ECONOMIC INEQUALITIES AND THE CURRENT STUDY

Some models have examined socio-economic variables and their explanatory power. However, these models considered the socio-economic variable simply as a background variable and samples were not always heterogeneous in relation to this attribute.

In contrast, in the study reported in this thesis, socio-economic differences are taken as the major issue upon which the study is built. Access to material resources is considered as a major determinant of dental health and dental behaviours, and the study seeks to explain how and to what extent attitudes, beliefs and behaviours influence levels of dental health and treatment needs.

Attitudes, beliefs and behaviours do not exist in a social vacuum, and while research on health behaviour concentrates mainly on the individual, the influences of the social environment should not be overlooked. Health promotion efforts should take into account the influence of the social environment. Thus, in this thesis, access to resources and services (and in particular dental services) of the individual and of the community are assumed to be of importance. While it is recognised that social and economic policy which may influence the social and economic environment of the communities are outwith the responsibility of health care and health promotion planners, proof of such influences on health raises awareness among policy makers. In particular, if health policy planners recognise the real needs of the populations served, their efforts will have a greater potential for success.

In order to examine the effect of social environment, the sampled populations should differ in relation to this variable. While social class analysis is a tradition in British research, the occupational classification used has been criticised[161]. It is important to recognise that other factors play part in determining class, like income, wealth, housing, education, style of consumption, social origins and family and local connections. These factors are interrelated, but none of them, taken singly is a sufficient indicator of class. Also, the ranking of occupations according to their prestige, includes a number of arbitrary steps. The identification of numbers of ranks and the criteria for differentiating between ranks are not very clear, the procedure being a mixture of presupposition and partial representation of social perceptions. Thus, the Registrar General's classification reflects the social prejudices prevailing in 1911. The classification has also been criticised in that allocation of occupations had been manipulated in such a way as to produce smooth mortality gradients[161].

As a consequence, it has been noted, that, in terms of the analysis of health differences, ranking by occupational class may understate the true impact of socio-economic inequalities on health[162].

The other tradition of research is area analysis. In particular, small area analysis has expanded since the '80s, due to the introduction and use of the post code system as a basis for area coding, the central postcode directory (CPD), and the population data from the census being available on a small area basis. Linking between the postcode unit and the enumeration districts provides the opportunity to use enumeration districts as building blocks in order to form the area of interest.

A problem which is encountered when using small areas is that small populations attract small numbers of events, and thus there may not be sufficient numbers for analysis. Thus some aggregation is necessary. Two ways of overcoming this, is either the aggregation of events over a number of years, or over a number of areas[163]. Aggregation over years is possible when the characteristics of the areas are not changing greatly over time. Also, data used must be centred on a Census year, for which population denominators are available. Aggregation over areas presents problems as to which areas belong to a homogeneous group. When the boundary of the area of interest is determined on the basis of prior knowledge, contiguous areas are aggregated. Alternatively, and essentially for studies which attempt to document associations with other variables, areas must be assembled which are similar in their characteristics regardless of geographical location. In such a way, the aggregation of EDs into larger areas means that these areas are more homogeneous.

This latter method was adopted in the present study and Enumeration Districts with similar levels of deprivations were aggregated to form the areas where the samples were drawn. One group was from ED's with the highest level of deprivation in Glasgow, and the other was of a completely differing social environment, that with the lowest levels of deprivation. Thus the heterogeneity of the sample in relation to affluence - deprivation was assumed to yield the hypothesised results of the effect of social environment of dental health and health behaviours.

Another important aspect of the present study was the use of qualitative research in the form of group discussions at a first stage. This methodology was employed in order to minimise researcher bias and explore the issues that respondents consider important. The results of this phase were used for the formulation of the questionnaire used in the main study.

Thus, the present study, in contrast to the other models reviewed, does not test variables which were considered of importance to researchers or which would validate some model of health behaviour. It rather represents an exploratory study, one which examines the inter-relationships of dental health status, dental health attitudes, beliefs, and behaviours, and availability and accessibility of dental services, in order to identify how all these variables operate under differing socio-economic conditions.

CHAPTER 4 : MATERIAL AND METHOD

4. MATERIAL AND METHOD

4.1 THE AREAS OF INTEREST

Areas of social deprivation within the city of Glasgow were the areas of interest for this study. Some socially deprived areas in Glasgow are served by Health Centres. In these Health Centres, an "out-reach" programme of preventive dentistry had been running for seven years[20]. It was thus considered useful to distinguish between deprived areas, and deprived areas with an "out-reach" programme, and have samples from both groups. In order to have a basis for comparison, affluent areas were also areas of interest.

Thus, three types of areas of interest were identified :

1. Affluent.
2. Deprived.
3. Deprived with an "out-reach" programme of preventive dentistry.

4.2 SAMPLING

4.2.1 The sampling requirements

For this study, two stages were required in order to obtain the sample. Firstly, the entire population of Glasgow had to be stratified according to the social environment in which they resided. Secondly, it was necessary to obtain a valid and complete register of the population aged between 16 and 65 years of age living within each of those areas. Therefore, the requirements for the study were firstly, to identify areas within the Greater Glasgow Health Board which were affluent or socially deprived and, secondly, to obtain lists of persons living therein.

4.2.2 Defining target areas

To identify areas of relative affluence, two methods were available. The first of these was via Greater Glasgow Health Board, which has classified Glasgow's 2880 enumeration districts (EDs) into eight groups. This classification examines 30 variables relating to home ownership, housing type, age of house occupants, occupation, number of individuals per household, household amenities, and socio-economic status. By so doing, 15 clusters can be identified, each with six principle component variables. Utilising these clusters allows EDs to be ranked into eight groups according to the overall socio-economic status within the area. These groupings are :

1. Large owner-occupied housing with two or more cars; low levels of unemployment and overcrowding; mainly professional and non-manual workers, e.g. Eastwood, Bearsden and Milngavie. Such a group comprised 15% (427) of EDs.

2. Mainly owner-occupied housing, families with young children; low levels of unemployment; mainly non manual with some professional workers, e.g. Croftfoot and interspersed among cluster-type 1. These comprised 11% (317) of EDs.

3. Mixed tenure; mainly owner occupied (predominantly areas with tenemental property); young married couples with no children; working wives; single persons; some sharing of amenities and slightly more than average proportion of immigrants; mainly non-manual, e.g. Shawlands, Langside, Thornwood, Partickhill. This group comprised 6% (171) of EDs.

4. Mainly inter-war local authority housing; families with no young children; ageing and elderly population; mixture of non-manual, skilled and unskilled workers, eg. Knightswood, Mosspark, comprising 18% (516) of EDs.

5. Mainly post-war local authority housing; some overcrowding and some single parent families; higher than average unemployment mixture of skilled and unskilled workers, e.g. apart from Penilee this cluster-type is dispersed among cluster type 7 - comprised 20% (583) of EDs.

6. Mixed tenure type of private-rented-furnished and owner-occupied housing; small households, shared amenities, not self contained; higher than average proportion of immigrants, students and single persons; mixture of all socio-economic groups, eg. Woodlands, Hillhead and N.E. Pollokshields. This group comprised 5% (130) of EDs.

7. Mainly post-war local authority housing; young families with school-aged children; some larger families and single parent families; overcrowding; cluster group with highest level of unemployment; mainly unskilled and skilled workers, eg. Drumchapel, Easterhouse, Possilpark - 20% (567) of EDs.

8. Mixed tenure of mainly owner-occupied and vacant dwellings with some local authority and private rented housing; high proportion of small households,

shared amenities and overcrowding; mainly unskilled and skilled workers, e.g. parts of Govan, Whiteinch, Yoker near the river comprised 6% (169) of EDs.

For the purposes of the study, the target groups of EDs were 1 and 7, which comprised 15% (427) and 20% (567) of Glasgow's EDs respectively.

An alternative method of determining areas with contrasting socio-economic environments is to use commercial data. Like the GGHB system, this classification is based on census data. One such data set is available within a system known as ACORN - A Classification Of Residential Neighbourhoods - which is supplied through the company CACI. ACORN, like the GGHB classification, profiles all EDs into groups (in this case 11), according to housing type, household composition and socio-economic status, as follows (1988 Acorn Profile: GB) :

Group	Number	Description	Population	%
A	1,2	Agricultural areas	1811485	0.4
B	3,4,5,6,7	Modern family housing,, higher incomes	8667137	16.2
C	8,9,10,11	Older housing of intermediate status	9420477	17.6
D	12,13,14	Poor quality older terraced housing	2320846	4.3
E	15,16,17,18	Better-off council estates	6976570	13.0
F	19,20,21	Less well-off council estates	5032657	9.0
G	22,23,23,25	Poorest council estates	4048658	7.6
H	26,27,28,29	Multi-racial areas	2086026	3.9
I	30,31,32	High status non-family areas	2248207	4.2
J	33,34,35,36	Affluent sub-urban housing	8514878	15.9
K	37,38	Better-off retirement areas	2041338	3.8
U	39	Unclassified	388632	0.7

The two methods available for delineating the target areas are, therefore, very similar, with the main advantage of the first being its lower cost.

4.2.3 Defining the sample within the target areas

Having defined the areas in question, it was necessary to obtain a list of individuals (who were aged between 16 and 65) residing within each area. This process was problematic for two reasons. Firstly, EDs and ACORN statistics are based on census data. Therefore confidentiality is an important consideration, and information about individuals (as opposed to clusters of individuals) should not be available. Secondly, enumeration district boundaries are not congruent with Unit post-code boundaries, although unit postcodes within an ED can be identified.

The component parts of E.D. numbers and unit post code numbers are as follows:

Enumeration District (E.D.) number	41	BJ	17
	E.D. unique number	Unit	Glasgow City identifier
Post - code	G14	9	HD
	Postal district	Postal sector	Postal unit

Unfortunately, due to the confidential nature of census data, it is not possible to derive names and addresses within an ED, without using Unit postcodes.

Hence, if the sample chosen is based on EDs, the only method of ensuring that all addresses within an ED are included in the sample, is to transfer ED boundaries on to a street map. Even so, having achieved a list of unit postcodes within an ED, the requirement is still to list all the individuals resident within the Unit postcode. While it is a simple matter to obtain the addresses within a unit postcode, using the G.P.O's postcode address file, if one wishes to sample individuals (rather than households), one must use other means. Available sources of individual names and addresses are the electoral register (or community charge register) and the community health index.

4.2.4 The ACORN system

The commercial company which provides the ACORN system is able to match each enumeration district (ED) to postal geography, using their own software to generate a list of addresses. They are also able, using the electoral roll, to supply a list of residents within each address. However, since the electoral register is used, the age or dates of birth of the persons involved cannot be obtained (although all individuals on the roll are aged over 18 years). Also, persons ineligible to vote are not included. A further problem lies in the fact that the register is only updated each October, and is issued the following February, thus the listings may be 18 months out-of-date. Finally, transient populations (typically those aged 20-29), are frequently omitted.

The alternative to utilising this somewhat expensive commercial data, with its inherent flaws, is the Community Health Index.

4.2.5 The Community Health Index (CHI)

The CHI is a computer-held file of all individuals registered with general medical practitioners within a given area. A ten digit number is used to identify each individual, and each record holds the patient's name, date of birth, address and full postcode, together with the practitioner's name.

One of the stated functions of the CHI, is the identification of individuals for the purpose of conducting community-based epidemiological studies. However, this role for the CHI appears to be less developed than its administrative purpose (remuneration of G.P.s).

Another study which had also used the CHI, concerned a 14 year follow-up of a middle-aged cohort in the West of Scotland. That study, which had used the CHI in conjunction with GP records and the National Health Service Central Registry, was successful in identifying these individuals. However, the authors noted that contact through the GPs was more successful than postal contact using the address registered on the CHI lists[164].

4.2.6 The sampling frame selected

Utilising the Community Health Index for the purpose of the study, involved identifying the ED numbers which were located within the areas of interest, identifying the ten or so unit postcodes within each of the EDs, then identifying patients within each unit postcode. The final step necessitated specifying unit postcodes of interest, then deriving from the lists of patients on the CHI, those individuals living within the Unit postcodes described. One major advantage of the CHI is that it lists dates-of-birth, and it is possible, therefore, to sample 16 and 17 year olds, and omit individuals who are aged over 65 years.

As less than 1% of the population are not registered with a doctor, samples generated from the CHI are virtually complete. However, people who move house, or die, are not always removed from G.P.'s lists. Therefore the Index tends to be inflated.

The commercial system available had inherent flaws, in that the ages of individuals would not be known and the lists were incomplete. Furthermore, commercial data is expensive. As a result, the CHI appeared to be a better option, except that the software which enabled searching of the index by postcode was only recently in place, and at the time of sample preparation, the Health Board had recently contracted their data-holding requirement to a commercial company. Whilst Health Boards will release data for the purposes of academic research, commercial companies are less willing to do so, without reimbursement. There was thus an unresolved dilemma as to who "owns" the access to data held by commercial companies for Health Boards, when an outside agency (such as a University) wishes to utilise these data.

Other methods of sampling individuals were considered (e.g. the voluntary population survey conducted by Strathclyde Regional Council) but confidentiality problems could not be overcome. Hence, taking all the above into consideration, use of the CHI was the favoured option.

4.3 PHASE 1 - QUALITATIVE RESEARCH

At the planning phase of the project, it was thought that the questionnaire which would be used for the interviews, should apply to the population under study, and also that an attempt should be made to minimise researcher bias. In view of these requirements, exploratory research of attitudes, beliefs, and behaviours of the population was considered to be necessary, and a qualitative research methodology was considered to be appropriate for this purpose.

Qualitative research, is a methodology commonly used in market research. It can take either the form of individual interviews or group discussions, and it has been advocated as a useful tool in the field of health education[165]. Reports of its use may also be found in the dental literature[103,104,119,166,167], where it has caused controversy[168-173] as to the extent to which it is a scientifically sound method of research.

It has been argued that this type of research allows an in-depth analysis of complex sociological problems in greater detail and with more subtlety than many quantitative projects have been able to achieve[174]. It permits respondents the freedom to establish their own priorities[175]. It allows greater interaction between the research and study subjects[176], thus enabling the researcher to explore both spontaneous responses and areas of specific interest. In the case of group discussions, it provides respondents with the opportunity to react to each other's thoughts and thus develop original lines of enquiry. Also, informal group discussions give respondents time and stimuli to clarify issues in their own mind.

It has also been argued that while quantitative research attempts to define <u>if and to what extent</u> a programme works, the qualitative determines <u>how and why</u> it does so (or it does not)[177]. Thus, the two methodologies act in a complementary manner.

It was considered that the advantages of each methodology had a role to play in this study. Therefore, it was decided that qualitative research in the form of group discussions would be used to explore the dental health attitudes / beliefs / behaviours of the population in question, and, from its results, the questionnaire to be used in the quantitative phase of the study, would be compiled.

In total, six group discussions were carried out, two in each area of interest (affluent, deprived, and deprived with "out-reach" programme of preventive dentistry). Each group comprised six or seven respondents and, overall, 37 persons took part in the qualitative research. They were recruited by trained and experienced market researchers according to the Code of Practice of The Market Research Society, on a door-to-door basis, and they were selected on age, sex and social class criteria (using the quota sampling technique). Discussions were held in local community centres to ensure they were as informal as possible, and each was guided by a group moderator, who used a general discussion outline to ensure coverage of certain topics.

Based on the qualitative results (Appendix I), the questionnaire intended to be used in the main study was developed. It comprised of 63 questions, apart from the socio-demographic information. All points raised during the group discussions were used in formulating the questions. The questionnaire covered the following areas of interest :

1. Perception / importance of dental health.
2. Beliefs / perceptions about the participants' own role in managing their dental health.
3. Dental health knowledge / beliefs / attitudes / behaviours.
4. Dental visiting behaviour.
5. Reasons for attendance / non-attendance.
6. Barriers in the receipt of care.
7. Health services.
8. Charges / cost of dental treatment.

4.4 PHASE 2 -INTERVIEWS

4.4.1 The organisation of interviews / interviewers

A total of eight female market research interviewers worked on the survey. They were experienced in conducting face-to-face questionnaire interviews. When they were recruited, meetings were held, where the purposes of the study were explained to them. A detailed explanation of each question in the questionnaire, and of the coding system was given, and all points concerning the interview procedure were clarified. Additionally, they were provided with verbal and written instructions for each question.

Of the group of eight interviewers, at any one time, there were two teams of three interviewers, with work being sent to them on a fortnightly basis. This comprised

a. contact sheets with details of the sampled name and address.
b. a detailed map, to ensure that addresses were found.
c. appropriate stationery - questionnaires with prompt cards, appointment cards, thank-you letters (Appendix II), and dental inspection cards (Appendix III).

The areas to which interviewers were sent, were rotated to allow for any seasonal variations.

Each team was expected to conduct interviews over the first week, and arrange dental inspections for the following week, when interviewers would attend the dental inspection and act as scribes. This would offer the advantage of familiarity, from which it was hoped to yield a high dental inspection acceptance rate. It was agreed that if an interviewer who booked an inspection was unable to attend, then another interviewer of the same team would attend in her place. This problem happened on three occasions, although this practice was discouraged in case it had a negative influence on the dental inspection acceptance rate.

Interviewers were asked to record the day, date and time that attempted contacts were made. They were instructed that the initial contact with respondents must be made on a face-to-face basis, and that if contact proved difficult, efforts should not be terminated until four separate attempts (spread over two days) had been made. Appointment cards were used to reinforce a respondent's commitment to being interviewed, and to help them to remember the interview time. All interviews were conducted in the respondent's home, and parental permission was obtained to interview 16 and 17 year-olds. Where more than one member of a family was to be interviewed, the interviewer asked that only the individual being interviewed should be present in the room at that time. On average, interviews lasted between 30 and 40 minutes.

4.4.2 Sampling procedure

Participants for the main phase of the project, were selected by a two-stage random sampling technique. From each of the three types of area (affluent, deprived, deprived with " out-reach"), ten enumeration districts were selected randomly. The Community Health Index lists of all individuals residents in these catchment areas were obtained, and formed the sampling frame of the second stage. The sampling frame consisted of 7,369 contact names. Based upon a 25% estimated drop-off rate due to deaths, persons no longer resident, or refusal to be interviewed, the sampling frame was reduced to 5,527.

It was calculated that a sample of 200 of each study group would allow detection of differences of 14% between the groups at 80% power and 5% significance. It was also anticipated that 20% to 25% of participants would not accept the dental examination. Thus, the targeted sample for each of the three study groups was 260, and a systematic random sampling of 1 in 7 would yield the required 780 interviews.

Each interviewer was sent a list of 15 sampled names to contact each week. However, very frequently, the sampled individuals could not be found, and the targeted number of interviews per week was not met. In response to this problem, the number of contact names issued per week was increased to 22 per interviewer, but still the number of interviews was not satisfactory. As interviewers were complaining they could not find their subjects, it was decided to give a second and a third choice for a contact name. Thus, for every name sampled, the next name in the CHI list was allocated as a second choice in case the first choice could not be traced. In case this individual could also not be traced, the second next name in the CHI list was given as a third choice. Thus each list comprised 66 contact names. Interviewers were instructed that they should try to trace a person at least four times, and to establish the reason why this person could not be found before they proceeded to the next choice.

Although these steps increased, to a certain extent, the number of interviews per week, there were a few cases where some confusion arose amongst interviewers, and a second or a third choice had been interviewed, without having established a reason for failure to interview the first choice.

Furthermore, two months after the field work had started, a revision of progress showed that out of 545 names (in all three areas) sampled and given to interviewers in order to be contacted, a total of only 149 interviews and 88 dental inspections had been achieved, representing a conversion rate of sampled contacts into interviews of 27.3%, and a dental inspection acceptance rate of 59.1%. Thus the sampled contacts / interviews conversion rate was nearly 50% lower than had been anticipated (75% - 27.3%), and the dental inspection acceptance rate was approximately 18% less than had been planned (77% - 59.1%).

The lower number of interviews achieved was due mainly to the fact that the CHI had not been updated when individuals had died, moved, or residents (especially of the deprived areas) had been decanted due to home renovation and demolition work. It became clear, therefore, that the target of 780 interviews and 600 dental check-ups would not be met on the basis of a 1 in 7 sample.

It was realised that a further change in the sampling procedure was required, together with a change of the targeted interviews and check-ups. It was decided to increase the number of interviews and decrease the number of dental inspections targeted. In order to achieve 500 dental inspections, at the dental inspection acceptance rate of approximately 60%, 833 interviews were required.

Closer examination of the CHI also revealed that approximately two out of seven names listed on the CHI sampling frame did not fit the age criteria, i.e. their age was outwith the targeted 16 - 65 age band.

When the 149 names of individuals who had been interviewed were deducted from the original sampling frame (7,369), there remained 7,220 names. As two out of seven names approximately could not be used due to age restriction, the effective sampling frame was reduced to 5,157. A one in two sampling methodology would result in 2,579 names sampled, which at a sampled contact/interview conversion rate of 27.3%, would give 704 interviews. With the 149 interviews already completed, the total number estimated to be achieved was 853. Furthermore, such a change in the sampling procedure would overcome the problems and confusion associated with the "three choices" sampling methodology.

The decision was therefore taken to use a one in two sampling procedure. Thus, the sampling frame would be the original of 7,369 names, but excluding the 149 individuals who had already been interviewed, and those who until that time (the first two months of fieldwork) had not been found by the interviewers due to death or change of address.

As individuals were sampled, interviewers were advised that if they discovered that a person had changed address but still lived in the same area, they should try to trace him/her at the new address.

4.5 PHASE 3 - DENTAL EXAMINATIONS

4.5.1 The organisation and the procedure of dental inspections

At the end of an interview, interviewers encouraged respondents to agree to undergo a dental examination which would be carried out by a dentist, at their house. When respondents agreed to participate in the dental inspection, an appointment was arranged at a time most convenient for them, in an effort to enhance the dental inspection acceptance rate. Consequently, dental examinations were most frequently conducted outwith normal working hours, i.e. at evenings, holidays, or week-ends.

The dental examinations, which had a duration of 10 to 12 minutes on average, were carried out by one examiner (E.P.), who had been calibrated at the Glasgow Dental Hospital and School. Subjects were asked to sit on a high-back chair. A portable light source[a] with fibre optic cable[b] was used in order to have standardised illumination conditions. Disposable mirrors[c], sterilised CPITN probes[d], latex gloves and disinfectant wipes were used to avoid cross-infection.

To aid the examiner as a guide reference source, two cards, one with the codes of the SPEED system and the criteria for the evaluation of dentures, and an additional SPEED card, were available. The interviewer acted as a scribe and was positioned close to the examiner, so that she could hear the codes and, at the same time, the examiner could check whether the codes were recorded correctly.

The dental examination procedure followed the structure of the SPEED system, the card being shown in Appendix IIIa. After socio-demographic information was collected, the SPEED periodontal examination was carried out, followed by the tooth description and treatment-need section. Afterwards, the CPITN measurement was taken, followed by the assessment of dentures where applicable (Data collection card shown in Appendix IIIb).

4.5.2 The SPEED system

The System for Planning and Epidemiological Evaluation of Dental services (SPEED) is a method for carrying out dental surveys of population groups of any age, to provide information for planning and evaluating dental services and care programmes, intended primarily for use in management at local level[178].

A standardised method was used to collect and record data on dental diseases and conditions, and need for dental care, together with relevant personal information. Data were recorded using numerical codes on specific collection charts (Appendix IIIa).

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[a] Light Source Type LS10, 240V,50Hz & 270mA. Type A1/220. Pilkington Electro-optic Materials Ltd, Vale of Leven Industrial Estate, Dumbarton G82 3PP, Scotland.
[b] 1500mm x 5mm standard flexible fibre optic light guide Type LG5. Pilkington Electro-optic Materials Ltd, Vale of Leven Industrial Estate, Dumbarton G82 3PP, Scotland.
[c] Mirodent Disposable Mouth Mirrors. Guest Medical + Dental Products AG ZUG Switzerland.
[d] WHO CPITN E probes black band. PRIMA.

Some of the personal information which preceded the clinical section (date of birth, age, sex, social class and area of residence) was recorded by the interviewers before the beginning of the dental examination. The remaining information was collected by the dental examiner.

The periodontal examination followed, which, as shown on the card (Appendix IIIa) was based on the partial recording method (12 index teeth) of Lennon & Davies[179]. The presence or absence of soft deposits, supragingival calculus, frank gingival inflammation (characterised by unequivocal colour change or a tendency to bleed easily), and subgingival calculus, were coded. Need for periodontal treatment was calculated by computer, and was deemed necessary where there were supragingival accretions on at least 11 sites; five or more sites with gingivitis; or two or more sites with subgingival calculus.

Examination of teeth for caries and trauma followed the periodontal examination. All teeth were systematically examined and caries was recorded based on visual criteria alone. A tooth was scored as carious when there was a visible breakdown of enamel resulting in cavitation, or an unquestionable shadow or opacity beneath the enamel. In case of doubt, the lesion was tested gently with the 0.5mm blunt CPITN probe. Unless the tip entered the lesion, the site was regarded as sound, the validity of this method having been confirmed[180,181]. The type of treatment needed for caries, recurrent caries, trauma, or any defective restoration was recorded at the time of examination for each tooth. Numerical codes were used which corresponded with standard items of treatment allowed without approval, under the NHS regulations. A general anaesthetic was recorded automatically by the computer programme when extractions were required in more than two segments of the mouth. A denture was prescribed where tooth loss caused spacing of more than half a unit in the maxillary anterior segment or three or more units elsewhere in the mouth, or to replace an existing unsatisfactory denture.

Costs of treatment required for the subjects to be rendered dentally fit were estimated on the Resource Related Index (RRI), which was based on the NHS fee scale pertaining at the time of the examinations (1991) (Appendix IV).

The RRI described by Hill[182] was designed to produce objective estimates of the comparative amount of finance needed to provide dental care for populations. The index utilises item-of-service fee scale which is the basis of the payment system of general dental practitioners contracted to the NHS. This fee scale is useful for epidemiological measurement because it is founded, not on the value the services might command in an open, demand-stimulated private market, but rather on the nationally agreed price of a unit of dentist's time. Thus, the fee for each item is derived from the average number of time units that dentists take to complete that particular operation, with an added component for any laboratory expenses. As practice expenses are taken fully into account in computing the price of each item, the fee scale is both realistic and comprehensive. The price per unit time is calculated to produce an average income for dentists, after deduction of practice expenses, decided in relation to other professional groups by an independent body respected by both the dental profession and UK government[183].

4.5.3 The CPITN assessment

After the SPEED data collection was completed, the periodontal assessment, using the Community Periodontal Index of Treatment Needs (CPITN), was carried out.

This index was developed by the World Health Organisation and the Federation Dentaire Internationale, primarily to assess periodontal treatment needs rather than periodontal status[184]. For epidemiological use, it has been suggested that only partial recording relating to 10 index teeth should be used, whereas full recording is suggested for the determination of the treatment needs of individuals. However, it was noted that in cases where partial recording is considered insufficient (ie. adult populations with a history of high caries prevalence and extensive restorative treatment), full recording of all teeth is preferable. Hence, as the Glasgow population has a known record of poor dental health[7-10], full recording procedure of all teeth was chosen for this study.

Treatment needs were recorded for the six sextants of the mouth with third molars being excluded unless they were functioning in the place of second molars. A sextant had to have at least two teeth in order to be recorded, and the worst condition observed within each sextant was noted. If a sextant had one tooth only, the score of this tooth was incorporated in the adjacent sextant. The standard scoring system was : 0 = healthy sextant; 1 = bleeding after gentle probing of the pockets (approx. 25g force); 2 = supragingival or subgingival calculus; 3 = 4-5 mm deep pathological pockets; 4 = 6mm or deeper pockets.

4.5.4 The assessment of dentures

After the CPITN assessment, the denture assessment was completed, where applicable. Dentures were assessed for peripheral extension, posterior extension, occlusal loading, stability and retention. Dentures were removed for examination of the denture-bearing area for evidence of resorption or denture stomatitis. Finally, respondents were asked whether they were "happy with their dentures" and "happy with the appearance of their dentures". Data were recorded on a specially prepared card (Appendix IIIb), and according to the objective assessment of denture status and respondents' satisfaction (or lack of satisfaction), a judgement regarding need for new dentures was recorded on the SPEED card.

The criteria used for denture assessment[185] were as follows :

1. *Posterior extension.* Posterior extension of the upper denture was considered satisfactory if the posterior border covered the maxillary tuberosity and extended to within 2mm of the vibrating line. This was assessed visually by asking the person to say "Aah" and watching the movement of the soft palate. Lower dentures were considered satisfactory if the posterior border extended on to the retromolar pad. This was noted visually.
2. *Peripheral extension.* Flanges of upper and lower dentures were examined, and if an under- or over-extension of more than 2mm was found extending over more than half the length of the flange, it was considered unsatisfactory.
3. *Stability.* The upper denture was gripped in the premolar region with the thumb and forefinger, and an attempt was made to move it horizontally. If any movement was noted in excess of 5mm the denture was considered to be unsatisfactory. For the lower denture, any movement considered unsatisfactory was noted.
4. *Occlusal loading.* Finger pressure was exerted on the occlusal surfaces in the premolar region, and any significant movement was considered unsatisfactory.
5. *Retention.* The upper denture was gripped at the premolar region with the subject's mouth half-open and facial muscles relaxed, and an attempt was made to remove the denture downwards. Additionally, the incisors were gripped labially, and palatally and the denture was pulled downwards. If in either of the cases the denture was dislodged, retention was considered unsatisfactory. For assessment of the lower denture, the subject was asked to open his/her mouth, and if the denture did not remain seated, it was considered unsatisfactory.
6. *Resorption.* If there was some loss of alveolar height, resorption was coded as "mild". A "moderate" score was considered when some vestige of the residual ridge remained (other than soft tissue), and "severe" was recorded when there was no ridge form (or a negative form).
7. *Denture stomatitis.* If the mucosa had any reddening or signs of inflammation, denture stomatitis was recorded as present.

4.6 PILOT STUDY

The questionnaire which was formulated from the qualitative research, and the dental examination procedure, were tested in the pilot study.

4.6.1 Pilot study material and method

Four interviewers (two teams of two) were sent to areas where the required cross-section of population was expected to be found. They were instructed to select respondents on a door-to-door basis, according to certain criteria of age, sex and social class (quota sampling).

Twenty-three individuals were interviewed. Of these, 12 belonged to social classes ABC1, and 11 to C2DE. There were seven respondents aged 16 to 30-years-old, eight aged 31 to 45-years-old, and another eight were 46 to 65-years-old, 13 being female and ten male. Of all participants in the pilot study, 14 (60.9%) agreed to undergo the dental examination.

4.6.2 Pilot study results

The responses obtained during the pilot study interviews were used to modify the questionnaire. The original questionnaire which had 63 questions required an interview time of 50-55 minutes, which was longer than the public were willing to accept. Therefore, six questions relating to issues which were raised during the group discussions, but which did not relate directly to the study objectives, were omitted. A further six questions were omitted, five new were included and eight were modified into four, leaving 52 questions (apart from the socio-demographic information) in the final questionnaire which was used in the main study.

These modifications were undertaken in the light of interviewees' responses, the question's significance and accuracy, the question's relevance to the aims of the study, the comments made in open questions, and respondents' ability to understand the questions.

The figure of 60.9% for the dental inspection acceptance rate, together with the differences in the acceptance rates achieved by the four interviewers involved, gave rise to the need for a more structured approach to the manner in which the dental check-up was introduced to respondents. It was decided, therefore, that the dental examination should not be mentioned until the end of the interview. It would then be presented as an opportunity for a "free" dental check-up, after which the research aspects of the study would be stressed.

In addition, the pilot study provided the opportunity to test, in actual field conditions, the dental check-up procedure. The time which the clinical examination required was monitored so that, in the main study, dental inspection appointments could be arranged in the most efficient way possible. Also, the opportunity was given to interviewers to train as scribes, hence the quality of dental information recorded by them could be ascertained to be of a high standard.

Another important aspect of the pilot study was the development of co-operation and co-ordination between the teams of interviewers, the dentist, and the research secretary. Such a team approach was vital in a project where the logistics of co-ordination of effort are complicated.

4.7 "QUALITY CONTROL"

4.7.1 Interviews' "backchecking"

Throughout the main study, an experienced interviewer, who was unconnected with the survey, was given a sample of contact names within each area of study. She was instructed to check reasons for non-interview, as well as to fill out a backcheck questionnaire with those respondents who had been interviewed. This questionnaire consisted of a range of questions taken from the original questionnaire (Appendix V). Furthermore, interviewers were not given respondents' dates of birth. Afterwards, completed questionnaires were matched to the information contained in the Community Health Index. Such a procedure could ensure that no "hypothetical" interview was carried out, and that the correct person was interviewed.

Overall, the person conducting the "quality control" traced 63 people who had failed to be interviewed, and 76 who had successfully been interviewed, the latter representing 8.8% of the total number of interviews carried out (863). No irregularities were found with the interviewers' questioning or contact procedure.

4.7.2 Intra-examiner variability

During the fieldwork it was evident that respondents had difficulty in accepting the dental inspection, thus lower dental inspection acceptance rates than expected were achieved. A second dental inspection was not even suggested under the pertaining conditions. Consequently, duplicate dental inspections were not carried out, and intra-examiner variability was not checked. However, throughout data collection, a card with the clinical criteria was available for quick reference by the examiner, and conscious effort was made to adhere to these criteria.

4.8 PHASE 4 - OBJECTIVE INFORMATION ON AVAILABILITY AND ACCESSIBILITY OF DENTAL SERVICES

After the interviews and dental inspections were completed, the collection of the objective information on the availability and accessibility of the existing dental services was carried out.

All dental surgeries in the areas under study were visited, for the collection of the relevant information, which was recorded on a specially prepared form (Appendix VI). Data collected concerned the number of dentists working in the surgery, and the hours each dentist worked, as well as the opening hours of the surgery. The number of appointments arranged for each dentist per two half-day sessions was recorded, as were the average (estimated by interviewees) number of broken appointments per day, and the number of emergencies per day. The number of days a patient would have to wait in order to be seen for a non-emergency appointment; whether the surgery operated a recall system for regular check-ups, and the estimated response rate to the recall letters, were also recorded. Finally, the waiting rooms of the surgeries were examined for availability of leaflets and information concerning dental issues and services, and one leaflet of all different types available was taken as a sample. Additionally, all post offices and libraries of the areas under study were visited, and data about the availability of information on dental issues and services were collected. Also, the availability of public transport to dental surgeries was noted.

4.9 THE STATISTICAL ANALYSES EMPLOYED

The analysis was carried out in relation to two characteristics of the population under study. These were the area of residence, and the dental attendance pattern.

Initial analysis failed to reveal any differences between residents of deprived areas, and residents of deprived areas where the "out-reach" programme of preventive dentistry had been running. Thus, these two groups formed one group and are referred to in the analyses, as the "deprived" group, who are compared to the "affluent" group, ie. the residents of affluent areas.

In relation to dental attendance pattern, respondents are grouped as "regular" and "irregular" attenders. Regular attenders are those who reported that they had visited the dentist within the last two years, and the reason for that visit was either "to get teeth cleaned/scaled", or "received reminder card for check-up" or, "it was time for check-up". The remaining respondents who did not satisfy these criteria formed the irregular attenders group. It is more common in the literature to classify as regular attenders those who visit the dentist within the previous year. However, for the population under study, it was revealed during the qualitative research phase, that the criterion of one year should be relaxed to two years, and the question in the questionnaire was formed accordingly. Indeed, regular dental attendance based on two years' time, yielded satisfactory numbers of respondents in each age group, which facilitated the statistical analysis. At the same time it was possible to detect significant differences.

The statistical tests performed were the comparison of two proportions, the chi-square test of association, the t-test, the Mann-Whitney U test, the paired t-test, the Wilcoxon signed rank test, the Kruskal-Wallis analysis of variance, the Friedman analysis of variance for paired data, the Cronbach's a-reliability coefficient, the Pearson correlation coefficient, the Spearman rank correlation coefficient, and multiple regression analysis.

Statistical significance is reported in relation to the three traditional levels of 0.05, 0.01 and 0.001. In all cases, the null hypothesis is tested, which is that there is no difference between, for example, the two means, which are compared. The p-value is interpreted as follows : The p-value is the probability of getting a test statistic at least as extreme as the calculated test statistic (and thus reject the null hypothesis), if the null hypothesis is true.

4.9.1 Comparison of two proportions

For the comparison of two proportions estimated from large independent samples, the test statistic for the difference of two proportions described in Bland[186] was used, testing the null hypothesis that the two proportions were the same. A significant result suggests the rejection of the null hypothesis, thus indicating a significant difference in the two proportions.

4.9.2 Chi - square test of association

The chi-square test was used to check the association of two variables (categorical), testing the null hypothesis, that there is no association. A significant result suggests the rejection of the null hypothesis, thus indicating a significant association.

4.9.3 t-test

The t-test was used for the comparison of the means of two independent samples, coming from normal distributions and with constant variance. Although some deviation from normality was evident in some cases, the large sample available allowed the use of this test. Furthermore, when the variance of the two samples differed significantly, the separate variance t-test was used.

4.9.4 Mann - Whitney U test

This test was used for categorical data, or when there was deviation from normality, given that normality of distribution is not required in order to apply this test. For categorical data, additionally, t-tests were carried out, which in all cases gave the same results (same significance level). According to the Mann-Whitney U test, all cases are ranked, and the mean ranks are compared, instead of the means of the t-test. The null hypothesis here is that the two mean ranks are the same.

4.9.5 Paired t-test

The paired t-test was used for paired (not independent observations) continuous (parametric) data. In this test, the difference of the two measurements on the same subject is tested, and it is required to be normally, or approximately normally distributed. The null hypothesis is that the difference is zero.

4.9.6 Wilcoxon signed rank test

This test is used for categorical (non-parametric) paired data (not independent observations), or when the distribution of the difference was non-normal, but symmetric, or approximately symmetric. The null hypothesis tested is that the difference is zero. For categorical data, paired t-tests were also carried out, which gave the same results (same significance level).

4.9.7 Kruskal - Wallis analysis of variance test

This test is for categorical (non-parametric), or extremely non-normal data of three or more independent samples[187]. In this study, it was used to test a categorical variable in relation to age (five age groups - five independent samples). The null hypothesis tested was that, in relation to the variable tested, there was no difference among the age groups. A statistically significant result indicated the rejection of the null hypothesis, which suggested that there is a difference amongst the age groups. However, if it was desirable to find exactly which age group differed from which, multiple Mann -

Whitney U tests were carried out. For the determination of the levels of significance of these tests, the Bonferroni correction was used.

4.9.8 Friedman analysis of variance test

This test is used for three or more samples of repeated measurements (dependent samples) of categorical, or extremely non-normal data[188]. In the present study it was used for the analysis of categorical data (value of teeth), the different values attached to the different tooth health states (so four tooth health states tested gives four measurements coming from the same population, ie. dependent samples). The null hypothesis tested was that there is no difference in the value attached to the different tooth health states. A significant result suggested the rejection of the null hypothesis and, in order to rank the different tooth health states according to the value attached, multiple comparisons were carried out, using the Wilcoxon signed rank test (categorical and not independent data). For the determination of the level of significance of these tests, the Bonferroni correction was used.

4.9.9 The Bonferroni correction

The Bonferroni correction is a method used to overcome the problems associated with the multiplicity problem which occurs when large numbers of hypotheses tests are carried out. When many hypotheses tests are done, it is required that there is some degree of certainty that significant results have not occurred by chance. Suppose 100 paired t-tests are carried out with the significance level set at 0.05, and the null hypothesis for each test is true. If only one paired t-test is done at this significance level, the probability that we will wrongly reject the null hypothesis (if it is true) is 0.05. When 100 paired t-tests are done at the 0.05 significance level, it would be expected, that about five tests would yield p-values less than 0.05 even if all the null hypotheses are true. Thus, it is virtually certain that about five tests will lead to the incorrect decision to reject a true null hypothesis. This is called the multiplicity problem[189]. The Bonferroni adjustment uses smaller significance levels for each test when a large number of tests are done. If k tests are to be done, at an overall significance level a , the p-value of each test is compared with the adjusted level of significance, that is a / k. Thus, if 28 tests are to be carried out, and an overall significance level of 0.05 is desired, the p-value of each test has to be less than 0.05/28= 0.0018, in order to report it as statistically significant.

4.9.10 Cronbach's a-reliability coefficient

When a scale is formed, an index is needed of how reliable the scale is. In the dental anxiety scale, for example, the seven questions/items can be viewed as a sample from a universe of many possible items. Cronbach's α tells us how much correlation to expect between the scale in question and all other possible 7-item scales, coming from a universe of questions/items, which would measure the same thing. Since a can be interpreted as a correlation coefficient, its value ranges from 0 to 1. The higher its value the more reliable the scale is[190].

4.9.11 Pearson's and Spearman's correlation coefficients

Correlation coefficients indicate the strength of the linear association between two variables. When there is normality of distribution and continuous variables, Pearson's correlation coefficient is used. For non-parametric data or extreme non-normal distributions, Spearman's correlation coefficient is used.

4.9.12 Multiple regression analysis

Multiple regression analysis was used in order to build linear prediction models for certain dental health indices. Regression is a method of estimating the numerical relationship between variables, and in regression problems the interest is in how changes in one variable (the predictor or independent variable) are related to changes in another (outcome or dependent) variable. In multiple regression there are several variables which are related to the outcome variable and the effect of all of them together is examined (i.e. the effect of each independent variable after adjusting for the effect of the other independent variables of the multiple regression model).

CHAPTER 5 : SAMPLING RESULTS AND SOCIODEMOGRAPHIC ANALYSIS

5. SAMPLING RESULTS AND SOCIODEMOGRAPHIC ANALYSIS

5.1 INTRODUCTION

Any epidemiologic survey employing data collection on several stages, is liable to non-response. Additionally, the present study faced problems in sample acquisition, which, as described in the methods section, could be attributed to the quality of the sampling frame. However, the success of such studies depends on the size and representativeness of the sample. The aim of the following analysis is to describe the sample population, and the response rates achieved.

5.2 OBJECTIVES

The objectives of the following analyses were :
1. to report the results of the sampling methodology,
2. to describe the socio-demographic profile of the respondents in relation to their area of residence, and
3. to compare the population under study with the population of the areas from where the sample was drawn.

5.3 RESULTS

5.3.1 Sampling results

The original sampling frame consisted of 7,369 names. For the affluent areas the sampling frame was 2,832 names, and for the deprived 4,537. Overall, 3,025 (41.1%) names were sampled, 1,124 from affluent areas and 1,901 from deprived. This gives a total sampling ratio of approximately 3:7. This was an increased figure when compared to the originally planned 1:7 sampling methodology, and resulted from the problems and changes of the sampling methodology.

In Table 5.1, the total number of names (entries of the CHI lists) sampled and checked by interviewers, the number of wrong entries (people not residing at the address shown on the CHI lists) and the valid entries (people residing at the address shown on the CHI lists), are shown. It is evident that the proportion of wrong entries varies across the different areas. In affluent Newton Mearns, for example, the proportion of wrong entries was 26.8%. In contrast, in notoriously deprived Easterhouse and Castlemilk, the proportion of wrong entries amounted to 63.1% and 68.5% respectively.

Table 5.1 : Number of wrong, valid, and total number of entries of the CHI lists sampled and checked

	Wrong entries		Valid entries		Total number of entries checked	
	n	%	n	%	n	%
POLLOKSHIELDS+	180	37.0	306	63.0	486	100
NEWTON MEARNS+	171	26.8	467	73.2	638	100
DRUMCHAPEL	80	43.2	105	56.8	185	100
CASTLEMILK	228	68.5	105	31.5	333	100
POLLOK	173	48.3	185	51.7	358	100
CAMBUSLANG	252	64.8	137	35.2	389	100
EASTERHOUSE	236	63.1	138	36.9	374	100
PARKHEAD	78	52.3	71	47.7	149	100
BRIDGETON	11	42.3	15	57.7	26	100
SPRINGBURN	20	41.7	28	58.3	48	100
RUTHERGLEN	32	82.1	7	17.9	39	100
Affluent areas	351	31.2	773	68.8	1,124	100
Deprived areas	1,110	58.4	791	41.6	1,901	100
All areas	1,461	48.3	1,564	51.7	3,025	100

+ : Affluent area

Overall, of the 3,025 entries sampled, 48.3% were found to be incorrect, ie. the named person did not reside at the address shown. This figure varied from 31.2% in the affluent areas, to 58.4% in the deprived, the difference being statistically significant ($p<0.001$).

Of the 1,564 people who were found to reside at the address shown on the CHI lists, 863 (55.2%) were interviewed, the remainder being unavailable. This means that they either could not be contacted after four attempts, or they were on holiday, or had language problems, or simply refused to take part in the survey. This figure varied between the affluent and deprived areas. Among the 773 people who were found at the addresses given in the affluent areas, 372 (48.1%) took part in the survey and, of the 791 deprived residents who were traced, 491 (62.1%) were eventually interviewed. Statistical analysis showed that the proportion of people interviewed among all those traced, was significantly higher ($p<0.001$) among the deprived than among the affluent.

Of the 863 interviews which were carried out, 11 (6 from affluent and 5 from deprived areas) questionnaires could not be used due to missing data, inconsistencies, wrong person interviewed, or the respondent stopped the interview before completion. Thus, the total number of questionnaires used in the analysis was 852, representing 366 respondents from affluent areas and 486 respondents from deprived areas.

In Table 5.2, the dental examination acceptance rates by age, sex, area of residence, social class, dental attendance pattern and dentate/edentulous state are shown. For the 852 people who were interviewed, and whose questionnaires were used in the analysis, 512 (60.1%) agreed to undergo a dental examination. Of the 366 affluent respondents, 213 (58.2%) accepted to be dentally examined, and among the 486 deprived respondents, 299 (61.5%) accepted the dental examination, the difference not being significant ($p>0.05$).

The rate of acceptance of the dental examination was highest (66.7%) among the 25 to 34-year-olds, and lowest (54%) among the 45 to 54-year-olds. Chi-square testing failed to reveal any association between age and dental examination acceptance rate.

Of the 328 male respondents, 195 (59.5%) accepted the dental examination, and of the 524 female respondents, 317 (60.5%) agreed to be examined, the difference not being significant. Similarly, there was no statistically significant difference in the rate of acceptance of the dental check-up among the ABC1's and the C2DE's (57.9% and

Table 5.2 : Distribution of the entire study sample and of those clinically examined by age, sex, area of residence, social class, dental attendance, and dentate status

	Interviewed n	Clinically examined n	Acceptance rate %
AGE GROUP			
16 - 24	151	92	60.9
25 - 34	204	136	66.7
35 - 44	174	104	59.8
45 - 54	176	95	54.0
55 - 65	147	85	57.8
SEX			
Males	328	195	59.5
Females	524	317	60.5
AREA OF RESIDENCE			
Affluent	366	213	58.2
Deprived	486	299	61.5
SOCIAL CLASS			
ABC1	375	217	57.9
C2DE	477	295	61.8
DENTAL ATTENDANCE			
Regular	318	187	58.8
Irregular	531	323	60.8
DENTAL STATUS			
Dentate	728	436	59.9
Edentulous	124	76	61.3

61.8% respectively). Of the 318 respondents who were classified as regular attenders, 187 (58.8%) accepted the dental examination, and of the 531 who were classified as irregular dental attenders, 323 (60.8%) were examined clinically. Again, no statistically significant difference could be detected.

Of the 728 respondents who reported they were dentate, 436 (59.9%) were dentally examined, and for the 124 who stated they were edentulous, 76 (61.3%) accepted the dental examination, this difference being non-significant.

From the above findings it appears that the increased number of flaws in the CHI lists of deprived areas resulted in a lower proportion of deprived subjects being found. However, once people were traced, a higher proportion of deprived residents took part in the survey. Once involved, affluent and deprived respondents accepted the dental examination at a similar rate, irrespective of age, sex, social class, area of residence, dentate/edentulous state and regular dental attendance pattern.

5.3.2 Socio-demographic analysis results

Of all questionnaire respondents, 328 (38.5%) were males, and 524 (61.5%) were females. Chi-square tests of association between sex and area of residence, social class, and age, did not give any significant results, indicating that there was no area of residence, social class or age bias in the distribution of the sexes.

As shown in Table 5.3, 151 (17.7%) subjects were 16 to 24 years old, 204 (23.9%) were 25 to 34 years old, 174 (20.4%) were 35 to 44 years old, 176 (20.7%) were 45 to 54 years old, and 147 (17.3%) were 55 to 65 years old. Chi-square test of association between area of residence and age, gave a significant result ($p<0.01$). This finding suggested that the distribution of affluent respondents in the different age groups, was not similar to that of the deprived. Amongst the latter, there was a higher proportion (29.6%) of 25 to 34-year-olds than was recorded for the affluent (16.4%), whilst in this group, there was a higher proportion of 55 to 65-year-olds (21.3%), than amongst the deprived (14.2%).

Similar analysis involving only those respondents who accepted the dental examination is shown Table 5.4, the age distribution of affluent and deprived differing significantly ($p<0.05$). A higher proportion of 25 to 34-year-olds was found among the deprived.

Social class analysis showed that 375 (43.9%) participants belonged to social classes A, B and C1, and 477 (55.9%) to social classes C2, D and E. The distribution of the social

Table 5.3 : Age distribution of all respondents by area of residence

Age group	AFFLUENT		DEPRIVED		All areas	
	n	%	n	%	n	%
16 - 24	67	18.3	84	17.3	151	17.1
25 - 34	60	16.4	144	29.6	204	23.9
35 - 44	76	20.8	98	20.2	174	20.4
45 - 54	85	23.2	91	18.7	176	20.7
55 - 65	78	21.3	69	14.2	147	17.3
All ages	366	100.0	486	100.0	852	100.0

$x^2 = 23.6$
D.F.: 4
$p<0.01$

Table 5.4 : Age distribution of clinically examined respondents by area of residence

Age group	AFFLUENT		DEPRIVED		All areas	
	n	%	n	%	n	%
16 - 24	44	20.7	48	16.1	92	18.0
25 - 34	39	18.3	97	32.4	136	26.6
35 - 44	47	22.1	57	19.1	104	20.3
45 - 54	44	20.7	51	17.1	95	18.6
55 - 65	39	18.3	46	15.4	85	16.6
All ages	213	100.0	299	100.0	512	100.0

$x^2 = 12.9$
D.F.: 4
$p<0.05$

classes in the defined areas under study (affluent and deprived) is shown in Table 5.5. Statistical analysis showed a highly significant association ($p<0.001$) between social class and area of residence, 332 (88.5%) of the ABC1's residing in affluent areas, and 443 (92.9%) of C2DE's residing in deprived areas. Thus, the affluent / deprived distinction contains the social class attribute.

5.3.3 Comparison of age and sex profile of sample to the population of the areas under study

Based on the 1981 Census of the population of the areas under study, estimates for age and sex of residents in June 1990, at a post-code district level, were obtained from the Health Board. In Table 5.6 the age and sex profile of respondents and of the population of the areas under study are detailed.

Statistical analyses showed an under-representation of the 16 to 24-year-olds in the present study sample when all respondents were compared to the population of all the areas under study. While the composition of the entire population of the areas under study was such that the 16 to 24-year-olds comprised 21.1%, in the study sample the 16 to 24-year-olds comprised 17.7% ($p<0.05$). In contrast, the 45 to 54-year-olds were over-represented in the sample, as this group of the population of the areas under study accounted for 15.8%, while in the study sample their proportion amounted to 20.7% ($p<0.001$). Also, the study sample had a higher proportion of females (61.5%) than the proportion of females living in the areas under study (50.7%). These data were significant at the 0.001 level.

When affluent respondents were compared to the population of the affluent areas, it was found that while the 25 to 34-year-olds represented 26.5% of the population, in the study sample 16.4% were aged 25 to 34-years-old, the difference again being significant ($p<0.001$). In contrast, there was an over-representation in the study sample of the 45 to 54-year-olds and the 55 to 65-year-olds when compared to the entire population of the affluent areas. The 45 to 54-year-olds accounted for 16.5% of the population of the affluent areas, and 23.3% of the affluent respondents ($p<0.001$). The 55 to 65-year-olds represented 15.7% of the population of the affluent areas, but 21.3% of the affluent respondents ($p<0.01$).

While females formed 51.2% of the affluent areas' population, they formed 62.5% of the affluent respondents ($p<0.001$).

Table 5.5 : Social class distribution of all respondents by area of residence

Social class	AFFLUENT		DEPRIVED		All areas	
	n	%	n	%	n	%
A	75	20.5			75	8.8
B	175	47.8	5	1.0	180	21.1
C1	82	22.4	38	7.8	120	14.1
C2	30	8.2	92	18.9	122	14.3
D	1	0.3	127	26.1	128	15.0
E	3	0.8	224	46.1	227	26.6
Total	366	100.0	486	100.0	852	100.0

$x^2 = 617.7$
D.F.: 5
$p<0.001$

Table 5.6 : Age and sex breakdown of the population under study (affluent and deprived respondents) and of the populations of the areas under study (estimated from census)

	All respondents			Population of all areas		Affluent respondents			Population of affluent areas		Deprived respondents			Population of deprived areas	
AGE	n	%		n	%	n	%		n	%	n	%		n	%
16 - 24	151	17.7	*	42,726	21.1	67	18.3	NS	7,144	19.3	84	17.3	*	35,582	21.5
25 - 34	204	23.9	NS	53,752	26.5	60	16.4	***	9,795	26.5	144	29.6	NS	43,957	26.5
35 - 44	174	20.4	NS	39,739	19.6	76	20.8	NS	8,132	22.0	98	20.2	NS	31,607	19.1
45 - 54	176	20.7	***	32,041	15.8	85	23.2	***	6,088	16.5	91	18.7	NS	25,953	15.6
55 - 65	147	17.3	NS	34,555	17.0	78	21.3	**	5,790	15.7	69	14.2	NS	28,765	17.3
SEX															
Males	328	38.5	***	99,939	49.3	137	37.4	***	18,024	48.8	191	39.3	***	81,915	49.4
Females	524	61.5	***	102,874	50.7	229	62.6	***	18,925	51.2	295	60.7	***	83,949	50.6
Base	852	100.0		202,813	100.0	366	100.0		36,949	100.0	486	100.0		165,864	100.0

*   : p<0.05
** : p<0.01
*** : p<0.001
NS : not significant

When deprived respondents were compared to the population of the deprived areas, it was found that the 16 to 24-year-old age group was under-represented in the study sample. Of the population of the deprived areas, 21.5% were 16 to 24-years-old, while among deprived respondents, only 17.3% were aged 16 to 24-years ($p<0.05$). Similarly, females were over-represented in the study sample (60.7%), as compared to their proportion (50.6%) of the deprived areas' population ($p<0.001$).

In conclusion, the affluent respondents' sample was found to be biased towards older adults, in contrast to the deprived respondents' sample.

CHAPTER 6 : DENTAL HEALTH STATUS RESULTS

6.1 Edentulousness

6.2 The condition of the natural teeth
- 6.2.1 Retention of natural teeth
- 6.2.2 Sound and untreated teeth
- 6.2.3 Decayed teeth
- 6.2.4 Missing teeth
- 6.2.5 Filled teeth
- 6.2.6 DMFT score

6.3 The condition of the supporting tissues
- 6.3.1 CPITN Index assessment
- 6.3.2 SPEED periodontal assessment

6.4 Dentures
- 6.4.1 Full dentures
- 6.4.2 Partial dentures

6.5 Treatment Cost

6. DENTAL HEALTH STATUS RESULTS

6.1 EDENTULOUSNESS

During the interview, all participants were asked whether they had any of their natural teeth. From the responses, reported edentulousness rates were calculated and are shown on the left of Table 6.1. Of all subjects, 512 agreed to undergo the dental examination, and their clinically-assessed edentulousness rates were calculated as detailed on the right of the same Table.

Of all respondents, 14.3% (122) claimed they were edentulous, the majority (82%, 100) belonging to the 45- to 65-year-old age band. The reported edentulousness rate among the population under study was 13.1% (43/328) for males and 15.1% (79/524) for females.

A highly significant association ($p<0.001$) between reported edentulousness and area of residence was detected ($x^2=52.1$, D.F.=1), the trend being that the edentulous were more likely to be residents of deprived areas. Of all those who reported that they were edentulous, 87.7% (107) were residents of deprived areas.

Of the 512 respondents who were examined clinically, 14.5% (74) were found to be edentulous. The majority (81.1%, 60) again belonged to the 45- to 65-year-old age groups. The proportion edentulous among those who were assessed clinically was 13.3% (26/195) for males and 15.1% (48/317) for females.

Data in Figure 6.1 show the edentulousness rates found among "affluent" and "deprived" respondents who were examined clinically, by age. The rates increase with rising age. Similarly, the difference between the rates recorded for the "affluent" and the "deprived" increased among the older age groups, and the difference between the groups became statistically significant (Table 6.2) after the age of 35 years. No such difference was detected among younger adults (16- to 34-years-old). The highest rate of edentulousness recorded (67.4%) was among the 55- to 65-year-olds who were residents of deprived areas.

Table 6.1 : Reported and clinically-assessed edentulousness rates by age.

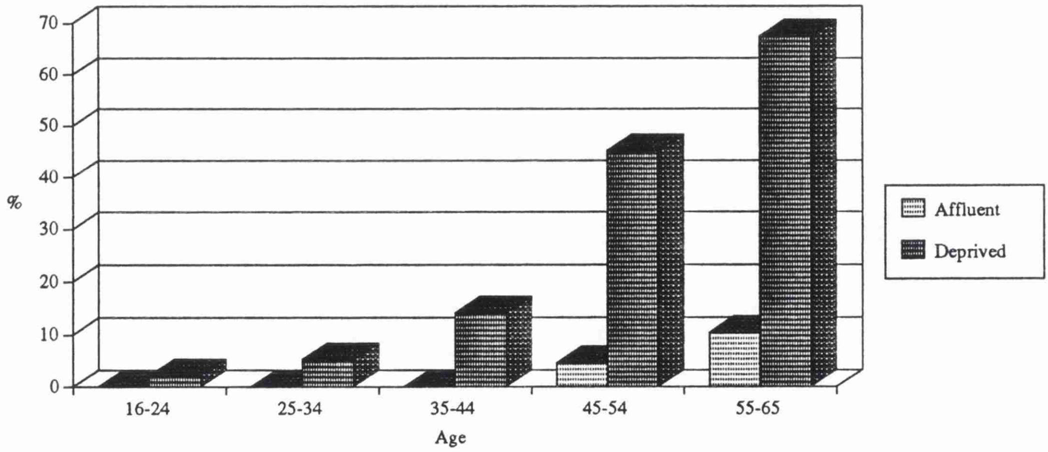
AGE	REPORTED EDENTULOUSNESS			CLINICALLY ASSESSED EDENTULOUSNESS		
(yrs)	n	Rate	Base	n	Rate	Base
16-24	1	0.7%	151	1	1.1%	92
25-34	8	3.9%	204	5	3.7%	136
35-44	13	7.5%	174	8	7.7%	104
45-54	49	27.8%	176	25	26.3%	95
55-65	51	34.7%	147	35	41.2%	85
Total	122	14.3%	852	74	14.5%	512

Table 6.2 : Clinically-assessed edentulousness rates by area of residence.

AGE	AFFLUENT			DEPRIVED			
(yrs)	n	Rate	Base	n	Rate	Base	
16-24	0	0.0%	44	1	2.1%	48	
25-34	0	0.0%	39	5	5.2%	97	
35-44	0	0.0%	47	8	14.0%	57	**
45-54	2	4.5%	44	23	45.1%	51	***
55-65	4	10.3%	39	31	67.4%	46	***
Total	6	2.8%	213	68	22.7%	299	***

** : p<0.01
*** : p<0.001

Figure 6.1 : Clinically-assessed edentulousness rates by area of residence.



6.2 THE CONDITION OF THE NATURAL TEETH

The following analyses on the condition of natural teeth was performed using the information collected from the clinical examination of the 512 respondents who agreed to be examined by the dentist. Edentulous persons are excluded from this analysis.

6.2.1 Retention of natural teeth

The numbers and proportions of individuals with 21 or more standing teeth was examined in this analysis. The overall proportion of the study population who were thus categorised by clinical examination was 75.8% (438) (Table 6.3). This figure varied from 87.4% (181) among the "affluent" dentate respondents, to 65.4% (151) among their "deprived" counterparts ($p<0.001$). Further statistical analysis revealed that, for all age groups, significantly more residents ($p<0.05$) of affluent areas had retained 21 or more teeth, the difference becoming highly significant ($p<0.001$) for those aged 35 or older (Fig. 6.2).

A similar analysis, which compared regular to irregular dental attenders (Table 6.4), showed that of the regular attenders, 88.7% (165) had retained 21 or more teeth. For irregular attenders, 66.4% (166) had 21 or more standing teeth, and the differences between these "regular" and "irregular" data were highly significant ($p<0.001$). Furthermore, for each individual age group, higher proportions of regular attenders had retained 21 or more teeth, when compared to irregular attenders, with only the differences for the 25- to 34-year-olds being non-significant ($p>0.05$).

The significant differences between "affluent" and "deprived" populations persisted even when the analysis was carried out separately for regular and irregular attenders (Table 6.5). Among "affluent" regular attenders, 91.8% (123) had retained 21 or more standing teeth, as compared to 80.8% (42) among their "deprived", but regularly attending, counterparts ($p<0.05$). Among irregular attenders, lower percentages were recorded; 80.3% (57) of "affluent" and 60.9% (109) of "deprived" were found to have 21 or more standing teeth ($p<0.01$).

6.2.2 Sound and untreated teeth

Large numbers of teeth which are sound and have never needed treatment, can be considered as an indicator of low disease levels. In the following analysis, the mean numbers of sound and untreated teeth found, the distribution of these teeth, and the

Table 6.3 : Proportions of dentate respondents with 21 or more standing teeth by area of residence

AGE	AFFLUENT			DEPRIVED			ALL DENTATE			
(yrs)	n	%	Base	n	%	Base	n	%	Base	
16-24	44	100.0%	44	43	91.5%	47	87	95.6%	91	*
25-34	37	94.9%	39	67	72.8%	92	104	79.4%	131	**
35-44	44	93.6%	47	32	65.3%	49	76	79.2%	96	***
45-54	30	71.4%	42	7	25.0%	28	37	52.9%	70	***
55-65	26	74.3%	35	2	13.3%	15	28	56.0%	50	***
All ages	181	87.4%	207	151	65.4%	231	332	75.8%	438	***

* : $p<0.05$
** : $p<0.01$
*** : $p<0.001$

Figure 6.2 : Proportions of dentate respondents with 21 or more standing teeth by area of residence

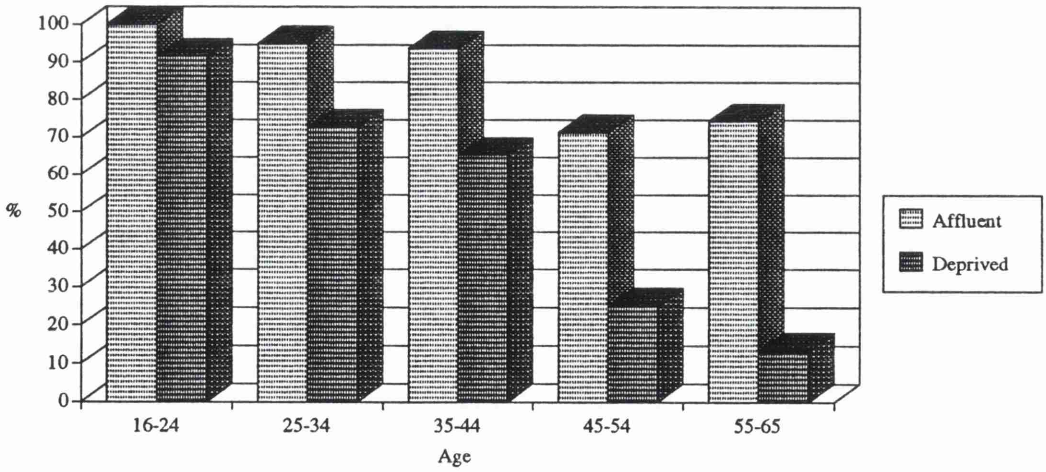


Table 6.4 : Proportions of dentate respondents with 21 or more standing teeth by dental attendance pattern

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS			ALL DENTATE		
(yrs)	n	%	Base	n	%	Base	n	%	Base
16-24	39	100.0%	39	48	92.3%	52	87	95.6%	91 *
25-34	43	84.3%	51	60	75.9%	79	103	79.2%	130
35-44	40	93.0%	43	36	67.9%	53	76	79.2%	96 **
45-54	24	75.0%	32	13	34.2%	38	37	52.9%	70 ***
55-65	19	90.5%	21	9	32.1%	28	28	57.1%	49 ***
All ages	165	88.7%	186	166	66.4%	250	331	75.9%	436 ***

* : p<0.05
** : p<0.01
*** : p<0.001

Table 6.5 : Proportions of dentate respondents with 21 or more standing teeth by dental attendance pattern and area of residence

AGE	AFFLUENT			DEPRIVED			ALL DENTATE		
(yrs)	n	%	Base	n	%	Base	n	%	Base
Regular attenders	123	91.8%	134	42	80.8%	52	165	88.7%	186 *
Irregular attenders	57	80.3%	71	109	60.9%	179	166	66.4%	250 **
Total	180	87.8%	205	151	65.4%	231	331	75.9%	436 ***

* : p<0.05
** : p<0.01
*** : p<0.001

proportions of respondents with 18 or more such teeth are considered in relation to area of residence and dental attendance pattern.

Data in Table 6.6 show the mean number of sound and untreated teeth for "affluent" and "deprived" respondents by age. Statistical analysis failed to detect significant differences in the mean number of sound and untreated teeth between the "affluent" (mean=13.1, n=207) and "deprived" dentate persons (mean=13.2, n=231). Amongst the age groups, the mean number of sound and untreated teeth ranged from 20.1 to 9.7 for the "affluent", and 17.2 to 8.0 for the "deprived". No statistically significant differences were detected apart from in the 16- to 24-years-old age group, where it was found that those in deprived areas had significantly ($p<0.05$) fewer sound and untreated teeth.

Analysis which compared regular to irregular dentate dental attenders, showed no evidence of a statistically significant difference of the mean number of sound and untreated teeth for any of the age groups (Table 6.7). Furthermore, no significant differences in the frequencies distribution of the numbers of sound and untreated teeth between "affluent" and "deprived" (Table 6.8), and regular and irregular dental attenders (Table 6.9), were detected.

Analysis comparing the proportions of dentate subjects with 18 or more sound and untreated teeth for every age group, between "affluent" and "deprived" populations, failed to detect any statistically significant difference (Table 6.10, Fig. 6.4). The figure for the entire study sample for this variable was 24.7% (108). The proportions of people with 18 or more sound and untreated teeth decreased with increasing age, being 61.5% (56) for the 16- to 24-year-olds and 8.0% (4) for those aged 55 to 65 years.

Similar analysis comparing regular to irregular dental attenders (Table 6.11), showed that for those aged 25 to 54 years, there was a higher proportion of irregular attenders with 18 or more sound and untreated teeth. However, this trend was only shown to be statistically significant ($p<0.05$), for the 35- to 44-year-olds.

6.2.3 Decayed teeth

The prevalence of decayed teeth was assessed by examining the mean numbers of decayed teeth, the distribution of the numbers of decayed teeth and the proportions of the dentate population under study with no decayed teeth. Analyses were carried out in relation to area of residence and dental attendance pattern.

Table 6.6 : Mean number of sound and untreated permanent teeth by area of residence

AGE (yrs)	AFFLUENT x	SD	n	DEPRIVED x	SD	n
16-24	20.1	5.7	44	17.2	6.5	47 *
25-34	14.5	4.7	39	13.1	5.6	92
35-44	11.5	5.9	47	13.4	5.5	49
45-54	9.2	4.5	42	8.0	5.2	28
55-65	9.7	4.6	35	10.2	4.6	15
All dentate	13.1	6.5	207	13.2	6.2	231

* : $p<0.05$

Figure 6.3 : Mean number of sound and untreated permanent teeth by area of residence

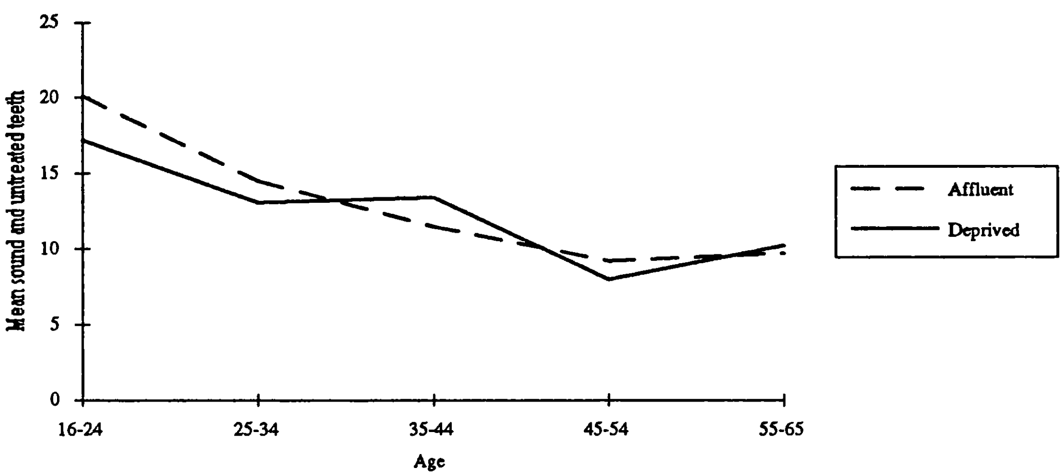


Table 6.7 : Mean number of sound and untreated permanent teeth by dental attendance pattern

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	19.7	6.1	39	17.8	6.4	52
25-34	13.5	4.8	51	13.5	5.8	79
35-44	11.6	4.8	43	13.2	6.4	53
45-54	9.4	4.5	32	8.2	5.0	38
55-65	11.2	4.8	21	8.9	4.2	28
All dentate	13.4	6.1	186	13.0	6.6	250

Table 6.8 : Frequency distribution of the numbers of sound and untreated permanent teeth among dentate by area of residence

Number of sound and untreated teeth	AFFLUENT		DEPRIVED		ALL DENTATE	
	n	%	n	%	n	%
0	1	0.5%	4	1.7%	5	1.1%
1-5	17	8.2%	19	8.2%	36	8.2%
6-11	78	37.7%	73	31.6%	151	34.5%
12-17	63	30.4%	75	32.5%	138	31.5%
18+	48	23.2%	60	26.0%	108	24.7%
Total	207	100.0%	231	100.0%	438	100.0%

$x^2 = 3.1$
DF = 4
$p>0.05$

Table 6.9 : Frequency distribution of the numbers of sound and untreated permanent teeth among dentate by dental attendance pattern

Number of sound and untreated teeth	REGULAR ATTENDERS		IRREGULAR ATTENDERS		ALL DENTATE	
	n	%	n	%	n	%
0	1	0.5%	4	1.6%	5	1.1%
1-5	13	7.0%	23	9.2%	36	8.3%
6-11	63	33.9%	87	34.8%	150	34.4%
12-17	70	37.6%	68	27.2%	138	31.7%
18+	39	21.0%	68	27.2%	107	24.5%
Total	186	100.0%	250	100.0%	436	100.0%

$x^2 = 7.1$
DF = 4
$p>0.05$

Table 6.10 : Proportions of dentate respondents with 18 or more sound and untreated permanent teeth by area of residence

AGE	AFFLUENT			DEPRIVED			ALL DENTATE		
(yrs)	n	%	Base	n	%	Base	n	%	Base
16-24	30	68.2%	44	26	55.3%	47	56	61.5%	91
25-34	10	25.6%	39	19	20.7%	92	29	22.1%	131
35-44	4	8.5%	47	11	22.4%	49	15	15.6%	96
45-54	2	4.8%	42	2	7.1%	28	4	5.7%	70
55-65	2	5.7%	35	2	13.3%	15	4	8.0%	50
All ages	48	23.2%	207	60	26.0%	231	108	24.7%	438

Figure 6.4 : Proportions of dentate respondents with 18 or more sound and untreated permanent teeth by area of residence

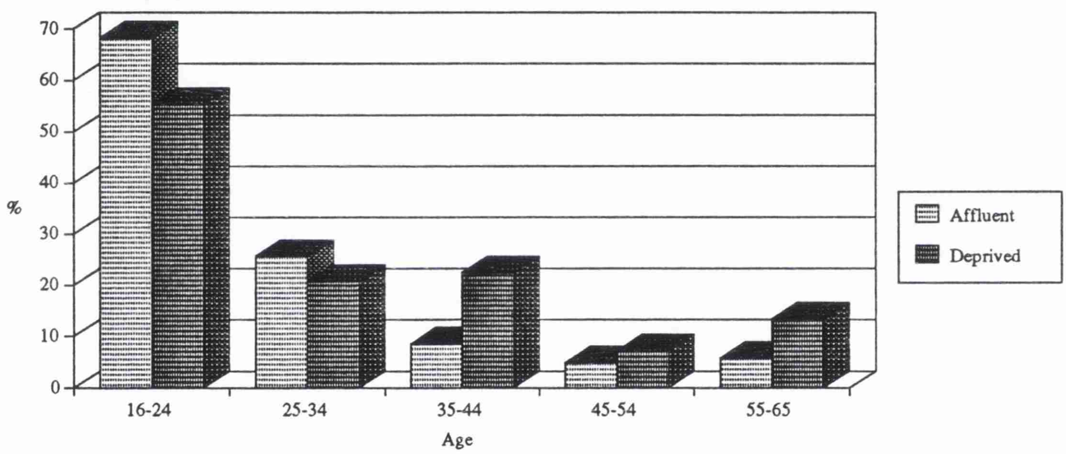


Table 6.11 : Proportions of dentate respondents with 18 or more sound and untreated permanent teeth by dental attendance pattern.

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS			ALL DENTATE		
(yrs)	n	%	Base	n	%	Base	n	%	Base
16-24	26	66.7%	39	30	57.7%	52	56	61.5%	91
25-34	8	15.7%	51	20	25.3%	79	28	21.5%	130
35-44	2	4.7%	43	13	24.5%	53	15	15.6%	96 *
45-54	1	3.1%	32	3	7.9%	38	4	5.7%	70
55-65	2	9.5%	21	2	7.1%	28	4	8.2%	49
All ages	39	21.0%	186	68	27.2%	250	107	24.5%	436

* : p<0.05

In Table 6.12, the mean number of decayed permanent teeth for "affluent" and "deprived" participants is shown, by age. Residents of deprived areas were found to have significantly ($p<0.001$) higher mean numbers of decayed teeth (mean=1.9, n=231), when compared to their "affluent" counterparts (mean=0.8, n=207), with significant differences being detected for all age groups.

For the "affluent" population, the mean number of decayed teeth was highest (mean=1.0, n=44) for the 16- to 24-year-olds. However, the value decreased in the middle age group, the 35- to 44-year-olds having the lowest number of decayed teeth (mean=0.5, n=47), while in older age cohorts there was a rise to a mean of 1.0 in 55- to 65-year-olds.

For the "deprived" population, the mean number of decayed teeth increased with rising age, the 16- to 24-year-olds having a mean of 1.8 decayed teeth, and the 55- to 65-year-olds having, on average, 2.4 decayed teeth (Fig. 6.5).

In Table 6.13, the mean numbers of decayed teeth for regular and irregular dental attenders are shown. Statistical analyses revealed that, for all ages, and for every age group, irregular attenders had significantly higher mean numbers of decayed teeth. For 186 regular attenders, a mean number of 0.7 decayed teeth was recorded. When this value was compared to the mean of 1.8 decayed teeth recorded for the 250 irregular attenders, the difference was found highly significant ($p<0.001$).

Data in Tables 6.14 and 6.15 show the distribution of decayed teeth by area of residence, and dental attendance pattern respectively. Statistical analysis indicated that there was a highly significant ($p<0.001$) association between the number of decayed teeth and area of residence, with 59.4% (123) of the "affluent" having no decayed teeth, compared to 38.5% (89) of the "deprived". A similar association ($p<0.001$) was detected between the number of decayed teeth and dental attendance pattern, with 58.1% (108) of regular, and 41.2% (103) of irregular attenders having no decayed teeth.

The proportions of dentate respondents who had no decayed teeth, by age, are detailed in Tables 6.16 and 6.17, for affluent and deprived populations, and for regular and irregular attenders respectively. For all age groups, higher proportions of decay-free dentate persons were found among the "affluent" than among the "deprived" (Fig. 6.6). A similar finding was recorded in relation to dental attendance patttern, the "regulars"

Table 6.12 : Mean number of decayed permanent teeth by area of residence

AGE (yrs)	AFFLUENT x	SD	n	DEPRIVED x	SD	n
16-24	1.0	1.6	44	1.8	2.2	47 *
25-34	0.9	1.8	39	1.8	2.1	92 *
35-44	0.5	0.9	47	1.9	2.1	49 ***
45-54	0.6	0.7	42	2.1	2.6	28 **
55-65	1.0	2.0	35	2.4	2.3	15 *
All dentate	0.8	1.5	207	1.9	2.2	231 ***

* : p<0.05
** : p<0.01
*** : p<0.001

Figure 6.5 : Mean number of decayed permanent teeth by area of residence

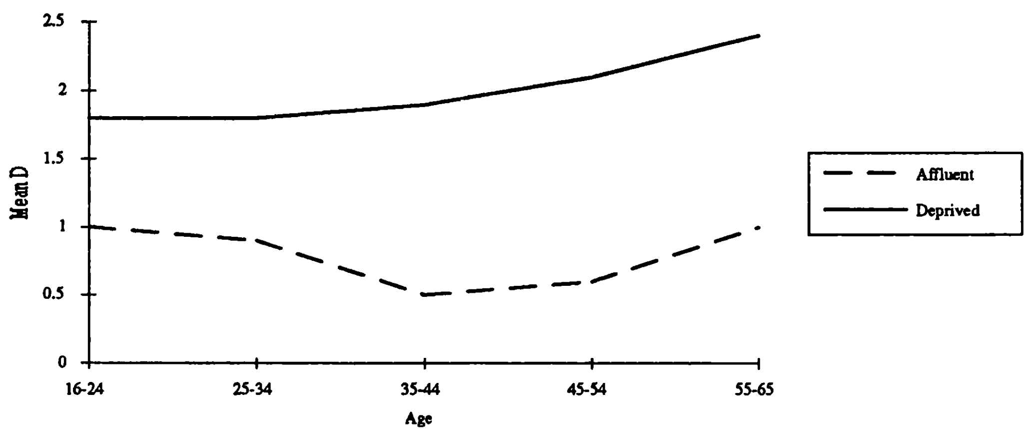


Table 6.13 : Mean number of decayed permanent teeth by dental attendance pattern

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	0.8	1.4	39	1.8	2.3	52 *
25-34	0.8	1.5	51	2.0	2.2	79 ***
35-44	0.8	1.1	43	1.6	2.2	53 *
45-54	0.5	0.7	32	1.8	2.3	38 **
55-65	0.7	0.8	21	1.9	2.7	28 *
All dentate	0.7	1.2	186	1.8	2.3	250 ***

* : p<0.05, ** : p<0.01, *** : p<0.001

Table 6.14 : Distribution of the numbers of decayed permanent teeth by area of residence

Number of decayed teeth	AFFLUENT n	AFFLUENT %	DEPRIVED n	DEPRIVED %	ALL DENTATE n	ALL DENTATE %
0	123	59.4%	89	38.5%	212	48.4%
1-5	81	39.1%	125	54.1%	206	47.0%
6+	3	1.4%	17	7.4%	20	4.6%
Total	207	100.0%	231	100.0%	438	100.0%

$x^2 = 23.4$
DF = 2
$p<0.001$

Table 6.15 : Distribution of the numbers of decayed permanent teeth by dental attendance pattern

Number of decayed teeth	REGULAR ATTENDERS n	REGULAR ATTENDERS %	IRREGULAR ATTENDERS n	IRREGULAR ATTENDERS %	ALL DENTATE n	ALL DENTATE %
0	108	58.1%	103	41.2%	211	48.4%
1-5	77	41.4%	128	51.2%	205	47.0%
6+	1	0.5%	19	7.6%	20	4.6%
Total	186	100.0%	250	100.0%	436	100.0%

$x^2 = 20.0$
DF = 2
$p<0.001$

Table 6.16 : Proportions of dentate respondents with no decayed permanent teeth by area of residence

AGE	AFFLUENT			DEPRIVED			ALL DENTATE			
(yrs)	n	%	Base	n	%	Base	n	%	Base	
16-24	26	59.1%	44	19	40.4%	47	45	49.5%	91	
25-34	23	59.0%	39	36	39.1%	92	59	45.0%	131	*
35-44	33	70.2%	47	19	38.8%	49	52	54.2%	96	**
45-54	23	54.8%	42	11	39.3%	28	34	48.6%	70	
55-65	18	51.4%	35	4	26.7%	15	22	44.0%	50	
All ages	123	59.4%	207	89	38.5%	231	212	48.4%	438	***

* : p<0.05
** : p<0.01
***: p<0.001

Figure 6.6 : Proportions of dentate respondents with no decayed permanent teeth by area of residence

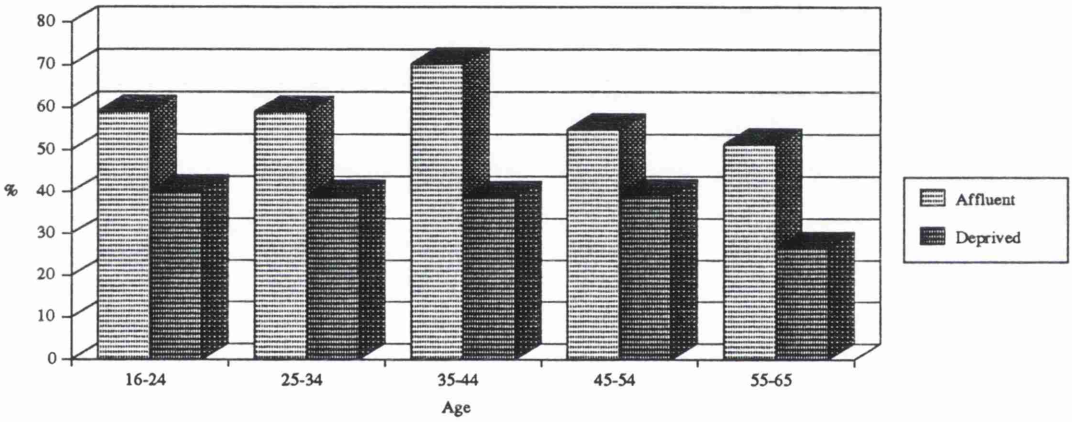


Table 6.17 : Proportions of dentate respondents with no decayed permanent teeth by dental attendance pattern

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS			ALL DENTATE			
(yrs)	n	%	Base	n	%	Base	n	%	Base	
16-24	25	64.1%	39	20	38.5%	52	45	49.5%	91	*
25-34	30	58.8%	51	28	35.4%	79	58	44.6%	130	**
35-44	24	55.8%	43	28	52.8%	53	52	54.2%	96	*
45-54	19	59.4%	32	15	39.5%	38	34	48.6%	70	
55-65	10	47.6%	21	12	42.9%	28	22	44.9%	49	
All ages	108	58.1%	186	103	41.2%	250	211	48.4%	436	***

* : p<0.05, ** :p<0.01, *** : p<0.001

having higher proportions of subjects with no decayed teeth when compared to irregular attenders.

6.2.4 Missing teeth

In the following analyses, the mean numbers of missing teeth, and the distribution of missing teeth are analysed in relation to area of residence and dental attendance pattern.

In Table 6.18, the mean numbers of missing permanent teeth of "affluent" respondents for all ages and for every age group separately, are shown. These values were significantly lower for the affluent than for their "deprived" counterparts.

For the "affluent" population, the mean number of missing teeth ranged from 4.0 to 10.2, and for the "deprived" from 6.3 to 18.0 among the different age groups. In both cases, the mean number of missing teeth increased with rising age (Fig. 6.7). Statistical analyses showed that the differences in the mean numbers of missing teeth became highly significant ($p<0.001$) after the age of 25 years.

Similar analyses (Table 6.19) comparing regular to irregular attenders, showed that regular attenders had a significantly lower ($p<0.001$) mean number of missing teeth (6.7) as compared to irregular attenders (10). Analysis by age group showed that from 25 years and older, irregular attenders were found to have significantly more teeth missing, the differences becoming highly significant for 45- to 65-year-olds.

The distributions of the numbers of missing teeth by area of residence and dental attendance pattern are detailed in Tables 6.20 and 6.21. Overall, only 2.7% (12) of the respondents had no missing teeth, 34.7% (152) had 1 to 5 missing teeth, 38.4% (168) had 6 to 11 missing teeth, and 24.2% (106) had 12 or more teeth absent. Statistical analysis detected highly significant ($p<0.001$) associations between the number of missing teeth, and both area of residence and dental attendance pattern, the trend being that "affluent" and regular attenders were likely to have fewer missing teeth.

6.2.5 Filled teeth

The mean numbers of filled teeth, their distribution, and the proportions of dentate respondents with 12 or more filled teeth, were examined in relation to area of residence and dental attendance pattern.

Table 6.18 : Mean number of missing permanent teeth by area of residence

AGE (yrs)	AFFLUENT x	SD	n	DEPRIVED x	SD	n
16-24	4.0	2.4	44	6.3	3.8	47 **
25-34	5.1	3.7	39	8.7	5.8	92 ***
35-44	6.0	3.6	47	10.9	6.1	49 ***
45-54	8.9	4.9	42	16.9	7.3	28 ***
55-65	10.2	6.0	35	18.0	4.7	15 ***
All dentate	6.7	4.8	207	10.3	6.7	231 ***

** : p<0.01
*** : p<0.001

Figure 6.7 : Mean number of missing permanent teeth by area of residence

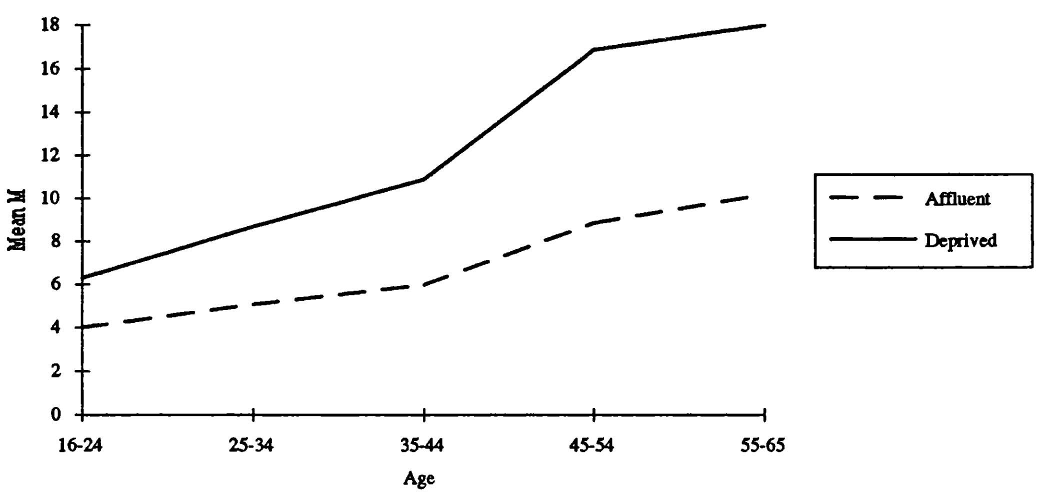


Table 6.19 : Mean number of missing permanent teeth by dental attendance pattern

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	4.6	2.4	39	5.6	3.9	52
25-34	6.4	5.2	51	8.5	5.6	79 *
35-44	6.7	3.1	43	9.9	6.6	53 **
45-54	8.8	4.7	32	14.8	7.7	38 ***
55-65	8.2	4.7	21	15.6	6.3	28 ***
All dentate	6.7	4.3	186	10.0	6.9	250 ***

* : p<0.05
** : p<0.01
*** : p<0.001

Table 6.20 : Distribution of the numbers of missing permanent teeth by area of residence

Number of missing teeth	AFFLUENT n	AFFLUENT %	DEPRIVED n	DEPRIVED %	ALL DENTATE n	ALL DENTATE %
0	10	4.8%	2	0.9%	12	2.7%
1-5	89	43.0%	63	27.3%	152	34.7%
6-11	82	39.6%	86	37.2%	168	38.4%
12-17	17	8.2%	45	19.5%	62	14.2%
18-23	8	3.9%	21	9.1%	29	6.6%
24+	1	0.5%	14	6.1%	15	3.4%
Total	207	100.0%	231	100.0%	438	100.0%

$x^2 = 38.4$
DF = 5
$p<0.001$

Table 6.21 : Distribution of the numbers of missing permanent teeth by dental attendance pattern

Number of missing teeth	REGULAR ATTENDERS n	REGULAR ATTENDERS %	IRREGULAR ATTENDERS n	IRREGULAR ATTENDERS %	ALL DENTATE n	ALL DENTATE %
0	5	2.7%	7	2.8%	12	2.8%
1-5	80	43.0%	71	28.4%	151	34.6%
6-11	80	43.0%	88	35.2%	168	38.5%
12-17	15	8.1%	47	18.8%	62	14.2%
18-23	5	2.7%	23	9.2%	28	6.4%
24+	1	0.5%	14	5.6%	15	3.4%
Total	186	100.0%	250	100.0%	436	100.0%

$x^2 = 31.9$
DF = 5
$p<0.001$

In Table 6.22, the mean numbers of filled permanent teeth for "affluent" and "deprived" respondents are shown, by age. For all cohorts and for every age group separately, "affluent" respondents were found to have higher mean numbers of filled teeth than did the "deprived". However, no statistically significant difference was detected between "affluent" and "deprived" 16-24 year olds. For older age groups, "affluent" residents had significantly higher mean numbers of filled teeth when compared to their "deprived" counterparts, the difference becoming highly significant ($p<0.001$) after 35 years of age.

"Affluent" respondents (n=207) were found to have 11.4 filled teeth on average and the "deprived" (n=231) were found to have a mean of 6.6 filled teeth.

Similar analyses (Table 6.23) comparing regular and irregular dental attenders, revealed significantly higher mean numbers of filled teeth among regular attenders aged 25- to 65-years-old, although no such difference was detected for the 16- to 24-year-olds. With respect to all 186 regular attenders, a mean of 11.1 filled teeth was recorded, and when these data were compared to the number of filled teeth recorded for the 250 irregular attenders (mean=7.2), the difference was found to be highly significant ($p<0.001$).

The distributions of the numbers of filled teeth by area of residence, and by dental attendance pattern, are shown in Tables 6.24 and 6.25, respectively. Overall, 9.8% (43) of respondents had no filled teeth, 21.9% (96) had 1 to 5 filled teeth, and 34.0% (149) had 6 to 11 filled teeth. For 34.2% (150) of the subjects, 12 or more filled teeth were recorded. Statistical analysis revealed that there was a highly significant ($p<0.001$) association between the numbers of teeth filled, and both area of residence and dental attendance pattern, the trend being that the "affluent" group and the regular attenders were more likely to have more than 12 filled teeth.

Illustrated in Tables 6.26 and 6.27, are the proportions of subjects with 12 or more filled teeth for every age group, by area of residence and dental attendance pattern respectively. For all cohorts, higher proportions of "affluent" respondents had 12 or more filled teeth (Fig. 6.9). However, this difference was not significant for the 16- to 24-year-olds. Overall, of the "affluent" subjects, 53.1% (110) were noted to have 12 or more filled teeth, while of the "deprived", 38.5% (40) were found to fall into this category ($p<0.001$).

Table 6.22 : Mean number of filled permanent teeth by area of residence

AGE	AFFLUENT			DEPRIVED		
(yrs)	x	SD	n	x	SD	n
16-24	6.9	5.4	44	6.7	5.0	47
25-34	11.4	5.2	39	8.4	5.2	92 **
35-44	14.0	5.0	47	5.8	4.2	49 ***
45-54	13.3	4.8	42	4.9	4.8	28 ***
55-65	11.1	5.4	35	1.4	2.4	15 ***
All dentate	11.4	5.7	207	6.6	5.1	231 ***

** : $p<0.01$
*** : $p<0.001$

Figure 6.8 : Mean number of filled permanent teeth by area of residence

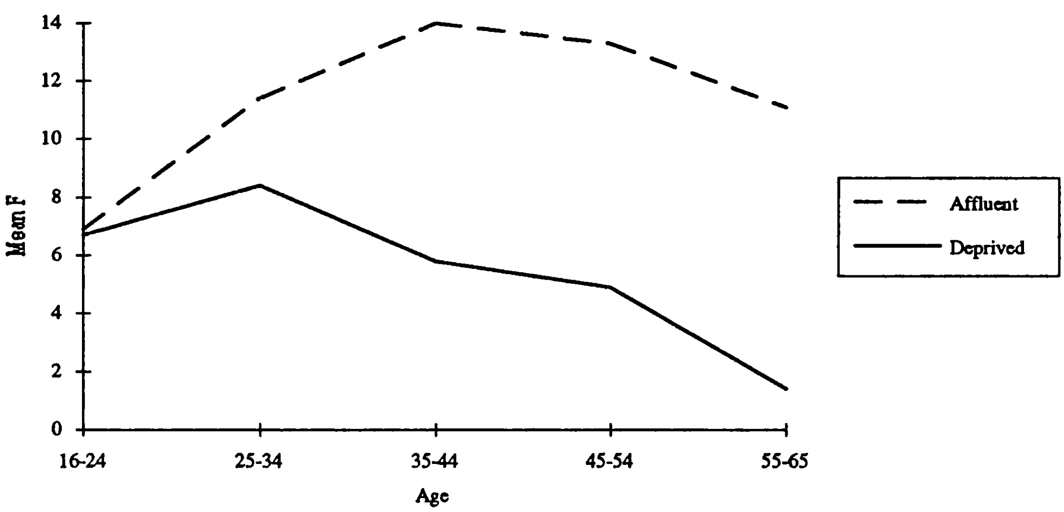


Table 6.23 : Mean number of filled permanent teeth by dental attendance pattern

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS		
(yrs)	x	SD	n	x	SD	n
16-24	6.8	5.5	39	6.8	5.0	52
25-34	11.3	4.6	51	8.0	5.4	79 ***
35-44	12.9	5.5	43	7.3	5.6	53 ***
45-54	13.2	4.9	32	7.2	6.1	38 ***
55-65	11.9	5.1	21	5.7	6.2	28 **
All dentate	11.1	5.6	186	7.2	5.6	250 ***

** : $p<0.01$
*** : $p<0.001$

Table 6.24 : Distribution of the numbers of filled permanent teeth by area of residence

Number of filled teeth	AFFLUENT n	AFFLUENT %	DEPRIVED n	DEPRIVED %	ALL DENTATE n	ALL DENTATE %
0	10	4.8%	33	14.3%	43	9.8%
1-5	23	11.1%	73	31.6%	96	21.9%
6-11	64	30.9%	85	36.8%	149	34.0%
12+	110	53.1%	40	17.3%	150	34.2%
Total	207	100.0%	231	100.0%	438	100.0%

$x^2 = 72.9$
DF = 3
$p<0.001$

Table 6.25 : Distribution of the numbers of filled permanent teeth by dental attendance pattern

Number of filled teeth	REGULAR ATTENDERS n	REGULAR ATTENDERS %	IRREGULAR ATTENDERS n	IRREGULAR ATTENDERS %	ALL DENTATE n	ALL DENTATE %
0	8	4.3%	35	14.0%	43	9.9%
1-5	24	12.9%	71	28.4%	95	21.8%
6-11	60	32.3%	88	35.2%	148	33.9%
12+	94	50.5%	56	22.4%	150	34.4%
Total	186	100.0%	250	100.0%	436	100.0%

$x^2 = 46.7$
DF = 3
$p<0.001$

Table 6.26 : Proportions of dentate respondents with 12 or more filled permanent teeth by area of residence

AGE	AFFLUENT			DEPRIVED			ALL DENTATE			
(yrs)	n	%	Base	n	%	Base	n	%	Base	
16-24	8	18.2%	44	5	10.6%	47	13	14.3%	91	
25-34	20	51.3%	39	29	31.5%	92	49	37.4%	131	*
35-44	37	78.7%	47	4	8.2%	49	41	42.7%	96	***
45-54	28	66.7%	42	2	7.1%	28	30	42.9%	70	***
55-65	17	48.6%	35	-	-	15	17	34.0%	50	***
All ages	110	53.1%	207	89	38.5%	231	212	48.4%	438	***

* : p<0.05
***: p<0.001

Figure 6.9 : Proportions of dentate respondents with 12 or more filled permanent teeth by area of residence

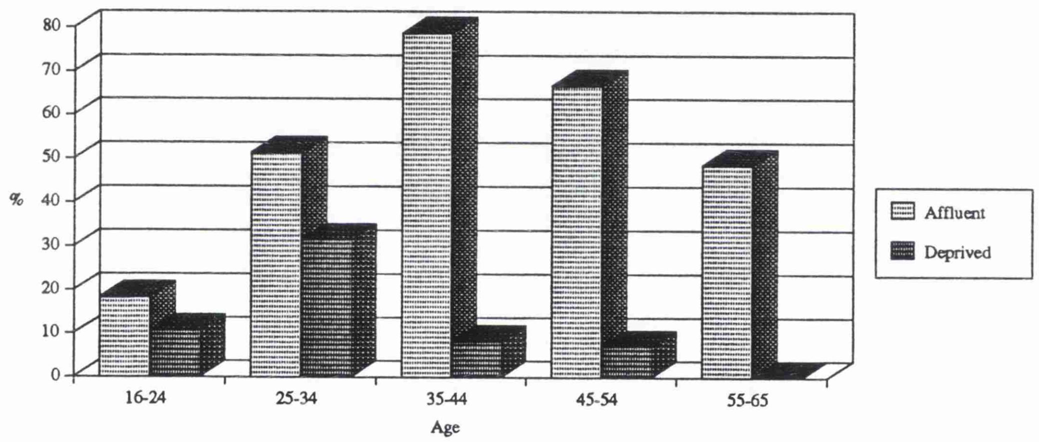


Table 6.27 : Proportions of dentate respondents with 12 or more filled permanent teeth by dental attendance pattern

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS			ALL DENTATE			
(yrs)	n	%	Base	n	%	Base	n	%	Base	
16-24	7	17.9%	39	6	11.5%	52	13	14.3%	91	
25-34	28	54.9%	51	21	26.6%	79	49	37.7%	130	**
35-44	28	65.1%	43	13	24.5%	53	41	42.7%	96	***
45-54	20	62.5%	32	10	26.3%	38	30	42.9%	70	**
55-65	11	52.4%	21	6	21.4%	28	17	34.7%	49	*
All ages	94	50.5%	186	56	22.4%	250	150	34.4%	436	***

* : p<0.05
** :p<0.01
*** : p<0.001

A higher proportion of regular attenders had 12 or more filled teeth, when compared to irregular attenders. Among dentate regular attenders, 50.5% (94) had 12 or more filled teeth, whilst of their irregular counterparts, 22.4% (56) had 12 or more filled teeth ($p<0.001$).

6.2.6 DMFT indices

With respect to the mean DMFT index for "affluent" and "deprived" respondents, no significant difference was detected between the "affluent" mean of 18.9 and the corresponding "deprived" mean of 18.8 (Table 6.28). Statistical analyses comparing "affluent" and "deprived" respondents for each age group also failed to reveal any significant differences except for the 16- to 24-year-olds. For this age group the "deprived" respondents scored 14.8 as compared to a DMFT score of 11.9 for the "affluent" ($p<0.05$). Overall, the mean DMFT score ranged from 11.9 to 22.8 for "affluent" subjects, and from 14.8 to 24.0 for those categorised as "deprived" (Fig. 6.10).

In Table 6.29, similar analyses are presented, comparing regular to irregular attenders. However, no significant differences could be detected when the mean DMFT index of regular attenders (18.6) was compared to the mean score recorded for irregular attenders (19.0). Analysis of each age group separately, failed to detect any significant differences in the mean DMFT indices between regular and irregular attenders.

The percentage contribution of each of the three DMFT score components for each age group, for "affluent" and "deprived" respondents, is shown in Table 6.30. It is evident that the "decayed" and "missing" components accounted for a larger proportion of the DMFT score of the "deprived" population, as compared to that of the "affluent". In contrast, the "filled" component contributed more so to the DMFT score for the "affluent" than the "deprived".

The percentages D/DMFT (Table 6.30) for the "deprived" ranged from 8.8% to 12.2% among the different age groups. For "affluent" respondents, lower percentages were recorded, ie. from 2.4% to 8.4%. Similarly, higher percentages of M/DMFT were noted amongst the "deprived" (42.6% to 82.6%) than "affluent" (29.3% to 45.7%). In contrast, the percentages F/DMFT found among the "deprived" (6.4% to 45.3%) were lower than those of the "affluent" (49.8% to 68.3%).

Table 6.28 : Mean DMFT score by area of residence

AGE	AFFLUENT			DEPRIVED			
(yrs)	x	SD	n	x	SD	n	
16-24	11.9	5.7	44	14.8	6.5	47	*
25-34	17.5	4.7	39	18.9	5.6	92	
35-44	20.5	5.9	47	18.6	5.5	49	
45-54	22.8	4.5	42	24.0	5.2	28	
55-65	22.3	4.6	35	21.8	4.6	15	
All dentate	18.9	6.5	207	18.8	6.2	231	

* : p<0.05

Figure 6.10 : Mean DMFT score by area of residence

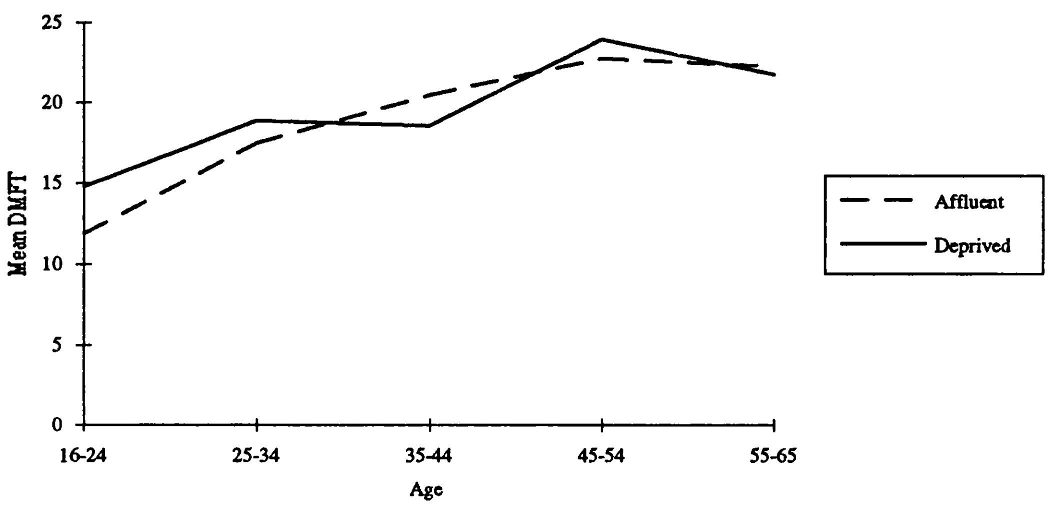


Table 6.29 : Mean DMFT score by dental attendance pattern

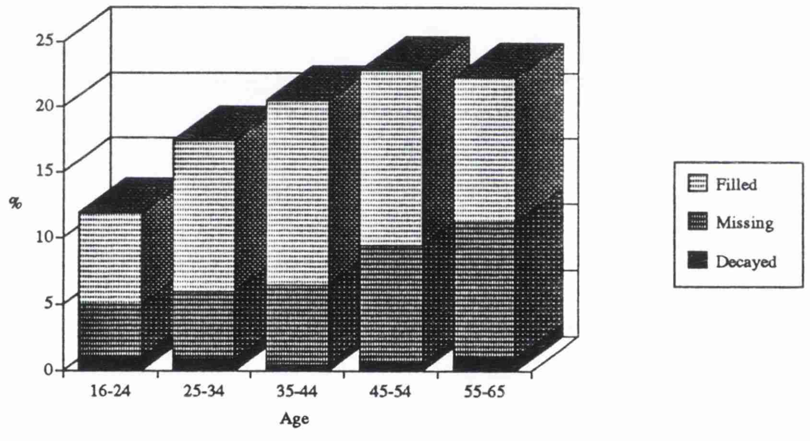
AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS		
(yrs)	x	SD	n	x	SD	n
16-24	12.3	6.1	39	14.2	6.4	52
25-34	18.5	4.8	51	18.5	5.8	79
35-44	20.4	4.8	43	18.8	6.4	53
45-54	22.6	4.5	32	23.8	5.0	38
55-65	20.8	4.8	21	23.1	4.1	28
All dentate	18.6	6.1	186	19.0	6.6	250

Table 6.30 : Percentages D/DMFT, M/DMFT and F/DMFT by age group and area of residence

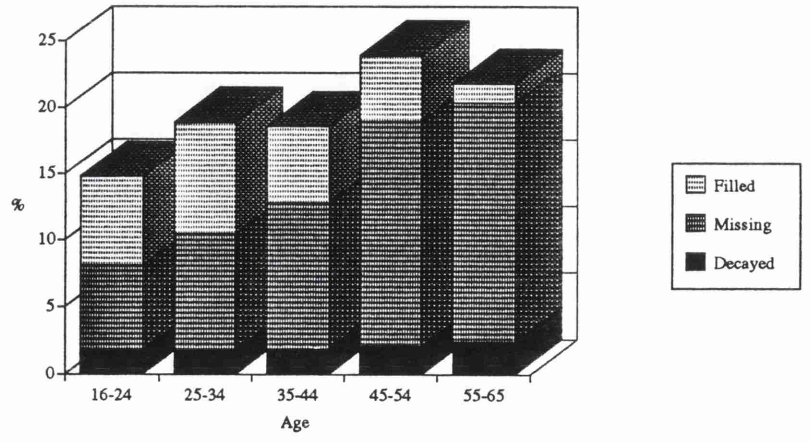
AGE	% D/DMFT		% M/DMFT		% F/DMFT	
(yrs)	Affluent	Deprived	Affluent	Deprived	Affluent	Deprived
16-24	8.4	12.2	33.6	42.6	56.0	45.3
25-34	5.2	9.5	29.3	46.0	65.5	44.4
35-44	2.4	10.2	29.3	58.6	68.3	31.2
45-54	2.6	8.8	39.0	70.4	58.3	20.4
55-65	4.5	11.0	45.7	82.6	49.8	6.4
All dentate	4.2	10.1	35.4	54.8	60.3	35.1

Figure 6.11 : The average number of teeth in each condition (D, M, or F) by age and area of residence

AFFLUENT



DEPRIVED



The differences in the contributions of the D, M and F components are shown diagrammatically in Figure 6.11, where the average number of D, M and F teeth are illustrated for every age group.

6.3 THE CONDITION OF THE TOOTH-SUPPORTING TISSUES

6.3.1 CPITN Index assessment

In Table 6.31, the distributions of the dentate respondents according to their highest Community Periodontal Index of Treatment Needs (CPITN) scores (thus according to the worst observable condition) by age, area of residence, dental attendance pattern, and toothbrushing behaviour are shown.

Of the 432 dentate subjects for which this information was available, 62.5% (270) had calculus without pockets (CPITN score=2); 24.3% (105) had shallow pockets (CPITN score=3); 7.4% (32) had pockets deeper than 5.5mm (CPITN score=4); 4.2% (18) had no observable periodontal disease (CPITN score=0), and for 1.6% (7) the worst condition measured was bleeding on probing (CPITN score=1).

The results indicated that the periodontal condition deteriorated with age. Deep periodontal pocketing (CPITN score=4) was found in only 3.3% (3) of the 16- to 24-year-olds, but this proportion increased to 17.1% (12) in the 45- to 54-years-old group. Periodontal health (CPITN score=0) was found in only 8.8% (8) of 16- to 24-year-olds, and in one of the 55- to 65-year-olds, i.e. 2.1%.

People affected by calculus as the worst condition (CPITN score=2) represented the highest percentages in all age groups, ranging from 41.4% (29) for 45- to 54-year-olds, to 81.3% (74) amongst 16- to 24-year-olds. For the "affluent" group, the prevalence of calculus without pockets was 51.5% (106), while amongst the "deprived" respondents it was 72.6% (164), this difference being highly significant ($p<0.001$).

Of the 186 regular dental attenders, 60.2% (112) were found to have calculus without pockets (CPITN score=2), whilst for the "irregulars" the corresponding percentage was 64.2% (158). This difference was not significant.

Stated brushing frequency was found to be associated with decreased calculus prevalence, 72.2% (26) of those respondents who said they brushed their teeth less than once a day having calculus, as compared to 52% (52) who claimed to brush three or more times daily.

le 6.31 : CPITN index analyses

	Proportion of dentates with a highest score of :					Treatment needs			Mean number of sextants with a highest score of :					
	0	1	2	3	4	TN1	TN2	TN3	0	1-4	2-4	3-4	4	Base
4	8.8%	2.2%	81.3%	4.4%	3.3%	91.2%	89.0%	3.3%	2.5	3.5	3.0	0.3	0.0	91
4	4.7%	1.6%	74.4%	17.1%	2.3%	95.3%	93.8%	2.3%	1.4	4.0	3.7	0.4	0.0	129
4	3.2%	2.1%	50.5%	34.7%	9.5%	96.8%	94.7%	9.5%	1.2	4.2	4.0	1.1	0.2	95
4	-	1.4%	41.4%	40.0%	17.1%	100.0 %	98.5%	17.1%	0.7	4.0	3.9	1.3	0.4	70
5	2.1%	-	48.9%	38.3%	10.6%	97.9%	97.8%	10.6%	0.6	3.7	3.5	0.9	0.2	47
ate	4.2%	1.6%	62.5%	24.3%	7.4%	95.8%	94.2%	7.4%	1.4	3.9	3.6	0.7	0.1	432
uent	6.8%	2.4%	51.5%	30.6%	8.7%	93.2%	90.8%	8.7%	1.9	3.8	3.5	0.9	0.2	206
	*		***	**		*	**							
ived	1.8%	0.9%	72.6%	18.6%	6.2%	98.2%	97.4%	6.2%	0.9	4.0	3.7	0.6	0.1	226
ılar ders	5.4%	2.2%	60.2%	27.4%	7.5%	94.6%	95.1%	7.5%	1.8	3.9	3.6	0.8	0.2	186
		*												
ular ders	3.3%	1.2%	64.2%	22.0%	7.3%	96.7%	93.5%	7.3%	1.0	3.9	3.7	0.7	0.1	246
d brushing frequency es per day)														
than	2.8%	2.8%	72.2%	22.2%	-	97.2%	94.4%	-	0.9	4.1	3.9	0.5	0.0	36
	-	3.4%	62.7%	18.6%	15.3%	100.0 %	96.6%	15.3%	0.9	4.0	3.6	0.8	0.2	59
e	5.5%	1.7%	65.4%	21.5%	5.9%	94.5%	92.8%	5.9%	1.5	3.8	3.4	0.6	0.1	237
e +	4.0%	-	52.0%	35.0%	9.0%	96.0%	96.0%	9.0%	1.5	4.1	3.9	0.9	0.2	100

p<0.05
p<0.01
p<0.001

A comparison of proportions analysis revealed that the proportions of people with healthy periodontia, of persons with calculus, and of those with shallow pockets, differed significantly between "affluent" and "deprived" populations. Significantly more people from the "affluent" group belonged to the "healthy" and "shallow pockets" categories, as compared to "deprived", amongst whom the majority (72.6%) had "calculus".

Analysis concerning treatment needs showed that of all 432 respondents, only 4.2% (18) needed no periodontal treatment at all. Of the entire dentate population under study, 95.8% (414) required oral hygiene instructions (TN1) and 94.2% (407) required scaling for calculus removal and/or reduction of pocket depth (TN2). Only 7.4% (32) were found to require complex treatment (TN3), but the proportion of included in this treatment category increased from 2.3% (3) amongst 25- to 34-year-olds to 17.1% (12) for those aged 45 to 54 years. The percentage of respondents in need of oral hygiene instruction was high even in the youngest age group. Here, 91.2% (83) were in this category, and the figure peaked at 100% (70) in the 45- to 54-year-olds. It then decreased slightly to 97.9% (46) for the 55- to 65-year-old age group.

The need for scaling (TN2) followed a similar pattern, from 89.0% (81) of those aged 16 to 24 years, to 97.8% (46) amongst 55- to 65-year-olds, with a maximum percentage of 98.5% (69) for 45- to 54-year-olds.

Statistical analyses comparing "affluent" to "deprived" respondents, showed that significantly more of the "deprived" population needed oral hygiene instruction ($p<0.05$) and scaling for calculus and/or shallow pocket treatment ($p<0.01$). No such difference was evident for the complex treatment category. Furthermore, when regular attenders were compared to irregular attenders, no significant differences could be detected for any of the treatment categories.

The need for oral hygiene instruction and scaling remained high (96.0%), even amongst those who claimed to brush their teeth three or more times daily.

6.3.2 SPEED periodontal assessment

Data in Table 6.32 show the results of the periodontal assessment analysis according to the SPEED method.

Table 6.32 : SPEED periodontal analysis

	Dentates with a worst condition present of :								Assigned for scaling		
AGE	soft deposits		gingivitis		supra-gingival calculus		sub-gingival calculus				
(yrs)	n	%	n	%	n	%	n	%	n	%	Base
16-24	10	11.6%	4	4.7%	64	74.4%	8	9.3%	25	29.1%	86
25-34	4	3.2%	7	5.6%	77	61.6%	37	29.6%	50	40.0%	125
35-44	3	3.3%	2	2.2%	40	44.0%	46	50.5%	43	47.3%	91
45-54	1	1.4%	-	-	23	33.3%	45	65.2%	37	53.6%	69
55-65	1	2.1%	-	-	18	37.5%	29	60.4%	29	60.4%	48
All dentate	19	4.5%	13	3.1%	222	53.0%	165	39.4%	184	43.9%	419
Affluent	10	5.2%	8	4.1%	111	57.5%	64	33.2%	63	32.6%	193
								*		***	
Deprived	9	4.0%	5	2.2%	111	49.1%	101	44.7%	121	53.5%	226
Regular attenders	10	5.8%	5	2.9%	105	60.7%	53	30.6%	64	37.0%	173
						**		**		*	
Irregular attenders	9	3.7%	8	3.3%	116	47.5%	111	45.5%	120	49.2%	244
Stated brushing frequency (times per day)											
Less than once	2	5.7%	-	-	13	37.1%	20	57.1%	21	60.0%	35
Once	1	1.8%	1	1.8%	32	56.1%	23	40.4%	23	40.4%	57
Twice	11	4.8%	10	4.4%	126	55.3%	81	35.5%	99	43.4%	228
Three +	5	5.3%	2	2.1%	50	53.2%	37	39.4%	38	40.4%	94

* : $p<0.05$
** : $p<0.01$
*** : $p<0.001$

Only 4.5% (19) of dentate respondents exhibited no signs of periodontal disease. Gingivitis was detected in 3.1% (13), supra-gingival calculus in 53% (222), and sub-gingival calculus in 39.4% (165) of the subjects examined.

The prevalence of gingivitis (as the worst condition present) was 4.7% (4) in the 16- to 24-year-olds, and rose to 5.6% (7) in 25- to 34-year-olds, before decreasing to 2.2% (2) in the 35- to 44-year-olds. For the 45- to 65-years-old age groups, this category did not apply as all conditions witnessed were more severe than gingivitis.

Supra-gingival calculus was detected in 74.4% (64) of the 16- to 24-year-olds, and decreased with increasing age to 33.3% (23) among the 45- to 54-year-olds. However, it then increased to 37.5% (18) for 55- to 65-year-olds.

The detection of sub-gingival calculus exhibited an opposite pattern, increasing from 9.3% (8) among 16- to 24-year-olds, to 65.2% (45) for 45- to 54-year-olds, after which a decrease was noted to 60.4% (29) for the oldest cohort.

A significantly higher percentage ($p<0.05$) of "deprived" individuals had sub-gingival calculus (44.7%), as compared to the "affluent" (33.2%). In contrast, the detection rate of supra-gingival calculus was lower amongst the "deprived" (49.1%) than "affluent" (57.5%). However, this difference was not statistically significant.

Analysis in relation to dental attendance pattern showed that for regular attenders (n=173) the prevalence of supra-gingival calculus at 60.7% (105) was significantly higher ($p<0.01$), and the prevalence of sub-gingival calculus at 30.6% (53) was significantly lower than that found for irregular attenders.

Stated brushing frequency did not appear related to a decrease in the prevalence of supra-gingival calculus, with 56.1% (32) of those who claimed to brush their teeth once a day having such deposits, as compared to 53.2% (50) of those who claimed to brush three or more times a day. Furthermore, the lowest prevalence of supra-gingival calculus was 37.1% (13), which was recorded amongst those who reported they brushed their teeth less than once per day.

The sub-gingival calculus prevalence decreased from 57.1% (20) for respondents who claimed to brush less than once per day, to 35.5% (81) among those who reported to brush twice per day. However, a higher percentage (39.4%) of those who said they brushed more frequently (three or more times a day) were scored as having sub-gingival calculus.

Of all 419 dentates for whom the above information was available, 43.9% (184) were assigned for scaling according to SPEED criteria. The proportion of dentate requiring scaling increased with increasing age , from 29.1% (25) of 16- to 24-year-olds, to 60.4% (29) of those aged 55 to 65 years. Amongst "deprived", the proportion assessed as needing scaling amounted to 53.5% (121), while amongst "affluent", 32.6% (63) were judged in need of such therapy, the difference being highly significant ($p<0.001$). Furthermore, a significantly higher ($p<0.05$) proportion of irregular attenders (49.2%) was found to require periodontal, treatment when compared to the 37.0% among regular attenders.

When need for scaling was analysed in relation to reported brushing behaviour, it was found that 60.0% (21) of those who said they brushed their teeth less than once per day were classified in need of periodontal treatment, as opposed to 40.4% (38) of those who claimed to brush three or more times daily. A higher proportion (43.4%) of those who said they brushed twice per day needed periodontal treatment, but none of these differences proved to be significant (Table 6.32).

6.4 DENTURE ASSESSMENT

In Table 6.33, the types of dentures worn by dentate and edentulous populations are detailed.

Of the 437 dentate subjects examined, 78.3% (342) did not wear any denture; 12.4% (54) wore a partial upper denture and 5.9% (26) a full upper. Only three dentate persons wore a partial lower and one subject a full lower. Of the remaining 11 dentate denture-wearing respondents, two were found to wear full upper and partial lower dentures, and nine had both partial upper and partial lower dentures. Statistical analyses revealed that significantly more deprived ($p<0.05$), and significantly more irregular attenders ($p<0.01$) were in possession of dentures.

Of the 74 edentulous subjects examined, 16.2% (12) did not wear any dentures; 20.3% (15) possessed a full upper, and 63.5% (47) had both full upper and lower dentures. Amongst edentulous, no association between possession (or lack of possession) of full dentures and area of residence, or dental attendance pattern could be detected.

Table 6.33 : Distribution of the types of dentures worn by dentate and edentulous respondents

TYPE OF DENTURE WORN	DENTATE n	DENTATE %	EDENTULOUS n	EDENTULOUS %	TOTAL n	TOTAL %
No denture worn	342	78.3%	12	16.2%	354	69.3%
Full upper	26	5.9%	15	20.3%	41	8.0%
Full lower	1	0.0%	-	-	1	0.0%
Full upper & full lower	-	-	47	63.5%	47	9.2%
Full upper & partial lower	2	0.0%	-	-	2	0.0%
Partial upper	54	12.4%	-	-	54	10.6%
Partial lower	3	0.0%	-	-	3	0.0%
Partial upper & partial lower	9	0.0%	-	-	9	1.8%
Total	437	100.0%	74	100.0%	511	100.0%

Thus, of the total number of 511 respondents (both dentate and edentulous) who were examined, 30.7% (157) were found to have some type of denture. Of these subjects, 36.9% (58) wore a set of dentures, and 63.1% (99) of individuals had one denture.

For the 58 respondents who were found to wear a pair of dentures, 14 belonged to the "affluent", and 44 to the "deprived" group, while, of the 99 subjects who wore one denture, 26 were classified as "affluent", and 73 as "deprived" group. All these respondents form the sample base used in the following denture appraisal.

The assessment of dentures (Table 6.34) (as described in Section 4.4, Phase 3 of Methods) showed that the mean number of "unsatisfactory" scores for the "affluent" respondents who wore one denture was 1.8 and, for their "deprived" counterparts, the mean was 1.9. For those "affluent" respondents who wore two dentures the mean number of "unsatisfactory" scores was 4.9, while for the "deprived", it was 5.2. Although the means recorded for residents of deprived areas were higher in both cases, these differences were not found to be statistically significant.

However, when requirement for dentures (according to SPEED criteria) were examined in relation to area of residence (Table 6.35), a highly significant ($p<0.001$) association was found, the trend being that a higher number of "deprived", as compared to "affluent", required dentures (either to replace old prostheses or acquire them for the first time). Similarly, significantly more irregular attenders required dentures than regular attenders($p<0.001$).

Of the 51 full upper dentures required, 51.0% (26) were for replacement of those deemed unsatisfactory, and of 43 full lower dentures needed, 37.2% (16) were for replacement. Regarding the 60 partial upper dentures required, 31.7% (19) would replace old ones, while of the 96 partial lower dentures required, only 6.3% (6) would replace old dentures.

With respect to the 157 respondents who were found to wear some type of denture, 58.6% (92) required replacement of their dentures. Of these, 48.9% (45) reported they "felt happy" about their appliances, 25.0% (23) felt "not so happy", and 26.1%24 (24) stated they felt "unhappy". Regarding the 65 respondents whose dentures were not found to require replacement, 63.1% (41) indicated they "felt happy" about their dentures, 27.7% (18) were "not so happy" and 9.2% (6) were "unhappy".

Table 6.34 : Dentures assessment - Mean number of "unsatisfactory" scores for respondents with one denture (score range=0 to 6) and with two dentures (score range=0 to 12) by area of residence.

	AFFLUENT			DEPRIVED		
	x	SD	n	x	SD	n
Subjects with ONE denture	1.8	1.2	26	1.9	1.6	73
Subjects with TWO dentures	4.9	1.8	14	5.2	3.1	44

Table 6.35 : Distribution of the types of dentures required (according to SPEED criteria) by area of residence

TYPE OF DENTURE	AFFLUENT		DEPRIVED		TOTAL	
REQUIRED	n	%	n	%	n	%
No denture required	175	52.1%	161	47.9%	336	100.0%
Full upper	1	12.5%	7	87.5%	8	100.0%
Full lower	2	18.2%	9	81.8%	11	100.0%
Full upper & full lower	1	3.2%	30	96.8%	31	100.0%
Partial upper	8	27.6%	21	72.4%	29	100.0%
Partial lower	15	27.8%	39	72.2%	54	100.0%
Partial upper &partial lower	8	26.7%	22	73.3%	30	100.0%
Full upper & partial lower	3	25.0%	9	75.0%	12	100.0%
Partial upper & full lower	-	-	1	100.0%	1	100.0%
Total	213	41.6%	299	58.4%	512	100.0%

$x^2 = 50.7$
DF = 8
$p<0.001$

Overall, full upper dentures were found in 90 respondents, full lowers in 48 subjects, partial uppers in 63 and partial lowers in 14 examinees, these being the basis for the analyses which follow.

6.4.1 Full dentures

In Table 6.36, the rates of "unsatisfactory" scores for each criterion (as described in Section 4.5.4 of Methods), separately for "affluent" and "deprived" full-upper denture wearers, are shown.

In total, 43.3% (39) of full upper dentures were found to be unsatisfactory in relation to occlusal loading and, for 35.6% (32) of subjects, denture stomatitis was present. Of full upper dentures, one third (30) had unsatisfactory stability, and 31.1% (28), and 30.0% (27) did not satisfy the criteria of posterior, and peripheral extension, respectively. The lowest rate of unsatisfactory scores recorded was for retention of full upper dentures (27.8%). However, statistical analysis failed to reveal significant differences in the "unsatisfactory" rates between "affluent" and "deprived" respondents with full upper dentures.

Overall, according to SPEED criteria, 26 full upper dentures should have been replaced, giving a renewal need of 28.9%.

A similar analysis for full lower denture wearers is shown in Table 6.37. Here the most prevalent problem was found to be retention-related, with an "unsatisfactory" rate of 87.5% (42), followed by 79.2% (38) which was stability-related. Unsatisfactory occlusal loading was found in 62.5% (30) of cases. The least prevalent problem amongst full lower denture wearers was denture stomatitis, noted in 14.6% (7) of the cases. Statistical analysis failed to reveal any significant association between an "unsatisfactory" denture condition and area of residence.

SPEED criteria used, gave a 33.3% (16) renewal need for full lower dentures.

6.4.2 Partial dentures

In Table 6.38, the rates of "unsatisfactory" partial upper denture scores found at assessment are detailed.

Unsatisfactory occlusal loading was the most commonly detected defect, in 54.0% (34) of cases, followed by a 44.4% (28) rate for poor retention. Denture stomatitis was associated with 30.2% (19) of partial upper dentures, and unsatisfactory stability was

Table 6.36 : Full upper dentures : "unsatisfactory" rates for every criterion and required replacement rates by area of residence

TYPE OF DENTURE CRITERIA	AFFLUENT		DEPRIVED		TOTAL	
	n	Rate	n	Rate	n	Rate
Posterior extension	3	30.0%	25	31.3%	28	31.1%
Peripheral extension	2	20.0%	25	31.3%	27	30.0%
Stability	3	30.0%	27	33.8%	30	33.3%
Occlusal loading	4	40.0%	35	43.8%	39	43.3%
Retention	2	20.0%	23	28.8%	25	27.8%
Denture stomatitis	4	40.0%	28	35.0%	32	35.6%
Dentures requiring replacement	2	20.0%	24	30.0%	26	28.9%
Base	10		80		90	

Table 6.37 : Full lower dentures : "unsatisfactory" rates for every criterion and required replacement rates by area of residence

TYPE OF DENTURE CRITERIA	AFFLUENT		DEPRIVED		TOTAL	
	n	Rate	n	Rate	n	Rate
Posterior extension	3	50.0%	17	40.5%	20	41.7%
Peripheral extension	2	33.3%	15	35.7%	17	35.4%
Stability	6	100.0%	32	76.2%	38	79.2%
Occlusal loading	4	66.7%	26	61.9%	30	62.5%
Retention	6	100.0%	36	85.7%	42	87.5%
Denture stomatitis	1	16.7%	6	14.3%	7	14.6%
Dentures requiring replacement	3	50.0%	13	31.0%	16	33.3%
Base	6		42		48	

Table 6.38 : Partial upper dentures : "unsatisfactory" rates for every criterion and required replacement rates by area of residence

TYPE OF DENTURE CRITERIA	AFFLUENT		DEPRIVED		TOTAL	
	n	Rate	n	Rate	n	Rate
Posterior extension	3	10.3%	5	14.7%	8	12.7%
Peripheral extension	2	6.9%	2	5.9%	4	6.3%
Stability	9	31.0%	8	23.5%	17	27.0%
Occlusal loading	15	51.7%	19	55.9%	34	54.0%
Retention	14	48.3%	14	41.2%	28	44.4%
Denture stomatitis	6	20.7%	13	38.2%	19	30.2%
Dentures requiring replacement	9	31.0%	10	29.4%	19	30.2%
Base	29		34		63	

recorded for 27.0% (17) of cases. The least prevalent problem was unsatisfactory peripheral extension, this being found in only 6.3% (4) of cases. No significant differences in the "unsatisfactory" rates between "affluent" and "deprived" could be detected.

Partial upper dentures assigned for replacement according to SPEED criteria, amounted to 30.2% (19) of those examined.

Data in Table 6.39 show a similar analysis for partial lower dentures. Occlusal loading and retention were unsatisfactory in 71.4% (10), and stability was unsatisfactory in 57.1% (8) of cases. Denture stomatitis was associated with partial lower dentures in 21.4% (3) of subjects. Significant differences in the "unsatisfactory" rates among "affluent" and "deprived" respondents could not be detected.

According to SPEED criteria, 42.9% (6) of partial lower dentures were assigned for replacement.

6.5 TREATMENT COST

The total treatment cost, and its component parts (i.e. restorative, periodontal and prosthetic costs), were analysed in relation to area of residence and dental attendance pattern. Additionally, prosthetic treatment costs for the edentulous were analysed separately. Here, treatment cost is expressed in Resource Related Index (RRI) units.

The mean total treatment need cost amounted to 37.4 for residents of affluent areas, and 55.0 for their "deprived" counterparts, the difference being highly significant ($p<0.001$).

For the "affluent", the total treatment cost increased with age, the 16- to 24-year-olds having a mean total cost of 18.2, and the 55- to 65-year-olds, 66.6. For the "deprived", the mean total amounted to 40.3 for the 16- to 24-year-olds, rose to 67.7 for the 35- to 44-year-olds, then decreased to 55.5 for the 55- to 65-year-olds (Fig. 6.12).

Statistical analyses revealed that the treatment need cost was significantly higher amongst the "deprived", for the 16- to 44-years-old age groups, but no such difference was detected among the older groups. However, when edentulous individuals were excluded from the analysis (Table 6.40b), significant differences in the total cost of treatment required were evident for <u>all</u> age groups (Fig. 6.13).

Table 6.39 : Partial lower dentures : "unsatisfactory" rates for every criterion and required replacement rates by area of residence

TYPE OF DENTURE CRITERIA	AFFLUENT n	AFFLUENT Rate	DEPRIVED n	DEPRIVED Rate	TOTAL n	TOTAL Rate
Posterior extension	3	33.3%	2	40.0%	5	35.7%
Peripheral extension	2	22.2%	1	20.0%	3	21.4%
Stability	6	66.7%	2	40.0%	8	57.1%
Occlusal loading	8	88.9%	2	40.0%	10	71.4%
Retention	8	88.9%	2	40.0%	10	71.4%
Denture stomatitis	2	22.2%	1	20.0%	3	21.4%
Dentures requiring replacement	4	44.4%	2	40.0%	6	42.9%
Base	9		5		14	

Table 6.40a : Mean total treatment cost (RRI units) by area of residence (all respondents included)

AGE (yrs)	AFFLUENT x	AFFLUENT SD	AFFLUENT n	DEPRIVED x	DEPRIVED SD	DEPRIVED n	
16-24	18.2	18.1	44	40.3	39.9	48	**
25-34	23.9	30.2	39	52.1	40.0	97	***
35-44	30.7	35.8	47	67.7	55.3	57	***
45-54	49.6	46.8	44	60.0	67.1	51	
55-65	66.6	55.3	39	55.5	68.5	46	
All dentate	37.4	42.5	213	55.0	53.6	299	***

** : p<0.01
*** : p<0.001

Figure 6.12 : Mean total treatment cost (RRI units) by area of residence (all respondents included)

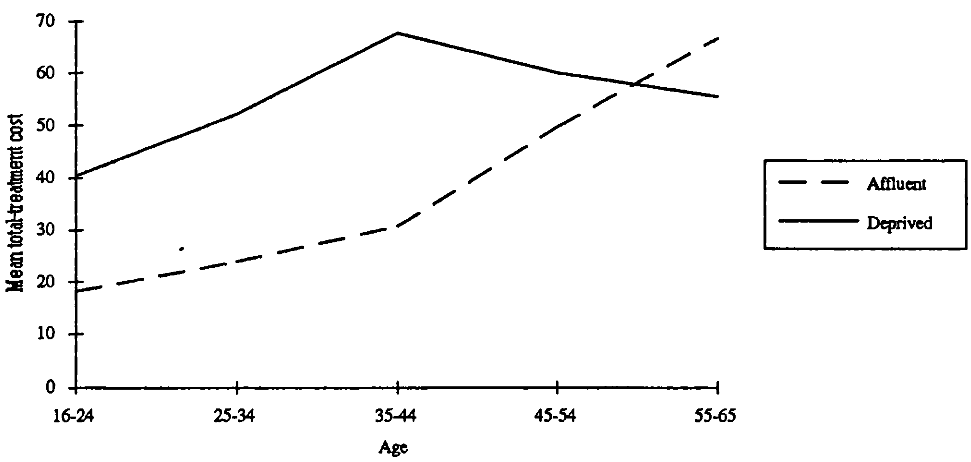
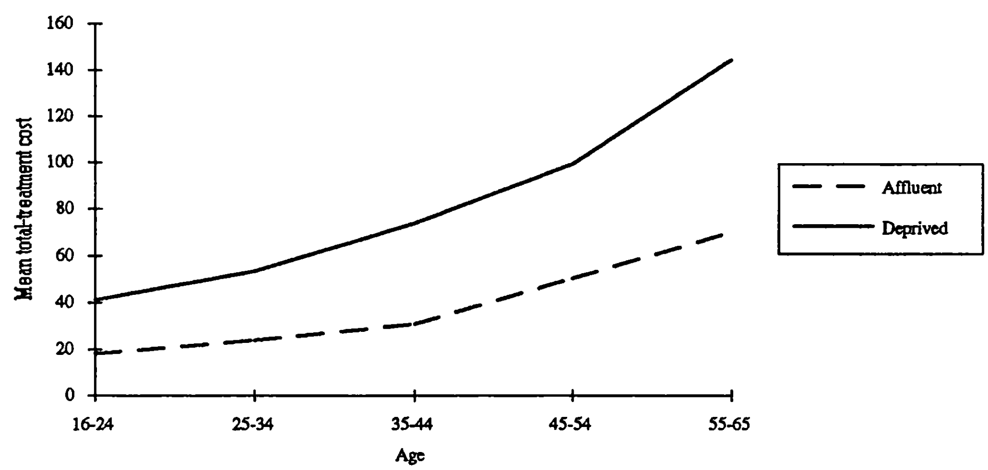


Table 6.40b : Mean total treatment cost (RRI units) by area of residence (edentulous excluded)

AGE (yrs)	AFFLUENT x	AFFLUENT SD	AFFLUENT n	DEPRIVED x	DEPRIVED SD	DEPRIVED n
16-24	18.2	18.1	44	41.0	40.0	47 **
25-34	23.9	30.2	39	53.2	40.1	92 ***
35-44	30.7	35.8	47	73.7	56.2	49 ***
45-54	50.2	47.3	42	99.3	67.1	28 **
55-65	69.8	56.5	35	144.4	41.6	15 ***
All dentate	37.3	42.8	207	66.6	54.7	231 ***

** : p<0.01
*** : p<0.001

Figure 6.13 : Mean total treatment cost (RRI units) by area of residence (edentulous excluded)



As shown in Table 6.41a, the mean total treatment cost for regular attenders (33.9) was significantly lower ($p<0.001$) than that of irregular attenders (55.6). For "regulars", it ranged from 21.5 among respondents aged 16 to 24 years, to 57.6 amongst 55- to 65-year-olds. For irregular attenders aged 16 to 24, the mean cost was 35.7, and this peaked at 64.7 for 35- to 44-year-olds.

Statistical analysis showed that the mean total treatment cost was significantly higher amongst irregular attenders aged 16 to 44 years. When the edentulous population was excluded from the calculations (Table 6.41b), significant differences were detected for all age groups.

When the three components of total treatment cost (restorative, scaling and prosthetic treatment cost) were analysed separately, it was found that the mean restorative cost for the "affluent" dentate population under study (19.0) was significantly lower ($p<0.05$) than that of the "deprived" (23.3) (Table 6.42). Restorative treatment need cost increased throughout life for the "affluent", ranging from 15.3 for 16- to 24-year-olds, to 27.2 for those aged 55 to 65 years. For the "deprived", costs peaked (24.7) at the age of 35 to 44 years, and decreased to 18.1 for the 55- to 65-year-olds (Fig. 6.14).

Statistical analysis revealed that although the mean restorative treatment cost was higher among the "deprived" for all ages, this difference was found to be significant ($p<0.05$) only for the 16- to 24-year-olds.

A similar analysis between regular and irregular dentate dental attenders (Table 6.43) showed that irregular attenders had a significantly higher ($p<0.01$) mean restorative treatment need cost (23.9) as compared to regular attenders (17.8). When age groups were analysed separately, a similar significant difference was found only for the 16- to 34-years-old age groups.

The mean periodontal treatment (scaling) cost for the "affluent" dentate population was 4.9 (Table 6.44) and, when compared to a mean of 8.4 recorded for the "deprived". This difference was found to be highly significant ($p<0.001$). Although for all age groups the "deprived" had higher mean periodontal costs, these differences were not significant for the 16- to 24-, nor for the 45- to 54-year-olds (Fig. 6.15).

As detailed in Table 6.45, the periodontal treatment cost was found to be significantly higher ($p<0.01$) among irregular attenders (mean=7.7), as compared to regular attenders (mean=5.5). When age groups were analysed separately, similar differences (which

Table 6.41a : Mean total treatment cost (RRI units) by dental attendance pattern (all respondents included)

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	21.5	22.6	39	35.7	38.3	53 *
25-34	27.2	29.8	51	54.7	41.1	84 ***
35-44	31.5	28.1	43	64.7	58.4	61 ***
45-54	46.8	44.4	33	59.6	64.7	62
55-65	57.6	50.0	21	60.7	66.7	63
All dentate	33.9	35.6	187	55.6	55.2	323 ***

* : p<0.05
*** : p<0.001

Table 6.41b : Mean total treatment cost (RRI units) by dental attendance pattern (edentulous excluded)

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	21.5	22.6	39	36.3	38.5	52 *
25-34	27.2	29.8	51	56.1	41.2	79 ***
35-44	31.5	28.1	43	69.8	60.0	53 ***
45-54	48.2	44.4	32	88.1	66.8	38 **
55-65	57.6	50.0	21	117.1	60.2	28 **
All dentate	34.0	35.7	186	66.6	56.8	250 ***

* : p<0.05
** : p<0.01
*** : p<0.001

Table 6.42 : Mean restorative treatment cost (RRI units) by area of residence (edentulous excluded)

AGE	AFFLUENT			DEPRIVED		
(yrs)	x	SD	n	x	SD	n
16-24	15.3	16.3	44	23.6	19.3	45 *
25-34	17.5	20.3	38	22.9	21.8	88
35-44	17.8	17.3	46	24.7	22.1	41
45-54	20.1	17.6	39	22.8	23.7	20
55-65	27.2	21.4	29	18.1	12.0	5
All dentate	19.0	18.6	196	23.3	21.2	199 *

* : $p<0.05$

Figure 6.14 : Mean restorative treatment cost (RRI units) by area of residence (edentulous excluded)

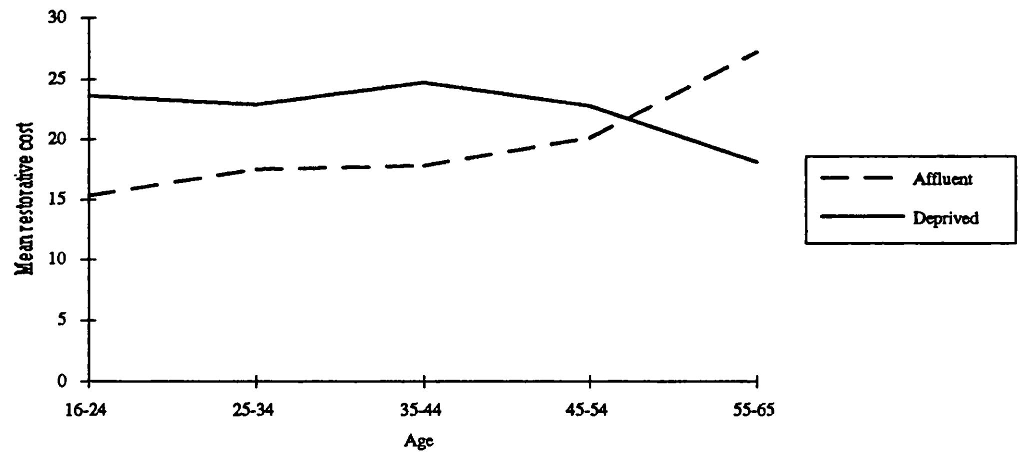


Table 6.43 : Mean restorative treatment cost (RRI units) by dental attendance pattern (edentulous excluded)

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS		
(yrs)	x	SD	n	x	SD	n
16-24	14.9	15.2	39	23.0	19.7	50 *
25-34	14.8	15.8	50	25.8	23.6	75 **
35-44	19.0	14.2	43	23.0	24.2	44
45-54	21.2	19.3	29	20.8	20.4	30
55-65	23.4	19.6	19	26.3	20.0	14
All dentate	17.8	16.5	180	23.9	22.1	213 **

* : $p<0.05$
** : $p<0.01$

Table 6.44 : Mean periodontal treatment (scaling) cost (RRI units) by area of residence (edentulous excluded)

AGE (yrs)	AFFLUENT x	AFFLUENT SD	AFFLUENT n	DEPRIVED x	DEPRIVED SD	DEPRIVED n	
16-24	2.9	6.2	44	5.8	7.8	47	
25-34	2.1	5.4	39	7.8	8.0	92	***
35-44	5.1	7.5	47	9.1	8.0	49	*
45-54	7.2	8.1	42	10.3	7.8	28	
55-65	7.3	8.1	35	13.9	5.6	15	**
All dentate	4.9	7.4	207	8.4	8.0	231	***

* : p<0.05
** : p<0.01
*** : p<0.001

Figure 6.15 : Mean periodontal treatment (scaling) cost (RRI units) by area of residence (edentulous excluded)

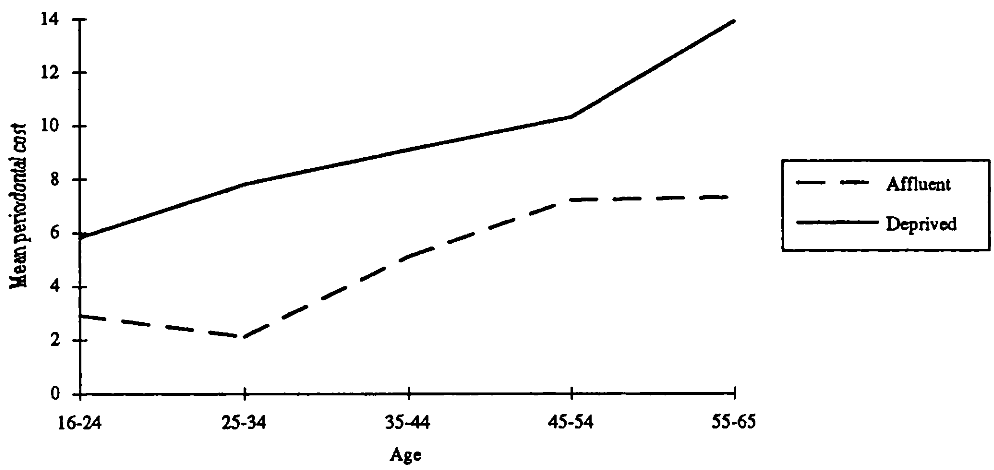


Table 6.45 : Mean periodontal treatment (scaling) cost (RRI units) by dental attendance pattern (edentulous excluded)

AGE (yrs)	REGULAR ATTENDERS x	REGULAR ATTENDERS SD	REGULAR ATTENDERS n	IRREGULAR ATTENDERS x	IRREGULAR ATTENDERS SD	IRREGULAR ATTENDERS n	
16-24	3.7	6.8	39	4.9	7.5	52	
25-34	4.7	7.4	51	7.1	8.0	79	
35-44	5.2	7.6	43	8.8	8.0	53	*
45-54	8.5	8.1	32	8.4	8.1	38	
55-65	6.9	8.1	21	11.4	7.4	28	*
All dentate	5.5	7.6	186	7.7	8.0	250	**

* : p<0.05
** : p<0.01

were significant at the 5% level), were detected for the 35- to 44-, and the 55- to 65-year-olds.

Highly significant ($p<0.001$) differences in the mean prosthetic treatment cost were evident (Table 6.46a) when "affluent" respondents (mean=7.0) were compared to their "deprived" counterparts (mean=16.7). For the " affluent " population under study, the mean prosthetic cost increased with age, ranging from 0.0 for the 16- to 24-year-olds, to 17.9 for 55- to 65-year-olds. In contrast, for the "deprived", costs increased from 5.0 for the 16- to 24-year-olds, to 23.2 among the 35- to 44-year-olds, and decreased to 14.9 among the 55- to 65-year-olds. Costs for prosthetic treatment were significantly higher amongst the "deprived" as compared to the "affluent", for the 16- to 44-years-old age groups (Fig. 6.16).

When edentulous subjects were excluded from the analysis (Table 6.46b), significant differences were detected for <u>all</u> age groups (Fig. 6.17).

A similar analysis, comparing regular and irregular attenders (Table 6.47a), showed that irregular attenders had a significantly higher ($p<0.001$) mean prosthetic treatment cost (16.1) than did their regular counterparts (6.7). When age groups were analysed separately, it was found that the irregular attenders aged 25 to 54 years had significantly higher ($p<0.05$) mean prosthetic treatment costs.

The exclusion of edentulous subjects (Table 6.47b), revealed similar significant differences amongst the same age groups.

Analysis of the mean prosthetic treatment cost of the 74 edentulous persons (Table 6.48), showed that the "affluent" (mean=33.0) had significantly ($p<0.05$) higher mean costs than their "deprived" (mean=10.9) counterparts. However, no differences could be detected for the various age groups. Furthermore, only one regular attender was found amongst the edentulous group, and he was not in need of any treatment (Table 6.49). The mean prosthetic treatment cost of the irregular attenders amounted to 12.8.

Table 6.46a : Mean prosthetic treatment cost (RRI units) by area of residence (all respondents included)

AGE (yrs)	AFFLUENT x	AFFLUENT SD	AFFLUENT n	DEPRIVED x	DEPRIVED SD	DEPRIVED n
16-24	0.0	0.0	44	5.0	16.2	46 *
25-34	1.5	9.2	38	18.1	26.5	93 ***
35-44	4.7	15.3	46	23.2	28.2	49 ***
45-54	13.7	24.7	41	20.2	28.0	43
55-65	17.9	26.0	33	14.9	25.8	36
All dentate	7.0	18.5	202	16.7	26.0	267 ***

* : $p<0.05$
*** : $p<0.001$

Figure 6.16 : Mean prosthetic treatment cost (RRI units) by area of residence (all respondents included)

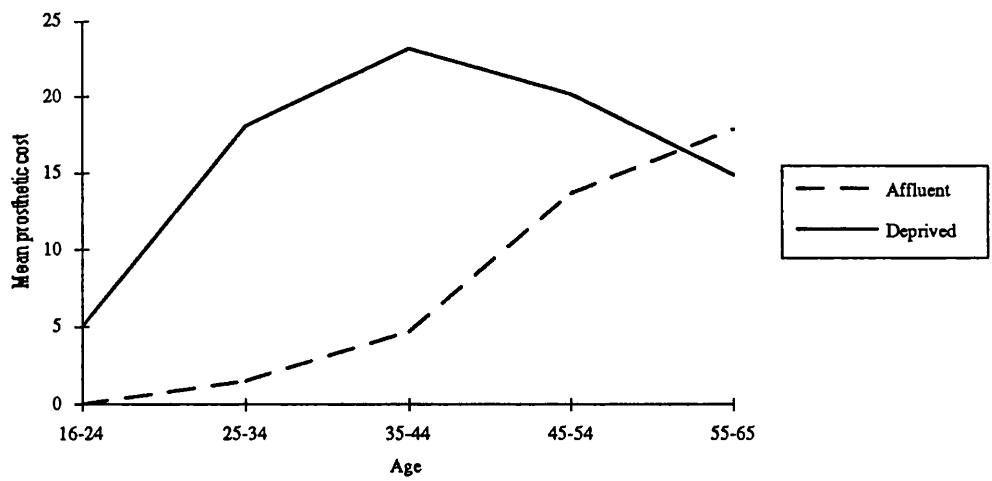


Table 6.46b : Mean prosthetic treatment cost (RRI units) by area of residence (edentulous excluded)

AGE (yrs)	AFFLUENT x	SD	n	DEPRIVED x	SD	n	
16-24	0.0	0.0	44	5.1	16.4	45	*
25-34	1.5	9.2	38	17.6	26.1	88	***
35-44	4.7	15.3	46	22.7	27.7	41	***
45-54	12.7	23.8	39	35.3	29.9	20	**
55-65	15.8	24.2	29	60.8	5.3	5	***
All dentate	6.2	17.3	196	18.7	26.8	199	***

* : $p<0.05$
** : $p<0.01$
*** : $p<0.001$

Figure 6.17 : Mean prosthetic treatment cost (RRI units) by area of residence (edentulous excluded)

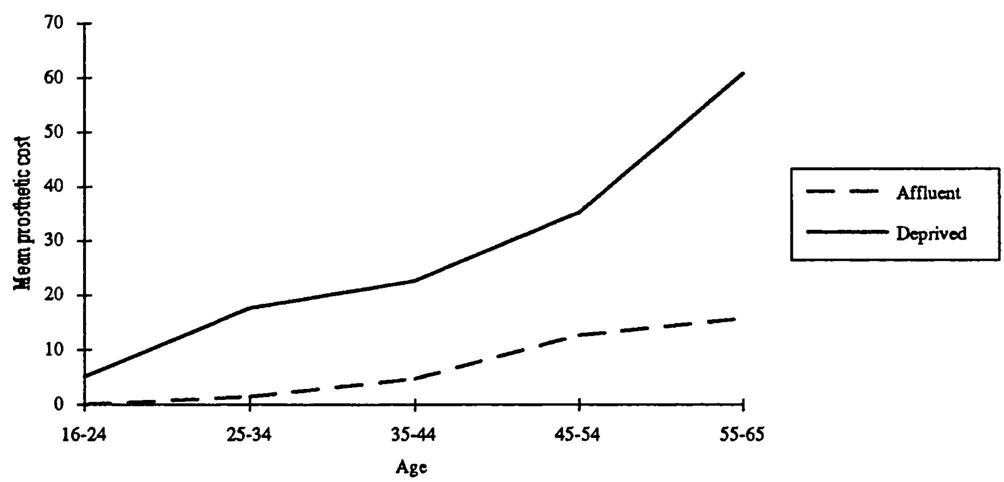


Table 6.47a : Mean prosthetic treatment cost (RRI units) by dental attendance pattern (all respondents included)

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	2.9	12.7	39	2.3	11.2	51
25-34	5.4	16.5	50	18.3	26.7	80 **
35-44	7.3	18.5	43	20.0	27.6	52 **
45-54	6.7	17.5	30	22.8	28.9	54 **
55-65	16.5	25.3	19	15.4	25.8	49
All dentate	6.7	17.8	181	16.1	25.9	286 ***

** : $p<0.01$
*** : $p<0.001$

Table 6.47b : Mean prosthetic treatment cost (RRI) by dental attendance pattern (edentulous excluded)

AGE (yrs)	REGULAR ATTENDERS x	SD	n	IRREGULAR ATTENDERS x	SD	n
16-24	2.9	12.7	39	2.3	11.3	50
25-34	5.4	16.5	50	17.8	26.3	75 **
35-44	7.3	18.5	43	18.9	26.9	44 *
45-54	6.9	17.7	29	33.4	30.0	30 ***
55-65	16.5	25.3	19	27.9	29.7	14
All dentate	6.7	17.8	180	17.2	26.3	213 ***

* : $p<0.05$
** : $p<0.01$
*** : $p<0.001$

Table 6.48 : Mean prosthetic treatment cost (RRI units) of edentulous by area of residence

AGE	AFFLUENT			DEPRIVED		
(yrs)	x	SD	n	x	SD	n
16-24	-	-	-	3.0	0.0	1
25-34	-	-	-	26.6	35.1	5
35-44	-	-	-	25.9	32.4	8
45-54	32.5	46.0	2	7.1	18.3	23
55-65	33.3	36.7	4	7.5	19.2	31
All dentate	33.0	35.1	6	10.9	22.7	68 *

* : p<0.05

Table 6.49 : Mean prosthetic treatment cost (RRI units) of edentulous by dental attendance pattern

AGE	REGULAR ATTENDERS			IRREGULAR ATTENDERS		
(yrs)	x	SD	n	x	SD	n
16-24	-	-	-	3.0	0.0	1
25-34	-	-	-	26.6	35.1	5
35-44	-	-	-	25.9	32.4	8
45-54	0.0	0.0	1	9.5	21.5	24
55-65	-	-	-	10.5	22.6	35
All dentate	0.0	0.0	1	12.8	24.5	73

CHAPTER 7 : ATTITUDES, BELIEFS AND BEHAVIOURS RESULTS

7. ATTITUDES, BELIEFS AND BEHAVIOURS RESULTS

7.1 UTILISATION OF DENTAL SERVICES

7.1.1 Introduction

Dental services utilisation is usually measured by recency of last dental visit (using the cut-off point of one year)[54,60,65,87,91,92,97], and reason for last visit[54,60,91]. In the following analyses, time since last visit to the dentist (using two years as the most recent time-reference point), type. of dental service used, and reasons for the visit are investigated.

7.1.2 Objectives

The objectives of the following analyses were to examine :

1. The time period since respondents had last utilised a dental service.
2. Which type of service had been utilised (General, Community or Hospital Dental Service).
3. The reasons underlying respondents' uptake of dental care, and the association, if any, of these variables with the area of the participants' residence.

7.1.3 Material and method

During the interview all respondents were asked for information about their most recent visit to a dentist: (a) how long it had been since they had visited a dentist, (b) what had made them decide to go, and (c) which type of dental service they had used (General or Community Dental Service, or Dental Hospital). Chi-square tests were used to examine the association of these variables with the area of residence of respondents.

The question *"last time you visited the dentist what made you decide to go to?"* , was partly structured (categories were formed from the findings of the pilot study), and partly open, with coded categories being formed during the final analysis. Respondents were able to give more than one answer.

7.1.4 Results

Of the entire population under study (n=850), 70.9% (603) reported they had visited a dentist within the previous two years. A highly significant ($p<0.001$) association (Table 7.1) between area of residence and time since last visit was found, the "affluent" respondents being much more likely than the "deprived" to have visited

Table 7.1 : Distribution of respondents according to time since their last visit to the dentist, by area of residence

When was the last time you visited the dentist ?	AFFLUENT		DEPRIVED		ALL RESPONDENTS	
	n	%	n	%	n	%
Within last 2 years	317	87.1	286	58.8	603	70.9
2 to 5 years ago	32	8.8	107	22.0	139	16.4
5 to 10 years ago	4	1.1	42	8.6	46	5.4
10 to 15 years ago	2	0.5	27	5.6	29	3.4
More than 15 years ago	9	2.5	24	4.9	33	3.9
Total	364	100.0	486	100.0	850	100.0

x^2=86.1
D.F.=4
p<0.001

a dentist within the last two years.

When the reason for the last dental visit was investigated, it was found that among those who had visited within the last two years, 52.9% (318) reported asymptomatic reasons for attendance (i.e. "time for check-up", "received reminder card for check-up", or "to get teeth cleaned/scaled"). In contrast, those who had visited a dentist more than two years previously were less likely ($p<0.001$) to report an asymptomatic reason (9.8%) for the visit.

A highly significant association ($p<0.001$) was found when the reason for last visit (asymptomatic / symptomatic) was examined in relation to area of residence. "Affluent" respondents were found to be more likely to have attended for asymptomatic reasons, in contrast to "deprived" respondents who were found to be more likely to have attended for symptomatic reasons (Table 7.2).

In Table 7.3, the reasons for the last attendance at the dentist, are shown. For the entire population under study, "time for check-up" was reported as the motivation for attendance by 35.0% (297) of respondents, and "pain or discomfort" was the stimulus for attendance for 30.3% (257) of them. When these two reasons were analysed in relation to area of residence, highly significant associations were detected. Among respondents residing in affluent areas, 58.2% (212) stated "time for check-up" as the reason for the last visit. Of deprived areas residents, 17.5% (85) reported the same reason for attendance. "Pain or discomfort" was the stimulus to attend for 41.0% (199) of the "deprived" population, but only for 15.9% (58) of the "affluent" population. Thus, "affluent" respondents were more likely to have had their most recent visit due to "time for check-up", while the "deprived" attended because of being "in pain or discomfort".

When respondents were asked which dental service they had used at their last visit to the dentist, 92.7% (761) reported the General Dental Service, 4.0% (33) the Community Dental Service, and 3.3% (27) the Hospital Dental Service. Analysis comparing "affluent" to "deprived" populations showed that "affluent" respondents were more likely ($p<0.001$) to have used the General Dental Service, and "deprived" respondents were more likely to have used the Community and Hospital Dental Services.

Table 7.2 : Distribution of respondents according to type of reasons for their last visit to the dentist, by area of residence

Reasons for last visit to the dentist	AFFLUENT		DEPRIVED		ALL RESPONDENTS	
	n	%	n	%	n	%
Asymptomatic	239	65.7	104	21.5	343	40.4
Symptomatic	125	34.3	380	78.5	505	59.6
Total	364	100.0	484	100.0	848	100.0

x^2=166.5
D.F.=1
$p<0.001$

Table 7.3 : Frequency distribution of respondents according to reported reason for last visit to the dentist

Time for check-up	297	35.0%
In pain or discomfort	257	30.3%
Received reminder card for check-up	76	9.0%
To get dentures fitted / repaired	70	8.2%
Part of course of treatment	69	8.1%
Filling fell out / loose	50	5.9%
Broken / loose tooth	37	4.4%
Problems with gums / bleeding	11	1.3%
To get teeth cleaned / scaled	6	0.7%
Encouraged / persuaded by family / friend	6	0.7%
Encouraged / referred by health professional	3	0.4%
Wisdom teeth coming in	1	0.1%
Base	849	

7.2 DENTAL ATTENDANCE

7.2.1 Introduction

As detailed in the literature review, reported regular dental attendance appears to be associated with various socio-economic indicators, even though it is not always an accurate measure of actual dental visiting behaviour. In the following analyses, the profile of the populations under study in relation to dental attendance behaviour (reported, and more objectively defined), is examined.

7.2.2 Objectives

The objectives of the analyses were :

1. To examine the dental attendance behaviour of the population under study, as reported by respondents and as defined objectively, in relation to area of residence.
2. To investigate whether certain life events identified during the qualitative research had been relevant to a change in the dental visiting behaviour.
3. To examine whether there was a relationship between the dental visiting behaviour of parents and children, as reported by parental participants.

7.2.3 Material and method

All subjects, both dentate and edentulous, were asked how often they usually attended the dentist for a check-up. However, this reported regular dental attendance could be compared with a more objectively defined regular attendance pattern derived from participants' responses about the length of time since their most recent visit, and the reasons for it. Regular attenders were objectively defined as those who claimed that they had visited the dentist within the last two years, and whose last visit was either for "time for check-up", or "received reminder card for check-up", or "to get teeth cleaned/scaled".

All dentate and edentulous respondents, apart from those who reported they had never attended the dentist for a regular check-up, were asked whether the following life events had altered their dental visiting behaviour in either a positive or negative way. These life events were *"when I got married"*, *"when I left home"*, *"when my children started going to the dentist"*, *"when I moved house"*, and (for women only) *"when I had my first child"*.

All participants were asked if they had any children under the age of 16 years living with them and whether or not they had ever taken their children to the dentist. A positive response to this question was followed by another concerning the reasons for their children's last visit to the dentist.

Chi-square tests were used to detect associations between the variables described and area of residence.

7.2.4 Results

The data in Table 7.4 show that 64.1% (543) of the respondents reported themselves to be regular attenders, visiting the dentist for check-ups at least once in every two years. Statistical analysis showed a highly significant ($p<0.001$) association between reported dental attendance pattern and area of residence. Those residing in affluent areas were more likely to report that they visited the dentist for a regular check-up either once or twice a year, than were residents of deprived areas.

Of all respondents, 37.5% (318) were found to be regular dental attenders as objectively defined (Table 7. 5). Statistical analysis revealed that in every age group there was a strong association ($p<0.01$) between objectively defined regular attendance and area of residence. Affluent area residents were more frequently regular dental attenders (objectively defined).

Of all subjects who reported they attend regularly every two years or more often, only 57.4% (311) were also found to be regular attenders when defined objectively. However, of all respondents who reported themselves to be irregular attenders, 98.0% (297) were found to be "objectively" defined irregular attenders.

Of those who stated they were edentulous, 18.7% (23) reported that they were regular attenders (attending every two years or more often). However, only 0.6% (2) of the edentulous people were objectively classified as regular attenders. No association between area of residence and attendance pattern was detected amongst the edentulous participants.

Data in Table 7.6 indicate that overall, the majority of respondents did not change their dental visiting behaviour (for regular check-ups), in relation to the life events (i.e. getting married, leaving home, when children started going to dentist, moving house

Table 7.4 : Reported regular dental attendance, by area of residence

How often do you go to the dentist for regular check-ups?	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Never	18	4.9	140	29.0	158	18.7
Not for many years	29	8.0	117	24.2	146	17.2
Every 2 years	24	6.6	36	7.5	60	7.1
Every year	74	20.3	62	12.8	136	16.1
Every 6 months	219	60.2	128	26.5	347	41.0
Total	364	100.0	483	100.0	847	100.0

x^2=161.0, D.F.=4
p<0.001

Table 7.5 : Objectively defined* regular dental attendance, by area of residence

	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Regular Attenders	225	61.8	93	19.2	318	37.5
Irregular Attenders	139	38.2	392	80.8	531	62.5
Total	364	100.0	485	100.0	849	100.0

x^2=159.6, D.F.=1
p<0.001

* Objectively defined regular attenders : Those who reported that they had visited the dentist within the last two years and that the reason was "time for check-up", or "received reminder card for check-up", or "to get teeth cleaned/scaled".

Table 7.6 : Distribution of respondents according to their responses to the question *'has any of the following changed how often you attend the dentist for regular check-ups?'*

	Started going/ more often		Made no difference		Less often/ stopped		Total	
	n	%	n	%	n	%	n	%
When I got married	36	7.2	446	89.4	17	3.4	499	100.0
When I left home	34	6.1	496	89.0	27	4.8	557	100.0
When my children started going to the dentist	83	17.7	379	80.6	8	1.7	470	100.0
When I moved house	29	4.9	537	90.9	25	4.2	591	100.0
When I had my first child	90	27.2	236	71.3	5	1.5	331	100.0

and when women had their first baby). These factors had been identified as influences on dental attendance during the preliminary qualitative research. However, analysis of the responses between "affluent" and "deprived" regarding changes in visiting in relation to life events, revealed that significantly ($p<0.05$) more "deprived" respondents changed how often they visited dentists for regular check-ups after they married. Further analysis, including only those who changed their dental visiting pattern in this case, failed to detect any association between area of residence and a change into a better or worse dental visiting pattern.

Additional analysis was carried out comparing those for whom none of the prompted life events had any impact on their dental attendance pattern, and those for whom at least one life event did so influence their dental visiting behaviour. In the entire population, 66.9% (326) reported they had not changed their dental visiting behaviour (for regular check-ups) in response to any one of the life events mentioned. Among the "affluent", 72.3% (180) were found in the category of "no change in response to any of the life events", as compared to 61.3% (146) amongst the "deprived" (x^2=6.1, D.F.=1, $p<0.05$).

Of the 334 respondents who reported that they had children at home under the age of 16 years, 83.5% (279) stated they had taken their child(ren) to the dentist. No area of residence bias was detected. However, regular attenders were found to be more likely ($p<0.05$) to have taken their child(ren) to the dentist, i.e. of the 279 who had taken their child(ren) to the dentist, 41.4% (115) were regular dental attenders. Of the remaining 55 who had not taken their child(ren) to the dentist, only 25.5% (14) were regular attenders ($p<0.05$, x^2=4.3, D.F.=1).

Further analysis revealed that both area of residence and dental attendance pattern of the parent were highly significantly ($p<0.001$) associated with the reason for the visit of their child(ren) to the dentist. "Affluent" respondents and regular attenders were more likely to report asymptomatic reasons for their child(ren)'s visit to the dentist, than their "deprived" and irregularly attending counterparts.

Of the "affluent" parents who had taken their child(ren) to the dentist, 82.3% (79) reported an asymptomatic reason ("time for check-up", "received reminder card for check-up", "to set a good example"). In contrast, of the "deprived" parents who had taken their child(ren) to the dentist, only 54.4% (98) reported an asymptomatic reason for so doing (x^2=19.9, D.F.=1, p<0.001).

Of the regular attenders (as objectively defined) who had taken their child(ren) to the dentist, 76.1% (86) reported an asymptomatic reason for the visit, compared to their irregular counterparts, of whom 55.6% (90) had taken their child(ren) to the dentist for an asymptomatic reason (x^2=11.3. D.F.=1, p<0.001).

7.3 ORAL HYGIENE

7.3.1 Introduction

As detailed in the literature review it appears that dental self-care practices and use of dental cleaning aids are not equally prevalent among social sub-groups of populations. Furthermore, differences have been found in relation to the importance attached to tooth-brushing by various population groups[128]. The following analyses examine toothbrushing behaviour and beliefs and attitudes of the study sample.

7.3.2 Objectives

The objectives of the following analyses were to :

1. To examine the toothbrushing behaviour of respondents
2. To examine respondents' belief about optimal toothbrushing frequency and compare this to their reported toothbrushing behaviour.
3. To examine potential stimuli to toothbrushing behaviour.
4. To examine respondents' attitudes towards reasons for toothbrushing which had been identified in the qualitative research.
5. To determine respondents' usage of commercial oral hygiene products.

7.3.3 Material and method

All respondents who reported that they were dentate were asked how often they brushed their teeth, and whether they had changed their toothbrushing behaviour since they were younger. They were also asked to give their opinion on "how often people should brush" their teeth. Chi-square tests were used in the analyses.

During the group discussions, five situations had been identified which participants said prompted toothbrushing. These were "first thing in the morning", "last thing at night", "after meals", "before meals", and "when getting ready to go out for the evening".

During the interviews, these situations were discussed, and respondents were asked how likely they were to brush in each of these situations. They had to choose from four alternative answers ranging from "very likely" (score=1), to "not at all likely" (score=4). Thus, the lower the score, the more likely respondents were to brush their teeth in the situations described. The scores of affluent and deprived respondents, and regular and irregular attenders, were analysed using the Mann-Whitney U test.

During the group discussions six reasons were given by participants for brushing teeth. These were "to remove plaque", "to have fresh breath", "to put fluoride on my teeth", "to prevent decay", "to have white teeth" and "to reduce gum disease". During the interviews, dentate respondents were asked how important each of these reasons was for them personally, the alternative responses ranging from "very important" (score=1), to "not at all important" (score=4). Thus, the lower the score, the more important a reason was. The scores of affluent and deprived respondents, and regular and irregular attenders, were analysed using the Mann-Whitney U test.

Finally, in the course of group discussions, certain commercial oral hygiene products were mentioned by the participants. These were "fluoride toothpaste", "non-fluoride toothpaste", "smokers toothpaste", "mouth spray", "dental chewing gum", "dental floss", and "mouthwash". During the interviews, respondents were asked when they had last changed their toothbrush, whether they regularly used the products mentioned above, and whether they had tried or used them occasionally or whether they had never used them. In the analyses by area of residence, chi-square tests of association were used.

7.3.4 Results

Reported frequency of toothbrushing was found to be strongly associated ($p<0.001$) with area of residence and objectively defined dental attendance pattern. Residents of affluent areas and regular attenders were more likely to report a higher toothbrushing frequency behaviour.

Of the "affluent" dentate respondents, for whom this information was available, 90.3% (315) reported that they brushed their teeth two or more times a day, as compared to 71.7% (268) of their "deprived" counterparts (Table 7.7). Of the dentate regular attenders, 90.8% (286) reported they brushed their teeth two or more times a day, while the comparable figure for dentate irregular attenders was 72.9% (296) (Table 7.8).

Table 7.7 : Reported tooth-brushing frequency, by area of residence

Toothbrushing frequency	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Less than once per day	5	1.4	54	14.4	59	8.2
Once per day	29	8.3	52	13.9	81	11.2
Twice per day	199	57.0	200	53.5	399	55.2
Three or more times per day	116	33.2	68	18.2	184	25.4
Total	349	100.0	374	100.0	723	100.0

x^2=59.0
D.F.=3
p<0.001

Table 7.8 : Reported tooth-brushing frequency, by dental attendance pattern

Toothbrushing frequency	REGULAR ATTENDERS		IRREGULAR ATTENDERS		Total	
	n	%	n	%	n	%
Less than once per day	3	1.0	56	13.8	59	8.2
Once per day	26	8.3	54	13.3	80	11.1
Twice per day	187	59.4	212	52.2	399	55.3
Three or more times per day	99	31.4	84	20.7	183	25.4
Total	315	100.0	406	100.0	721	100.0

x^2=49.5
D.F.=3
p<0.001

Statistical analysis revealed a strong association ($p<0.001$), between area of residence and a change of brushing behaviour since respondents were younger. "Deprived" respondents were more likely to report that they had changed their brushing behaviour than "affluent" respondents (Table 7.8). The proportion of "deprived" respondents who reported a change in brushing behaviour amounted to 65.2% (238), and of the "affluent", 49.4% (173). No significant association could be detected between dental attendance pattern and change of brushing behaviour.

Further analysis, including only those who reported that their brushing behaviour had changed, revealed that "deprived" respondents were more likely ($p<0.001$) than the "affluent" to report that they brushed less often than when they were younger (Table 7.9). The proportion of "deprived" who brushed less often was 31.9% (76), as compared to 13.3% (23) of the "affluent" who claimed to brush less often.

A similar analysis (including the 411 respondents who reported a change in their brushing behaviour) examining the association between the type of change of brushing behaviour and the dental attendance pattern was carried out. It was found that irregular attenders were more likely ($p<0.001$) than regular attenders to report that they brushed their teeth less often than when they were younger (Table 7.10)

When dentate respondents were asked to give their opinion on "how often should people brush their teeth?", 34.3% (247) thought that three or more times a day was the optimal frequency, 56.4% (406) answered "twice a day", and 6.3% (45) answered "once a day". In the opinion of 3.1% (22) of the respondents, optimal toothbrushing frequency was less than once a day (Table 7.11). Analysis in relation to area of residence showed that "affluent" respondents were more likely ($p<0.01$) than the "deprived" to report "three or more times a day" as the optimal frequency for brushing teeth.

The distribution of dentate respondents according to their belief on "how often people should brush their teeth", by how often they reported that they did actually brush, is shown in Table 7.12. Among those who thought that people should brush less than once a day, 50.0% (10) reported that they actually did so. Among the respondents who believed that people should brush their teeth once a day, 55.6% (25) reported they did so. Amongst subjects who considered "twice a day" as the optimal tooth brushing frequency, 71.1% (288) reported they did so, while for those who answered that people

Table 7.9 : Distribution of dentate respondents who reported that they had changed their toothbrushing behaviour since they were younger, by area of residence

Type of change	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Brush more often	150	86.7	162	68.1	312	75.9
Brush less often	23	13.3	76	31.9	99	24.1
Total	173	100.0	238	100.0	411	100.0

x^2=18.0
D.F.=1
p<0.001

Table 7.10 : Distribution of dentate respondents who reported that they had changed their toothbrushing behaviour since they were younger, by dental attendance pattern

Type of change	REGULAR ATTENDERS		IRREGULAR ATTENDERS		Total	
	n	%	n	%	n	%
Brush more often	149	85.1	162	69.2	311	76.0
Brush less often	26	14.9	72	30.8	98	24.0
Total	175	100.0	234	100.0	409	100.0

x^2=13.1
D.F.=1
p<0.001

Table 7.11 : Distribution of dentate respondents according to their response to the question *'how often do you think that people should brush their teeth?'*, by area of residence

How often should people brush their teeth?	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Less than once per day	6	1.7	16	4.3	22	3.1
Once per day	13	3.8	32	8.6	45	6.3
Twice per day	192	55.5	214	57.2	406	56.4
Three or more times per day	135	39.0	112	29.9	247	34.3
Total	346	100.0	374	100.0	720	100.0

x^2=14.8
D.F.=3
p<0.01

Table 7.12 : Distribution of dentate respondents according to their belief on how often people should brush, by how often they actually brush their teeth

How often should people brush their teeth?	How often do you brush your teeth ? (per day) Less than once		Once		Twice		Three or more		Total	
	n	%	n	%	n	%	n	%	n	%
Less than once per day	10	**50.0**	3	15.0	3	15.0	4	20.0	20	100.0
Once per day	10	22.2	25	**55.6**	10	22.2			45	100.0
Twice per day	24	5.9	39	9.6	288	**71.1**	54	13.3	405	100.0
Three or more times per day	14	5.7	13	5.3	94	38.2	125	**50.8**	246	100.0
Total	58	8.1	80	11.2	395	55.2	183	25.6	716	100.0

should brush three or more times a day, 50.8% (125) reported they actually brushed three times a day or more.

Thus, the overall belief-behaviour conversion rate for the dentate population under study was 62.6% (448). However, the highest belief-behaviour conversion rate was 71.1% (288), and was recorded for those who believed that people should brush twice a day.

Among all respondents, 10.3% (74) reported that they brushed their teeth more often than the frequency they believed to be optimal, and 27.1% (194) less often.

During the interviews, subjects were asked how likely they were to brush in each of certain situations which were identified in the qualitative research. In Table 7.13a, the results of the statistical analysis employed (Mann-Whitney U test), comparing "affluent" to "deprived" respondents, are shown. The lower the score, the more likely respondents were to brush their teeth in each of the cases.

"Affluent" dentate respondents were found to be more likely ($p<0.001$) than their "deprived" counterparts to brush their teeth "first thing in the morning", and "last thing at night". "Deprived" dentate respondents were found to be more likely than their "affluent" counterparts to brush their teeth "before meals", and "when getting ready to go out for the evening".

A similar analysis comparing dentate regular to irregular dental attenders (Table 7.13b) showed that regular attenders were more likely ($p<0.001$) than irregular attenders to brush their teeth "first thing in the morning" and "last thing at night". Irregular attenders were more likely ($p<0.01$) than regular attenders to brush "before meals".

During the interviews, dentate respondents were asked how important each of the reasons for toothbrushing (which had been identified in the qualitative research) was for them personally. In Table 7.14a, the results of the statistical analysis employed (Mann-Whitney U test), comparing dentate "affluent" to "deprived" respondents, are shown. The lower the score, the more important the reason.

For the "affluent", "to prevent decay" and "to reduce gum disease" was a significantly ($p<0.05$) more important reason for brushing teeth than for the "deprived". For the latter, "to put fluoride on my teeth" was a significantly ($p<0.001$) more important reason for brushing teeth than for the "affluent" respondents.

Table 7.13a : Mean scores of likelihood to brush teeth in each of the situations stated, for "affluent" and "deprived" dentate respondents (the lower the score the more likely respondents are to brush their teeth)

	AFFLUENT			DEPRIVED				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
First thing in the morning	1.2	330.72	350	1.5	395.78	378	54327.0	***
Last thing at night	1.3	311.30	350	1.7	413.76	378	47529.0	***
After meals	2.6	369.06	350	2.6	359.30	377	64204.0	NS
Before meals	3.6	405.31	349	3.3	324.79	377	51194.0	***
When getting ready to go out for the evening	1.4	382.35	350	1.3	347.98	378	59904.0	**

NS : not significant
** : p<0.01
***: p<0.001

Table 7.13b : Mean scores of likelihood to brush teeth in each of the situations stated, for dentate regular and irregular attenders (the lower the score the more likely respondents are to brush their teeth)

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
First thing in the morning	1.2	328.52	316	1.5	390.46	410	53726.5	***
Last thing at night	1.3	328.05	316	1.7	390.82	410	53578.0	***
After meals	2.5	346.78	316	2.6	375.53	409	59496.5	NS
Before meals	3.5	387.39	316	3.4	343.22	408	56598.0	**
When getting ready to go out for the evening	1.3	346.44	316	1.5	376.65	410	59390.0	NS

NS : not significant
** : p<0.01
***: p<0.001

Table 7.14a : Mean scores of importance attached to each of the stated reasons for brushing teeth, for "affluent" and "deprived" dentate respondents (the lower the score the more important the reason for brushing teeth)

	AFFLUENT			DEPRIVED				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
To remove plaque	1.2	357.70	348	1.2	368.84	378	63753.0	NS
To have fresh breath	1.2	357.95	349	1.2	369.59	378	63849.5	NS
To put fluoride on teeth	2.3	387.21	344	2.0	335.04	375	55140.0	***
To prevent decay	1.1	352.62	348	1.2	372.58	377	61985.5	*
To have white teeth	1.5	369.91	349	1.5	358.55	378	63899.5	NS
To reduce gum disease	1.2	351.16	348	1.3	374.87	378	61476.0	*

NS : not significant
* : $p<0.05$
***: $p<0.001$

Table 7.14b : Mean scores of importance attached to each of the stated reasons for brushing teeth, for dentate regular and irregular attenders (the lower the score the more important the reason for brushing teeth)

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
To remove plaque	1.1	348.85	316	1.2	373.07	408	60150.0	*
To have fresh breath	1.2	352.63	316	1.2	371.01	409	61346.0	NS
To put fluoride on teeth	2.1	362.40	313	2.1	356.37	404	62161.5	NS
To prevent decay	1.1	339.13	316	1.2	379.76	407	57077.5	***
To have white teeth	1.5	361.73	316	1.5	363.98	409	64221.0	NS
To reduce gum disease	1.2	340.29	315	1.3	379.61	409	57421.5	***

NS : not significant
* : $p<0.05$
***: $p<0.001$

A similar analysis comparing dentate regular to irregular dental attenders (Table 7.14b) showed that for regular attenders it was significantly more important to brush their teeth "to remove plaque", "to prevent decay", and "to reduce gum disease" than was the case for irregular attenders.

Statistically, there was not enough evidence to claim that there was a difference in the importance attached to "fresh breath" and "white teeth" between "affluent" and "deprived" respondents, or between regular and irregular attenders.

All dentate respondents were asked when they had last changed their toothbrush. Nine respondents reported they had never used a toothbrush (one was resident of affluent area, and eight were residents of deprived areas). The distributions of respondents according to time since they last changed their toothbrush, by area of residence and dental attendance pattern, are shown in Tables 7.15a and b, respectively. Significant associations were detected, the "affluent" ($p<0.01$) and the regular attenders ($p<0.05$) being more likely to report a shorter time period since they had last replaced their toothbrush.

In Table 7.16, the distribution of the respondents according to commercial products usage, by area of residence, is shown. Statistical analysis indicated that "affluent" respondents were more likely than "deprived" respondents to use fluoride toothpaste and dental floss regularly. "Deprived" respondents were more likely than "affluent" to have used smokers toothpaste and mouthwash.

7.4 DIET

7.4.1 Introduction

Dietary habits have an effect on both general and dental health. Sugar consumption, which has a direct effect on dental health, has been reported to be associated with education[100]. Restriction of sugar consumption, together with other self-care practices, has been found to be related to education and income[99].

7.4.2 Objective

The objective of the following analyses was to examine the attitudes of respondents towards diet as a factor contributing to general and dental health.

Table 7.15a : Distribution of respondents according to time since they had last replaced their toothbrush, by area of residence

When was the last time you changed your toothbrush?	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Within last 3 months	245	70.4	222	60.0	467	65.0
3 to 6 months ago	69	19.8	80	21.6	149	20.8
6 to 12 months ago	26	7.5	48	13.0	74	10.3
More than 12 months ago	8	2.3	20	5.4	28	3.9
Total	348	100.0	370	100.0	718	100.0

x^2=13.0
D.F.=3
p<0.01

Table 7.15b : Distribution of respondents according to time since they had last replaced their toothbrush, by dental attendance pattern

When was the last time you changed your toothbrush?	REGULAR ATTENDERS		IRREGULAR ATTENDERS		Total	
	n	%	n	%	n	%
Within last 3 months	221	69.9	245	61.1	466	65.0
3 to 6 months ago	63	19.9	86	21.4	149	20.8
6 to 12 months ago	23	7.3	51	12.7	74	10.3
More than 12 months ago	9	2.8	19	4.7	28	3.9
Total	316	100.0	401	100.0	717	100.0

x^2=9.0
D.F.=3
p<0.05

Table 7.16 : Distribution of dentate respondents according to their responses to the question *'how often do you use these products which people have said that they use for their teeth and gums?'*

		Use regularly		Tried/use occasionally		Never used		Total		
		n	%	n	%	n	%	n	%	
Fluoride toothpaste	Affluent	291	84.3	43	12.5	11	3.2	345	100.0	x^2=8.3
	Deprived	284	75.7	71	18.9	20	5.3	375	100.0	d.f.=2
	Total	575	79.9	114	15.8	31	4.3	720	100.0	$p<0.05$
Non-fluoride toothpaste	Affluent	41	12.1	185	54.6	113	33.3	339	100.0	x^2=3.7
	Deprived	31	8.4	196	53.1	142	38.5	369	100.0	d.f.=2
	Total	72	10.2	381	53.8	255	36.0	708	100.0	NS
Smokers toothpaste	Affluent	7	2.0	53	15.2	289	82.8	349	100.0	x^2=63.0
	Deprived	41	10.8	124	32.8	213	56.3	378	100.0	d.f.=2
	Total	48	6.6	177	24.3	502	69.1	727	100.0	$p<0.001$
Mouth spray	Affluent	7	2.0	104	29.8	238	68.2	349	100.0	x^2=1.7
	Deprived	13	3.4	118	31.2	247	65.3	378	100.0	d.f.=2
	Total	20	2.8	222	30.5	485	66.7	727	100.0	NS
Dental chewing gum	Affluent	8	2.3	75	21.4	267	76.3	350	100.0	x^2=4.0
	Deprived	13	3.4	101	26.7	264	69.8	378	100.0	d.f.=2
	Total	21	2.9	176	24.2	531	72.9	728	100.0	NS
Dental floss	Affluent	57	16.3	167	47.7	126	36.0	350	100.0	x^2=112.8
	Deprived	7	1.9	95	25.3	274	72.9	376	100.0	d.f.=2
	Total	64	8.8	262	36.1	400	55.1	726	100.0	$p<0.001$
Mouthwash	Affluent	46	13.2	174	49.9	129	37.0	349	100.0	x^2=7.2
	Deprived	61	16.1	212	56.1	105	27.8	378	100.0	d.f.=2
	Total	107	14.7	386	53.1	234	32.2	727	100.0	$p<0.05$

NS : not significant

7.4.3 Material and method

All respondents were asked how important they thought that "eating a good diet" is to keeping healthy, the alternative answers ranging from "very important" to "not at all important". Proportions were compared with the test statistic for the difference of two proportions.

All participants were also asked whether they had ever tried to change their diet for any reason. A positive answer was followed by a question seeking more details about this change. Additionally, they were asked whether they had ever tried to alter their diet for dental health reasons, and further details about this change were sought after a positive response. Chi-square tests were employed to detect associations in relation to area of residence.

7.4.4 Results

Of all respondents, 68.6% (580) considered "eating a good diet" as very important to keeping healthy. A significantly ($p<0.001$) higher proportion of "affluent" respondents held this opinion when compared to their "deprived" counterparts. Among the "affluent", 80.6% (295) thought eating a good diet was very important to keeping healthy, and for the "deprived" respondents, 59.4% (285) held the same opinion.

Amongst regular attenders, 76.0% (241) respondents thought that eating a good diet was important to keeping healthy. This proportion was significantly ($p<0.01$) higher than the proportion of 64.1% (337) found among the irregular attenders who held the same opinion.

When subjects were asked whether they had ever tried to change their diet, 55.4% (471) answered positively. Statistical analysis showed that there was a highly significant ($p<0.001$) association between change of diet and area of residence, the "affluent" respondents being more likely to report a change in their diet than the "deprived" (Table 7.17a). A similar analysis in relation to dental attendance pattern detected a significant ($p<0.05$) association, the regular attenders being more likely to report a change in diet than irregular attenders (Table 7.17b).

When those who reported they had changed their diet for some reason were asked to give more details, it was found that the most prevalent change (stated by 50.6% (228)) was to reduce the amount of fat consumed (Table 7.18). Reduced consumption of sugar was quoted by 28.4% (128) of the respondents, and increased amount of fibre was reported by 26.8% (121). Statistical analysis showed that a higher ($p<0.05$) proportion

Table 7.17a : Distribution of respondents according to whether they had tried to change their diet, by area of residence

Have you ever tried to change your diet?	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Yes	230	62.8	241	49.8	471	55.4
No	136	37.2	243	50.2	379	44.6
Total	366	100.0	484	100.0	850	100.0

x^2=13.8, D.F.=1
$p<0.001$

Table 7.17b : Distribution of respondents according to whether they had tried to change their diet, by dental attendance pattern

Have you ever tried to change your diet?	REGULAR ATTENDERS		IRREGULAR ATTENDERS		Total	
	n	%	n	%	n	%
Yes	192	60.6	277	52.3	469	55.4
No	125	39.4	253	47.7	378	44.6
Total	317	100.0	530	100.0	847	100.0

x^2=5.2, D.F.=1
$p<0.05$

Table 7.18 : Type of diet change and reasons for these changes

Type of diet change	n	%
Less fat	228	50.6
Less sugar	128	28.4
More fibre	121	26.8
Less red meat	44	9.8
More protein	16	3.5
Less alcohol	13	2.9
Base	451	

Reasons for diet change	n	%
To lose weight	251	55.3
Specific health problem	107	23.6
For general health improvement	87	19.2
Because of being pregnant	5	1.1
Base	454	

of "affluent" respondents (32.4%) reported increased consumption of fibre when compared to "deprived" respondents (21.8%).

The most prevalent reason given for any one of the changes reported was "to lose weight" which was reported by 55.3% (251) of respondents. A significantly ($p<0.05$) higher proportion of "deprived" (60.0%) gave this reason for a diet change than of "affluent" respondents (50.2%).

A specific health problem was the stimulus to a diet change for 23.6% (107) of subjects. A significantly ($p<0.05$) higher proportion of the "deprived" (28.1% (66)) reported this reason than did "affluents" (18.7% (41)).

Improvement of health and well-being in general, was the reason for the diet change for 19.2% (87) of the participants. A higher proportion of the "affluent" (26.9% (59)) than of the "deprived" (11.9% (28)) gave this reason.

Of all respondents who reported that they had reduced their sugar intake, 77.4% (96) had done so in order to lose weight, 13.7% (17) to improve their health and well-being in general, and the same proportion (13.7%) for a specific health problem Only four respondents had reduced their sugar consumption in order to keep their teeth healthy and three respondents reported they had done so for a specific dental health problem.

Data in Tables 7.19a and 7.19b show the distribution of subjects according to their responses to the question "have you ever tried to change your diet for dental health reasons", by area of residence and dental attendance pattern respectively. Significant associations were detected, the "affluent" being more likely ($p<0.001$) than the "deprived", and the regular attenders being more likely ($p<0.05$) than the irregular attenders, to report a change in their diet for dental health reasons.

Overall, of all respondents, 6.5% (55) reported that they had tried to change their diet for dental health reasons. A reduced amount of sugar intake was reported by 84% (42) of them (Table 7.20). A reason given for a dental health-related change in diet was "to keep teeth healthy", this being reported by 33.3% (15) of this group of respondents. A specific dental health problem was the stimulus to a diet change for 33.3% (15). Only two respondents reported that they changed their diet after being advised to do so by their dentist.

Table 7.19a : Distribution of respondents according to whether they had tried to change their diet for dental health reasons, by area of residence

Have you ever tried to change your diet for dental health reasons?	AFFLUENT		DEPRIVED		Total	
	n	%	n	%	n	%
Yes	36	9.9	19	3.9	55	6.5
No	327	90.1	463	96.1	790	93.5
Total	363	100.0	482	100.0	845	100.0

$x^2=11.2$
D.F.=1
$p<0.001$

Table 7.19b : Distribution of respondents according to whether they had tried to change their diet for dental health reasons, by dental attendance pattern

Have you ever tried to change your diet for dental health reasons?	REGULAR ATTENDERS		IRREGULAR ATTENDERS		Total	
	n	%	n	%	n	%
Yes	28	8.9	26	4.9	54	6.4
No	287	91.1	501	95.1	788	93.6
Total	315	100.0	527	100.0	842	100.0

$x^2=4.5$
D.F.=1
$p<0.05$

Table 7.20 : Type of diet change and reasons for these changes

Type of diet change for dental health reasons	n	%
Less sugar	42	84.0
Base	50	

Reasons for diet change	n	%
To keep teeth healthy	15	33.3
Specific dental problem	15	33.3
Advised by dentist	2	4.4
Base	45	

Of all those who changed their diet for a health reason, only 9.0% (42) also changed it for a dental health reason. In contrast, of those who had changed their diet for a dental health reason, 76.4% (42) had also changed it for general health reasons.

7.5 DENTAL HEALTH AS A HEALTH ISSUE

7.5.1 Introduction

During the qualitative group discussion, it emerged that dental health was not perceived as a health issue. This finding was in accordance with findings of other studies, where dental health has been reported to form a separate dimension than that of general health[197]. Given that dental disease is not perceived as life-threatening[103], dental issues are not considered health issues[196,198]. The following analyses used the available data to examine the perceptions of the populations under study.

7.5.2 Objectives

The objective of the following analyses was to examine the attitude of respondents towards dental health as a health issue, by investigating the correlation of the importance attached to dental health and general health by the respondents.

7.5.3 Material and method

In the qualitative phase of the study, the following nine items were raised as being important to keeping healthy". These were : "getting enough sleep", "looking after feet", "eating a good diet", "brushing your teeth regularly", "not drinking too much alcohol", "storing fresh foods correctly", "visiting the dentist regularly", "keeping your weight at a reasonable level", and "avoiding too much stress". In the quantitative phase, respondents were asked how important to keeping healthy they thought the above mentioned nine items were. The alternative answers ranged from "very important" (score=1), to "not at all important" (score=4).

Of the nine items listed, two subscales were calculated. One concerned the importance attached to dental health, the score being the sum of the scores of the importance of "visiting dentist regularly" and "brushing teeth regularly". The other concerned the importance attached to general health, the score being the sum of the scores of the remaining seven items. Spearman's correlations of the two scores were calculated.

7.5.4 Results

"Brushing teeth regularly" was considered as very important to keeping healthy by 76.3% (649) of the respondents. Analysis showed that among the "affluent", 80.9% (296) held this opinion, as compared to 72.8% (353) of the "deprived", the difference being significant ($p<0.01$). "Visiting dentist regularly", was considered as very important to keeping healthy by 59.6% (507) of the respondents, with a significantly higher ($p<0.01$) proportion of "affluent" (65.8%) holding this opinion, as compared to the "deprived" (54.9%).

When the internal consistency of the nine items was tested, it was found that the Cronbach's α-reliability coefficient was 0.71 (n=844). However, when the internal consistency of the two sub-scales was tested, it was found that the Cronbach's α-reliability coefficient for the dental scale was 0.59 (n=850), and that for the general health scale was 0.63 (n=829).

When the correlation of the score attached to general health and to dental health was examined for the entire population, the Spearman correlation coefficient was found to be 0.47 ($p<0.001$, n=827).

Finally, when Spearman correlations between the General Health Score and the Dental Health Score were calculated separately for the "affluent" and the "deprived", it was found that the correlation coefficient for the "affluent" was 0.45 (n=360, $p<0.001$), and for the "deprived" it was 0.48 (n=467, $p<0.001$).

7.6 ATTITUDES TOWARDS DENTURES - NATURAL TEETH

7.6.1 Introduction

The acceptability of false teeth and dentures has been reported to differ in relation to social background[2,119,120]. There is thus an implicit assumption, that when false teeth are more acceptable, natural teeth are less valued and less appealing. The following analyses examine attitudes to dentures, and the image of a person with a natural dentition, in contrast to the image of a person with dentures.

7.6.2 Objectives

The objectives of the following analyses were :

1. To examine the extent of respondents' agreement with certain statements (identified in the qualitative research) which related to attitudes towards false and natural teeth.

2. To examine participants' perceptions of the image of a person with dentures, and of a person with natural teeth only.

7.6.3 Material and method

During the interview, adults who relied on natural teeth only and had never had any dentures, were asked to report the extent to which they agreed or disagreed (on a 'strongly agree' -score:1, to 'strongly disagree' - score:6 scale) with eight statements, drawn from the group discussions, relating to dentures and loss of teeth. These were :

(a) *'you tend to think people who wear dentures have let themselves go a bit'*

(b) *'I'll do almost anything to hold on to my own teeth'*

(c) *'when you think of dentures you tend to think of the elderly'*

(d) *'you tend to think that people who wear dentures haven't been brought up properly'*

(e) *'when I get older, I expect I'll eventually have to wear dentures'*

(f) *'the thought that I might have to wear dentures, doesn't really bother me that much'*

(g) *'people who try to hang on to their teeth for as long as they can are really just being vain'*

(h) *'when you've got bad teeth and you have a lot of bother with them, then you're better just to have them out than try to hold on to them'*

In the analysis, the proportions of respondents who agreed with the statements are given, and chi-square tests examining the association of the extent of agreement and area of residence of respondents, were employed.

All subjects were asked to imagine the kind of person who wears dentures, and the kind of person who has all his/her natural teeth. They were then asked to tick, on a 1 - 7 scale, the five prompted images, i.e. old / young, poor / well off, dirty / clean, not bothered about appearance / bothered about appearance, and unfit / fit, all of which had been identified in the qualitative research as being relevant to the subject. The "image of the denture wearer" score was calculated as the sum of the five scores when the respondents imagined a person with dentures and, similarly, the "image of the natural-teeth person" score was calculated as the sum of the five scores when the respondents imagined such a person. The higher the score, the better the image, and thus the more favourable the attitude the respondent had towards the denture wearer, or persons with natural teeth.

The internal consistency of the scales was tested with the Cronbach's α-reliability coefficient test.

To examine whether there was a difference in the image of the denture wearer and that of the natural-teeth person, Wilcoxon matched-pairs test was used, as some deviation of normality of distribution was found, and the two scores were measurements of the same sample. To examine differences in the score of the image of the denture wearer or the natural-teeth person between "affluent" and "deprived" respondents and regular and irregular dental attenders, Mann - Whitney U tests were used.

The Kruskal - Wallis one-way analysis of variance (non-parametric test) was used to examine the effect of age on the perception of the image of the denture wearer or the natural-teeth person.

7.6.4 Results

Data in Table 7.21 show the distribution of the "affluent" and "deprived" respondents in the agreement/disagreement categories.

Among the "affluent" subjects, 38.3% (108) agreed (either strongly or to some extent) with the statement *'you tend to think people who wear dentures have let themselves go a bit'*, as compared to 33.7% (90) of the "deprived" respondents.

The vast majority of respondents (95.5%) agreed with the statement *'I'll do almost anything to hold on to my own teeth'* (either strongly or to some extent). Little variation between "affluent" and "deprived" subjects was evident, with 96.1% (273) of the former and 94.8% (255) of the latter reporting agreement with the statement.

A larger proportion of "affluent" respondents (71.4%) than of "deprived" (65.1%) agreed (either strongly or to some extent) with the statement *'when you think of dentures you tend to think of the elderly'*. However, this difference was also not found to be significant.

Among the "affluent" participants, 15.2% (43) agreed (either strongly or to some extent) with the statement *'you tend to think that people who wear dentures haven't been brought up properly'*, as compared to 7.4% (20) among the "deprived", the difference being significant ($p<0.01$).

Of the "affluent" group, 43.8% (124) agreed (either strongly or to some extent) with the statement *'when I get older, I expect I'll eventually have to wear dentures'*, compared to 58.4% (157) of the "deprived" who held the same opinion. In this case, the difference in the proportions was found to be highly significant ($p<0.001$).

		Strongly AGREE		AGREE to some extent		DISAGREE to some extent		Strongly DISAGREE			
		n	%	n	%	n	%	n	%	Base	
You tend to think people who wear dentures have let themselves go a bit	Affluent	13	4.6	95	33.7	105	37.2	69	24.5	282	$x^2=2.4$
	Deprived	15	5.6	75	28.1	102	38.2	75	28.1	267	df=3
	Total	28	5.1	170	31.0	207	37.7	144	26.2	549	NS
I'll do almost anything to hold on to my own teeth	Affluent	181	63.7	92	32.4	8	2.8	3	1.1	284	$x^2=4.5$
	Deprived	189	70.3	66	24.5	11	4.1	3	1.1	269	df=3
	Total	370	66.9	158	28.6	19	3.4	6	1.1	553	NS
When you think of dentures you tend to think of the elderly	Affluent	62	21.9	140	49.5	51	18.0	30	10.6	283	$x^2=9.9$
	Deprived	75	27.9	100	37.2	51	19.0	43	16.0	269	df=3
	Total	137	24.8	240	43.5	102	18.5	73	13.2	552 *	$p<0.05$
You tend to think that people who wear dentures haven't been brought up properly	Affluent	3	1.1	41	14.5	103	36.5	135	47.9	282	$x^2=17.3$
	Deprived	3	1.1	17	6.3	78	29.0	171	63.6	269	df=3
	Total	6	1.1	58	10.5	181	32.8	306	55.5	551 ***	$p<0.001$
When I get older, I expect I'll eventually have to wear dentures	Affluent	22	7.8	102	36.0	86	30.4	73	25.8	283	$x^2=19.5$
	Deprived	51	19.0	106	39.4	58	21.6	54	20.1	269	df=3
	Total	73	13.2	208	37.7	144	26.1	127	23.0	552 ***	$p<0.001$
The thought that I might have to wear dentures doesn't really bother me that much	Affluent	20	7.1	43	15.3	87	31.0	131	46.6	281	$x^2=16.9$
	Deprived	41	15.2	61	22.7	68	25.3	99	36.8	269	df=3
	Total	61	11.1	104	18.9	155	28.2	230	41.8	550 ***	$p<0.001$
People who try to hang on to their teeth for as long as they can, are really just being vain	Affluent	13	4.6	33	11.6	75	26.4	163	57.4	284	$x^2=0.7$
	Deprived	11	4.1	29	10.9	79	29.6	148	55.4	267	df=3
	Total	24	4.4	62	11.3	154	27.9	311	56.4	551	NS
When you've got bad teeth and you have a lot of bother with them,then you're better just to have them out than try to hold on to them	Affluent	59	21.0	110	39.1	53	18.9	59	21.0	281	$x^2=43.0$
	Deprived	124	45.8	72	26.6	48	17.7	27	10.0	271	df=3
	Total	183	33.2	182	33.0	101	18.3	86	15.6	552 ***	$p<0.001$

Similarly, a lower percentage of "affluent" respondents (22.4%) than of "deprived" (37.9%) agreed that *'the thought that I might have to wear dentures, doesn't really bother me that much'*. The difference between the groups was found to be highly significant ($p<0.001$).

Amongst the "affluent", 16.2% (46) agreed with the statement *'people who try to hang on to their teeth for as long as they can are really just being vain'*, as compared to 15% (940) of their "deprived" counterparts who held the same opinion.

Of the "affluent" respondents, 60.1% (169) agreed with the statement *'when you've got bad teeth and you have a lot of bother with them, then you're better just to have them out than try to hold on to them'*, and amongst the "deprived", the corresponding figure was 72.3% (196), the difference being significant ($p<0.01$).

When the eight statements were analysed as a scale, the score of the "attitudes towards dentures" was calculated for every person as the sum of the scores of the eight items of the scale. The higher a person scored, the more favourable was the attitude towards dentures which he/she held. The internal consistency of the scale was tested, and it was found that the Cronbach's α-reliability coefficient was 0.44 ($n=538$).

Statistical analysis (Mann-Whitney Rank Sum Test) (Table 7.22) showed that "deprived" respondents (mean score=27.2) scored significantly higher ($p<0.001$) than their "affluent" counterparts (mean score=24.5), indicating that residents of deprived areas held a more favourable attitude towards dentures than did residents of affluent areas.

Similar analysis comparing regular to irregular attenders, showed that irregular attenders scored significantly higher ($p<0.001$) than their regular counterparts, indicating that irregular attenders held a more favourable attitude towards dentures.

Analysis of the internal consistency of the scales of the 'image of the denture wearer', and 'image of the natural-teeth person', showed that the Cronbach's α-reliability coefficient for the "image of the denture wearer" scale was 0.52 ($n=830$), and for the "image of the natural-teeth person" scale was 0.64 ($n=831$).

Wilcoxon matched-pairs signed-ranks test (Tables 7.23a and b) showed that the difference between the two scores was not zero, at a significance level of $p<0.001$. This

Table 7.22 : 'Attitudes to dentures' score (the higher the score the more favourable the attitude towards dentures),by area of residence and dental attendance pattern

	AFFLUENT			DEPRIVED				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
"Attitudes to dentures"	24.5	234.21	281	27.2	306.67	262	26416.5	***

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
"Attitudes to dentures"	24.3	226.60	249	27.1	305.66	288	25297.5	***

*** : p<0.001

Table 7.23a : Mean scores of the image of the denture wearer and of the natural teeth person and statistical analysis of their differences (Wilcoxon matched-pairs signed-ranks test), for the entire population and for affluent and deprived populations

ENTIRE POPULATION

Age (yrs)	Natural-teeth person (mean score)	Denture wearer (mean score)	n	Z	p
16-24	25.4	19.1	149	-9.7	***
25-34	25.2	19.8	199	-10.3	***
35-44	25.3	20.6	167	-8.3	***
45-54	25.5	20.9	171	-9.1	***
55-65	25.8	21.3	139	-7.7	***
All ages	25.4	20.3	825	-20.3	***

*** : $p<0.001$

AFFLUENT

Age (yrs)	Natural-teeth person (mean score)	Denture wearer (mean score)	n	Z	p
16-24	25.3	18.2	67	-6.9	***
25-34	24.3	19.2	60	-6.2	***
35-44	24.8	19.6	71	-6.4	***
45-54	24.9	20.4	82	-6.6	***
55-65	25.6	20.6	74	-6.2	***
All ages	25.0	19.6	354	-14.4	***

*** : $p<0.001$

DEPRIVED

Age (yrs)	Natural-teeth person (mean score)	Denture wearer (mean score)	n	Z	p
16-24	25.4	19.9	82	-6.8	***
25-34	25.5	20.0	139	-8.4	***
35-44	25.7	21.4	96	-5.6	***
45-54	25.9	21.3	89	-6.3	***
55-65	26.2	21.9	65	-4.7	***
All ages	25.7	20.8	471	-14.4	***

*** : $p<0.001$

Table 7.23b : Mean scores of the image of the denture wearer and of the natural teeth person and statistical analysis of their differences (Wilcoxon matched-pairs signed-ranks test), for regular and irregular attenders

REGULAR ATTENDERS

Age (yrs)	Natural-teeth person (mean score)	Denture wearer (mean score)	n	Z	p
16-24	25.8	18.0	68	-6.9	***
25-34	24.8	18.7	78	-6.9	***
35-44	24.9	19.6	69	-6.1	***
45-54	25.2	19.8	55	-5.2	***
55-65	25.5	20.8	42	-4.5	***
All ages	25.2	19.2	312	-13.4	***

*** : p<0.001

IRREGULAR ATTENDERS

Age (yrs)	Natural-teeth person (mean score)	Denture wearer (mean score)	n	Z	p
16-24	25.0	20.1	81	-6.8	***
25-34	25.3	20.5	120	-7.6	***
35-44	25.5	21.4	98	-5.8	***
45-54	25.6	21.4	116	-7.5	***
55-65	25.9	21.3	95	-6.1	***
All ages	25.5	20.9	510	-15.1	***

*** : p<0.001

suggests that for the entire population under study the person who has all his natural teeth projects a better image than does the person who wears dentures.

A similar analysis was carried out separately for the "affluent" population, for the "deprived", for regular attenders and for irregular attenders, and for every age group. Highly significant ($p<0.001$) results were found in all tests. These indicated that for all respondents (for "affluent", for "deprived", for regular and for irregular attenders), and for all age groups, the natural-teeth person projects a better image than does the denture wearer.

Analysis was then carried out (Mann-Whitney U test), in order to detect differences in the image of the denture wearer between "affluent"-"deprived" and regular-irregular attenders (Table 7.24). "Deprived" respondents (mean score=20.8) scored significantly higher ($p<0.001$) than their "affluent" counterparts (mean score=19.6). Similarly, irregular attenders (mean score=21.0) scored significantly higher ($p<0.001$) than regular attenders (mean score=19.2). These results indicated that the denture wearer was perceived by "deprived" and irregular attenders as having a better image than was the case with "affluent" and regularly attending subjects.

Kruskal-Wallis one-way analysis of variance, carried out for the entire population and for the sub-populations of interest ("affluent", "deprived", regular attenders, irregular attenders) (Table 7.25) examined whether the image of the person who has dentures differed among the age groups. This analysis suggested that the image was not the same for all age groups, i.e. that age did indeed influence attitudes towards denture wearers. Higher scores in the older age groups (for the entire population and for all sub-populations) indicated that irrespective of area of residence or dental attendance pattern, older people have more favourable attitudes towards denture wearers.

Similar analyses concerning the image of the person who has all his/her natural teeth (Table 7.26) failed to detect any significant differences. Thus, there was not strong evidence to suggest that the image of such a person differed between the "affluent" and "deprived", or between regular and irregular attenders. Furthermore, (Table 7.27) high significance levels found with the Kruskal-Wallis one-way analysis of variance of the image of the natural teeth person among the different age groups, suggested that the image did not differ with age. Thus, irrespective of area of residence or dental attendance pattern, for the population under study, age does not affect attitudes towards natural teeth.

Table 7.24 : Image of the denture wearer : Statistical analysis (Mann-Whitney U test) comparing affluent to deprived and regular to irregular attenders

	AFFLUENT			DEPRIVED				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	18.2	64.92	67	19.9	83.24	82	2071.5	**
25-34	19.2	91.67	60	20.1	104.29	140	3670.0	NS
35-44	19.5	71.81	72	21.4	94.02	96	2542.0	**
45-54	20.4	78.31	82	21.3	93.96	90	3018.5	*
55-65	20.7	66.07	75	21.9	76.60	66	2105.5	NS
All ages	19.6	376.41	356	20.8	444.86	474	70456.5	***

NS : not significant
* : p<0.05
***: p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	18.0	64.26	68	20.1	84.02	81	2023.5	**
25-34	18.7	83.38	78	20.6	110.71	121	3422.5	**
35-44	19.6	72.64	69	21.3	92.77	99	2597.0	**
45-54	19.8	75.42	55	21.4	91.71	117	2608.0	*
55-65	20.8	64.89	42	21.4	72.21	97	1822.5	NS
All ages	19.2	352.49	312	20.8	444.86	474	70456.5	***

NS : not significant
* : p<0.05
***: p<0.001

Table 7.25 : Image of the denture wearer : Kruskal-Wallis one-way analyses of variance of the score in the age groups

	ALL RESPONDENTS			AFFLUENT			DEPRIVED			REGULAR ATTENDERS			IRREGULAR ATTENDERS		
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n
16-24	19.1	344.99	149	18.2	139.48	67	19.9	206.67	82	18.0	131.01	68	20.1	219.89	81
25-34	19.8	382.96	200	19.2	163.88	60	20.1	212.93	140	18.7	142.31	78	20.6	242.98	121
35-44	20.6	427.07	168	19.5	172.40	72	21.4	253.99	96	19.6	162.19	69	21.3	267.86	99
45-54	20.9	452.12	172	20.4	196.20	82	21.3	259.32	90	19.8	171.34	55	21.4	272.71	117
55-65	21.3	477.72	141	20.7	211.57	75	21.9	274.17	66	20.8	195.35	42	21.4	280.75	97
Cases			830			356			474			312			515
x^2 corrected for ties			30.8			21.5			17.2			17.1			10.5
p			***			***			**			**			*

* : p<0.05
** : p<0.01
*** : p<0.001

Table 7.26 : Image of the natural-teeth person : Statistical analysis (Mann-Whitney U test) comparing affluent to deprived and regular to irregular attenders

	AFFLUENT			DEPRIVED				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	25.3	76.54	67	25.4	73.74	82	2644.0	NS
25-34	24.3	89.95	60	25.5	105.70	141	3567.0	NS
35-44	24.8	79.43	71	25.7	87.38	96	3083.5	NS
45-54	25.0	82.82	84	25.9	91.87	90	3387.0	NS
55-65	25.6	69.07	74	26.1	72.11	66	2336.0	NS
All ages	25.0	399.95	356	25.7	428.03	475	78835.0	NS

NS : not significant

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	25.8	81.86	68	25.0	69.24	81	2287.5	NS
25-34	24.8	95.96	78	25.3	103.40	122	4404.0	NS
35-44	24.9	79.37	69	25.5	87.26	98	3061.5	NS
45-54	25.2	85.31	56	25.6	88.54	118	3181.5	NS
55-65	25.5	67.26	42	25.9	70.48	96	1922.0	NS
All ages	25.2	408.08	313	25.5	418.40	515	78587.5	NS

NS : not significant

Table 7.27 : Image of the natural-teeth person : Kruskal-Wallis one-way analyses of variance of the score in the age groups

	ALL RESPONDENTS			AFFLUENT			DEPRIVED			REGULAR ATTENDERS			IRREGULAR ATTENDERS		
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n
16-24	25.4	417.89	149	25.3	190.87	67	25.4	229.91	82	25.8	174.70	68	25.0	239.74	81
25-34	25.2	401.97	201	24.3	158.68	60	25.5	233.67	141	24.8	146.69	78	25.3	253.48	122
35-44	25.3	412.21	167	24.8	174.46	71	25.7	237.98	96	24.9	150.15	69	25.5	263.07	98
45-54	25.5	419.76	174	25.0	176.43	84	25.9	245.57	90	25.2	156.91	56	25.6	262.27	118
55-65	25.8	433.98	140	25.6	189.60	74	26.1	247.02	66	25.5	158.87	42	25.9	268.72	96
Cases			831			356			475			313			515
x^2 corrected for ties			1.6			4.2			1.0			4.1			2.1
p			NS			NS			NS			NS			NS

* : p<0.05
** : p<0.01
*** : p<0.001

7.7 VALUE OF TEETH

7.7.1 Introduction

Treatment preferences (preservation as opposed to extraction of teeth), used as indicators of value attached to teeth, have been found to be related to social class[2,119,120], education[120,122], and dental attendance pattern[2,121-123]. The following analyses, examines the value affluent and deprived respondents attached to teeth which show different levels of dental disease.

7.7.2 Objectives

The objective of the following analyses was to identify the values attached to different tooth-health states, and to detect differences in the value attached to teeth between "affluent" and "deprived" respondents and regular and irregular dental attenders.

7.7.3 Material and method

All dentate respondents were asked to imagine that they had four front teeth which showed "different signs of wear and tear", one being perfectly healthy, one being filled and not giving any pain, one being decayed and giving no pain, and finally, one being decayed and giving a lot of pain. They were then asked how bothered they would be about losing each tooth, indicating their responses on a scale which was constructed as 1 (not bothered at all) to 7 (very bothered). The higher the score, the more bothered respondents were about losing a tooth, thus the higher the value they attached to it.

Friedman analysis of variance tests (for ordinal data and related samples) were carried out, to examine the null-hypothesis that the health state of the tooth had no effect on the value respondents attached to it. In order to rank the four different tooth health states according to their value, Wilcoxon matched-pairs signed-rank tests (for all six possible pairs) were conducted, and the Bonferroni correction was used in order to establish the significance levels. For an overall significance level of 0.05, the p value of each of the six possible tests had to be less than 0.05/6 = 0.0083. For an overall significance level of 0.01, the p value of each of the six possible tests had to be less than 0.01/6 = 0.0017. For an overall significance level of 0.001, the p value of each of the six possible tests had to be less than 0.001/6 = 0.00017.

In order to detect differences in the values attached to each tooth health state between "affluent" / "deprived" and regular / irregular attenders, Mann-Whitney U tests were carried out. Although non-parametric tests were used, mean scores are given in the Tables, for descriptive reasons.

7.7.4 Results

The results of the Friedman analysis of variance tests for the entire population and for each of the sub-populations of interest ("affluent", "deprived", regular and irregular attenders) are shown in Table 7.28. Highly significant ($p<0.001$) results were found, indicating that the null-hypothesis could be rejected. Thus, it appears that the health state of the tooth did indeed influence the value attached, both by all respondents and all sub-populations.

In Tables 7.29a and b, the results of the Wilcoxon matched-pairs signed-rank tests for all six possible pairs are shown. These indicate that for the entire population under study, the healthy tooth had the highest value (mean score=6.7). A filled tooth without any pain, had a significantly lower value (mean score=5.9), but was itself of significantly higher value than a decayed-without-pain tooth (mean score=5.4). This, in turn, had a significantly higher value than a decayed-with-pain tooth (mean score=5.0).

The same sequence of tooth values (all of which were significant), were found for the "affluent", and for regular and the irregular attenders. However, for the "deprived", no significant difference could be detected between the value attached to a decayed-without-pain, and a decayed-with-pain tooth.

The results of the Mann-Whitney U tests examining differences in the values attached to each tooth health state between "affluent" / "deprived", and regular / irregular attenders, are shown in Table 7.30.

When "affluent" respondents were compared to their "deprived" counterparts, no differences in the values attached to a healthy, a filled-without-pain and a decayed-with-pain tooth could be detected. However, "deprived" respondents were found to value a decayed-without-pain tooth significantly lower ($p<0.05$) than "affluent" respondents.

Similar analysis comparing regular to irregular attenders, showed that regular attenders attached a significantly higher value to all four tooth health states than the value attached by their irregular counterparts.

Table 7.28 : Value of teeth : Friedman analyses of variance

	ALL RESPONDENTS		AFFLUENT		DEPRIVED		REGULAR ATTENDERS		IRREGULAR ATTENDERS	
	Mean score	Mean rank	Mean score	Mean rank	Mean score	Mean rank	Mean score	Mean rank	Mean score	Mean rank
Healthy	6.7	3.02	6.8	3.02	6.7	3.02	6.9	2.97	6.6	3.06
Filled	5.9	2.54	6.0	2.57	5.8	2.52	6.3	2.57	5.6	2.52
Decayed	5.4	2.31	5.7	2.36	5.2	2.26	5.8	2.33	5.1	2.30
Decayed painfull	5.0	2.12	4.9	2.05	5.0	2.20	5.2	2.13	4.8	2.12
Cases		723		348		375		313		408
x^2 (corrected for ties)		195.6		104.9		94.6		73.3		123.2
d.f.		3		3		3		3		3
p		***		***		***		***		***

*** : p<0.001

Table 7.29a : Value of teeth : statistical analysis of the difference in value attached to the various tooth health states (Wilcoxon matched-pairs signed-ranks test), for the entire population and for affluent and deprived populations

ENTIRE POPULATION

	Mean difference	n	Z	p
Healthy - Filled	0.8	726	-12.0	0.0000 ***
Healthy - Decayed	1.3	724	-14.0	0.0000 ***
Healthy - Decayed painful	1.8	726	-14.7	0.0000 ***
Filled - Decayed	0.5	725	-6.4	0.0000 ***
Filled - Decayed painful	0.9	725	-9.2	0.0000 ***
Decayed - Decayed painful	0.4	723	-5.4	0.0000 ***

*** : p<0.0004

AFFLUENT

	Mean difference	n	Z	p
Healthy - Filled	0.8	349	-8.1	0.0000 ***
Healthy - Decayed	1.1	348	-9.5	0.0000 ***
Healthy - Decayed painful	1.8	350	-10.7	0.0000 ***
Filled - Decayed	0.3	348	-3.5	0.0000 ***
Filled - Decayed painful	1.1	349	-7.5	0.0000 ***
Decayed - Decayed painful	0.7	348	-6.2	0.0000 ***

*** : p<0.0004

DEPRIVED

	Mean difference	n	Z	p
Healthy - Filled	0.9	377	-8.9	0.0000 ***
Healthy - Decayed	1.5	376	-10.4	0.0000 ***
Healthy - Decayed painful	1.7	376	-10.1	0.0000 ***
Filled - Decayed	0.6	377	-5.5	0.0000 ***
Filled - Decayed painful	0.8	376	-5.6	0.0000 ***
Decayed - Decayed painful	0.1	375	-1.4	0.1504 NS

*** : p<0.0004
NS : not significant

Table 7.29b : Value of teeth : statistical analysis of the difference in value attached to the various tooth health states (Wilcoxon matched-pairs signed-ranks test), for regular and irregular attenders

REGULAR ATTENDERS

		Mean difference	n	Z	p
Healthy	- Filled	0.6	315	-7.2	0.0000 ***
Healthy	- Decayed	1.1	314	-8.8	0.0000 ***
Healthy	- Decayed painful	1.7	315	-9.5	0.0000 ***
Filled	- Decayed	0.5	314	-4.3	0.0000 ***
Filled	- Decayed painful	1.0	314	-6.9	0.0000 ***
Decayed	- Decayed painful	0.5	313	-4.6	0.0000 ***

*** : p<0.0004

IRREGULAR ATTENDERS

		Mean difference	n	Z	p
Healthy	- Filled	1.0	409	-9.6	0.0000 ***
Healthy	- Decayed	1.5	408	-10.9	0.0000 ***
Healthy	- Decayed painful	1.8	409	-11.1	0.0000 ***
Filled	- Decayed	0.5	409	-4.8	0.0000 ***
Filled	- Decayed painful	0.8	409	-6.2	0.0000 ***
Decayed	- Decayed painful	0.3	408	-3.2	0.0015 **

** : p<0.0041
*** : p<0.0004

Table 7.30 : Value of teeth : mean scores and statistical analysis (Mann-Whitney U test) for each tooth health state, comparing affluent to deprived and regular to irregular attenders

	AFFLUENT			DEPRIVED				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
Healthy	6.8	370.44	350	6.7	358.02	377	63722.0	NS
Filled	6.0	372.28	349	5.8	356.35	378	63069.5	NS
Decayed	5.7	379.13	348	5.2	348.11	377	59983.5	*
Decayed painfull	4.9	360.88	350	5.0	365.94	376	64883.5	NS

NS : not significant
* : p<0.05

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
Healthy	6.9	381.56	316	6.6	348.66	409	58756.0	***
Filled	6.3	394.58	315	5.6	338.73	410	54626.0	***
Decayed	5.8	391.96	314	5.1	339.00	409	54805.0	***
Decayed painfull	5.2	379.81	315	4.8	349.17	409	58965.0	*

* : p<0.05
*** : p<0.001

7.8 IMAGE OF THE DENTIST

7.8.1 Introduction

As detailed in the literature review, subjects of different social[2,119], socio-economic[116,117] and educational[118] background perceive the image of the dentist in a different way. Furthermore, irregular attenders tend to have a more negative perception of the dentists[2,116,117]. Using descriptions of dentists from the group discussions, the attitude to dentists of the study sample was examined in the following analyses.

7.8.2 Objectives

The objective of the following analyses was to identify differences in the "image of the dentist" as perceived by "affluent" and "deprived" respondents, and by regular and irregular dental attenders.

7.8.3 Material and method

All subjects were asked to think of their own experiences with dentists, and to indicate their thoughts on a 1 to 7 scale, which described dentists as friendly / unfriendly, modern / old fashioned, informal / formal, underpaid / overpaid, reliable / unreliable, caring / uncaring, and patient / impatient. The "image of the dentist" score was computed as the sum of the scores of each of the seven items of the scale. The higher the score, the more negative the image of the dentist was, thus the more unfavourable was the respondent's attitude towards dentists. The internal consistency of the scale was tested with the Cronbach's α-reliability coefficient test. As some deviation from normality of the distribution of the scores was found, Mann - Whitney U tests were employed in order to detect differences between "affluent" and "deprived", and regular and irregular attenders.

In order to examine the effect of age on the image of the dentist score, Kruskal-Wallis analysis of variance was carried out for the entire population, and for the sub-populations of interest ("affluent", "deprived", regular and irregular attenders), followed by Mann - Whitney U tests, for all 10 possible comparisons among the age groups. For an overall significance level of 0.05, the p value of each test was considered significant if it were less than 0.05/10 = 0.005 (Bonferroni correction).

7.8.4 Results

When the internal consistency of the scale was tested, it was found that the Cronbach's α-reliability coefficient was 0.64 (n=801).

Analysis comparing "affluent" to "deprived" respondents, showed that "deprived" respondents (mean=19.1) scored significantly higher ($p<0.001$) than did their "affluent" counterparts (mean=17.2). This result indicated that the dentist projected a more negative image among the "deprived" population under study than among the "affluent". Similar analysis comparing regular to irregular attenders (Table 7.31) showed that irregular attenders (mean=19.1) reported a significantly ($p<0.001$) more negative image of the dentist than did regular dental attenders (mean=17.0).

When analysis was carried out for every age group separately, no significant difference in the image of the dentist score between "affluent" and "deprived" could be detected among the 16- to 24-year-olds, and the 35- to 44-year-olds. For the remaining age groups, "deprived" respondents scored significantly higher than their "affluent" counterparts.

In order to examine the effect of age on the image of the dentist score, Kruskal-Wallis analysis of variance was carried out for the entire population and for the sub-populations of interest ("affluent", "deprived", regular and irregular attenders) (Table 7.32). Results suggested that when the population under study was examined as a whole, the image of the dentist scores differed among the various age groups. Similar results were found for the affluent, the deprived and the irregular attenders. In contrast, for the regular dental attenders, age was not found to affect the image of the dentist score.

In order to detect differences between the age groups, multiple comparisons (Mann-Whitney U tests) were carried out for the entire population, for the affluent, for the deprived, and for the irregular attenders. Results indicated that, for the entire population, the 16- to 24-year-olds (mean=19.7) held a significantly more negative image of dentists than did the 45- to 54-year-olds (mean=17.2), and the 55- to 65-year-olds (mean=17.4). Similarly, amongst irregular attenders, the 16- to 24-year-olds (mean=21.0) scored significantly higher than the 45- to 54-year-olds (mean=18.0) and the 55- to 65-year-olds (mean=17.8). No other significant differences could be detected.

7.9 IMPORTANCE OF HEALTH SERVICES TO HEALTH

7.9.1 Introduction

Attitudes to dental services as compared to other health services can be considered as an indicator of the extent to which dental health is perceived as relating to general health. Furthermore, it can be assumed that persons who perceive a certain health (or

Table 7.31 : Image of the dentist : Statistical analysis (Mann-Whitney U test) comparing affluent to deprived and regular to irregular attenders

	AFFLUENT			DEPRIVED				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	18.9	68.27	67	20.3	78.80	80	2296.0	NS
25-34	16.6	78.85	57	20.1	106.56	139	2841.5	**
35-44	18.1	84.12	70	17.8	81.29	94	3176.5	NS
45-54	16.1	73.87	78	18.1	89.46	85	2681.0	*
55-65	16.2	58.63	69	18.8	74.20	62	1630.5	*
All ages	17.2	361.61	341	19.1	430.20	460	64999.0	***

NS : not significant
* : p<0.05
** : p<0.01
*** : p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	18.1	63.89	67	21.0	82.47	80	2002.5	**
25-34	17.4	85.90	75	20.1	105.56	120	3592.5	*
35-44	16.9	77.14	68	18.6	86.30	96	2899.5	NS
45-54	15.5	71.47	53	18.0	87.07	110	2357.0	*
55-65	16.7	61.04	40	17.8	66.78	89	1621.5	NS
All ages	17.0	362.15	303	19.1	422.36	495	63676.0	***

NS : not significant

Table 7.32 : Image of the dentist : Kruskal-Wallis one-way analyses of variance of the score in the age groups

	ALL RESPONDENTS			AFFLUENT			DEPRIVED			REGULAR ATTENDERS			IRREGULAR ATTENDERS		
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n	Mean score	Mean rank	n
16-24	19.7	455.84	147	18.9	197.92	67	20.3	260.54	80	18.1	167.79	67	21.0	239.74	80
25-34	19.0	427.56	196	16.6	168.48	57	20.1	247.25	139	17.4	159.66	75	20.1	253.48	120
35-44	17.9	389.07	164	18.1	184.49	70	17.8	205.15	94	16.9	150.79	68	18.6	263.07	96
45-54	17.2	359.35	163	16.1	151.91	78	18.1	211.59	85	15.5	129.99	53	18.0	262.27	110
55-65	17.4	366.48	131	16.2	154.83	69	18.8	218.55	62	16.7	142.41	40	17.8	268.72	89
Cases			801			341			460			303			495
x^2 corrected for ties			19.6			11.2			12.0			6.6			17.4
p			***			*			*			NS			**

*   : p<0.05
** : p<0.01
*** : p<0.001
NS : not significant

dental health) service as important in keeping healthy, would make use of such services. However, the belief in the importance of dental visiting, has been found to be more likely to be translated to actual dental attendance among higher social class groups, as compared to lower[124]. These issues are examined in the following analyses.

7.9.2 Objectives

The objectives of the following analysis were :

1. To examine the beliefs of respondents about the importance of various health services to health, and identify differences in these beliefs between residents of affluent and deprived areas.
2. To examine the reported health services utilisation, in relation to beliefs on importance of services to health.

7.9.3 Material and method

All respondents were asked how important to people's health they thought that certain health services were. These were Hospitals, General Practitioners, Dentists, Opticians, Chiropodists and Family Planning clinics. The alternative answers ranged from 'very important' (score=1) to 'not at all important' (score=4). Thus, the lower the score, the greater the importance attached to each health service. Additionally, they were asked to report whether they had visited these health services during the previous 12 months, and if so, on how many occasions.

To detect differences between "affluent" and "deprived" respondents, and regular and irregular attenders, Mann - Whitney U tests were chosen, due to some deviation from normality of the distribution of the data.

In order to rank the health services according to the importance attached to them by respondents, Friedman analyses of variance tests were carried out for the entire population, and for the sub-groups of interest ("affluent", "deprived", regular, and irregular attenders), followed by Wilcoxon matched-pairs signed rank tests for all 15 possible combinations. With a selected overall significance level of 0.05, differences are reported as being significant when the p value was less than 0.05/15 = 0.0033 (Bonferroni correction for multiple comparisons). Although non-parametric tests are reported, for descriptive reasons, the mean values are again given in the Tables.

For comparisons of proportions, the test statistic for the comparisons of two proportions, was used.

7.9.4 Results

In Table 7.33 the mean scores of importance of each of the health services under consideration, as well as the statistical analyses employed (Mann-Whitney U test), are shown. The lower the score, the more the importance attached to the health service.

When "affluent" respondents were compared to their "deprived" counterparts, it was found that for the "affluent", the mean score of importance attached to the dentists was 1.29, and for the "deprived" the corresponding figure was 1.44. This difference was found to be highly significant ($p<0.001$), indicating that dentists were considered to be more important to people's health by the "affluent" population under study, than by residents of deprived areas. In contrast, chiropodists were considered to be more important to people's health by the "deprived" than by the "affluent". Hospitals, General Practitioners, opticians and Family Planning clinics were perceived as equally important to people's health by both "affluent" and "deprived" respondents.

When the importance to people's health scores for every health service in consideration reported by regular dental attenders were compared to the corresponding scores reported by irregular attenders, no significant differences were found, with only one exemption. Regular attenders were found to report significantly greater ($p<0.001$) importance attached to dentists when compared to irregular attenders.

In Table 7.34 , the mean scores, and the Friedman tests results are given. Low significance values indicated that, for the entire population and for every sub-population of interest, the importance attached to the different health services varied. Further analyses (Wilcoxon signed ranks tests) resulted in the ranking models shown in Figures 7.1a and 7.1b.

For the entire population under study, Hospitals and General Practitioners were found to be equally, and most important to people's health. Significantly lower importance was attached to Dentists who, in turn, were found to be significantly more important than Opticians, Family Planning clinics and Chiropodists.

"Affluent" respondents were found to rank these health services in the same sequence. However, the "deprived" ranked Hospitals and General Practitioners equally and most important, attached significantly lower importance to dentists who were found to be of equal importance to opticians. However, dentists were found to be more important than Family Planning clinics and Chiropodists.

Table 7.33 : "Importance to people's health" score of the specified health services : Statistical analysis (Mann-Whitney U test) comparing affluent to deprived and regular to irregular attenders (the lower the score the more important the service is considered)

	AFFLUENT			DEPRIVED				
Health Services	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
Hospital	1.21	426.19	364	1.18	421.46	482	86743.0	NS
GP	1.19	418.24	366	1.21	429.25	482	85914.5	NS
Dentist	1.29	394.96	365	1.44	445.99	482	77366.0	***
Optician	1.50	420.01	366	1.51	427.03	481	86564.5	NS
Chiropodist	1.96	445.98	365	1.81	405.53	480	79212.5	**
Family Planning	1.67	421.56	356	1.60	410.95	474	82216.0	NS

NS : not significant
** : p<0.01
*** : p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
Health Services	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
Hospital	1.22	430.19	318	1.18	417.04	525	80871.0	NS
GP	1.20	422.30	318	1.20	423.42	527	83571.5	NS
Dentist	1.28	391.36	318	1.43	441.32	526	73732.0	***
Optician	1.53	431.13	318	1.49	417.28	526	80890.0	NS
Chiropodist	1.91	430.22	318	1.86	416.21	524	80543.0	NS
Family Planning	1.62	412.66	309	1.63	414.80	518	79617.0	NS

NS : not significant
*** : p<0.001

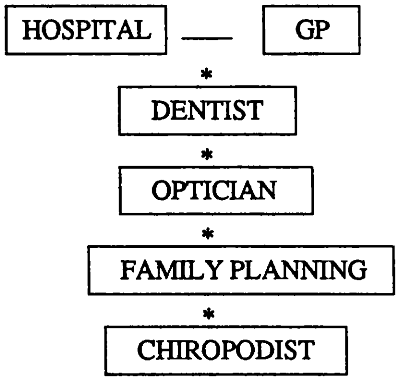
Table 7.34 : "Importance to people's health" scores of the health services : Friedman analyses of variance
(the lower the score the more important the health service is)

	ALL RESPONDENTS		AFFLUENT		DEPRIVED		REGULAR ATTENDERS		IRREGULAR ATTENDERS	
	Mean score	Mean rank	Mean score	Mean rank	Mean score	Mean rank	Mean score	Mean rank	Mean score	Mean rank
Hospital	1.19	2.84	1.21	2.90	1.18	2.80	1.22	2.91	1.18	2.80
GP	1.20	2.85	1.19	2.82	1.21	2.86	1.20	2.85	1.20	2.85
Dentist	1.37	3.29	1.29	3.05	1.44	3.46	1.28	3.03	1.43	3.44
Optician	1.50	3.65	1.50	3.63	1.51	3.66	1.53	3.71	1.49	3.61
Family Planning	1.63	3.89	1.67	3.94	1.60	3.85	1.62	3.91	1.63	3.87
Chiropodist	1.88	4.49	1.96	4.66	1.81	4.37	1.91	4.60	1.86	4.43
Cases		826		354		472		309		514
x^2 (corrected for ties)		487.7		259.5		243.7		213.8		285.2
d.f.		5		5		5		5		5
p		***		***		***		***		***

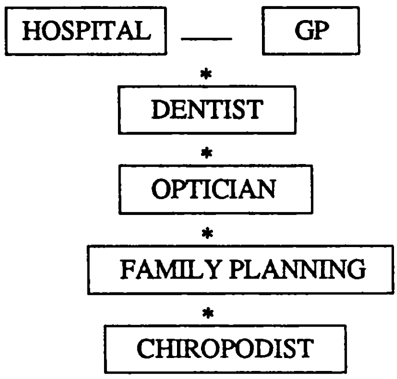
*** : p<0.001

Figure 7.1a : Ranking of the specified Health Services according to their "importance to people's health" as assessed by by the study sample, the affluent, and the deprived.

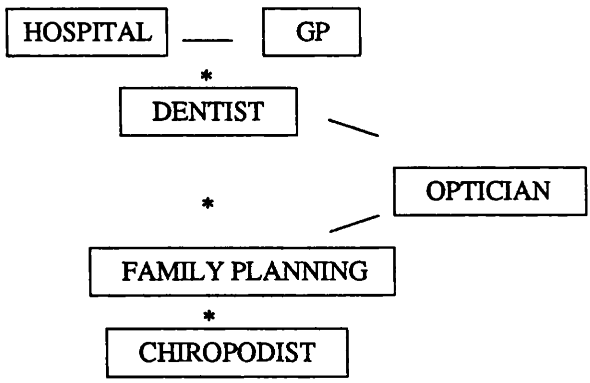
Entire population



Affluent



Deprived



—— No significant difference

* Significant difference

Figure 7.1b : Ranking of the specified Health Services according to their "importance to people's health", as assessed by regular and irregular attenders.

Regular attenders

HOSPITAL — GP — DENTIST

*

OPTICIAN — FAMILY PLANNING

*

CHIROPODIST

Irregular attenders

HOSPITAL — GP

*

DENTIST — OPTICIAN

*

FAMILY PLANNING

*

CHIROPODIST

—— No significant difference

* Significant difference

Regular attenders were found to attach equal importance to Hospitals, General Practitioners and dentists. Significantly lower importance was accorded to opticians and Family Planning clinics. These, in turn were found to be more important than Chiropodists. Irregular attenders attached equal importance to Hospitals and General Practitioners, and significantly less importance to dentists and opticians. Dentists were ranked as being of equal importance to opticians, and more important than Family Planning clinics and chiropodists.

In Table 7.35 the proportions of respondents who reported that they had visited a health service once or more frequently within the previous 12 months, amongst all respondents who considered the corresponding health service as "very important to people's health", are shown.

Of the 563 respondents who considered Dentists as "very important to people's health", 68.4% had visited their dentist at least once within the previous 12 months. This proportion varied from 84.3% amongst the "affluent", to 54.1% amongst the "deprived", the difference being highly significant ($p<0.001$). Of all respondents who were objectively defined as regular attenders, 73.6% (234) considered visiting the dentist as very important to keeping healthy, and of them, 94.4% had actually visited the dentist within the previous year. The corresponding figures for the irregular attenders were significantly lower. Of the irregular attenders, 61.7% (328) considered visiting the dentist as very important to keeping healthy, and of them, 49.7% had actually visited within the previous year.

Of the 687 subjects who considered General Practitioners to be very important "to people's health", 81.4 % had visited their GP. No significant variation in this proportion could be detected between the "affluent" and the "deprived" respondents, nor between regular and irregular dental attenders.

7.10 PERCEIVED AVAILABILITY OF DENTAL SERVICES

7.10.1 Introduction

Irrespective of the actual availability of dental services, which has been found to be related to greater utilisation[136,137,140], lack of the perception that there are dental services available, may act as a barrier in the uptake of care. Results of the group discussions suggested that the majority of respondents were aware of the services. The following analyses examine relevant issues.

Table 7.35 : Proportions of respondents who had visited the health services under consideration during the previous 12 months, among those who considered the corresponding service as 'very important to people's health'

	ALL RESPONDENTS		AFFLUENT			DEPRIVED		REGULAR ATTENDERS			IRREGULAR ATTENDERS	
	%	Base	%	Base	p	%	Base	%	Base	p	%	Base
Hospital	42.7	696	37.2	298	**	46.7	398	37.5	256	*	45.7	438
GP	81.4	687	79.9	303	NS	82.6	384	80.7	259	NS	81.7	426
Dentist	68.4	563	84.3	267	***	54.1	296	94.4	234	***	49.7	328
Optician	36.3	466	37.9	206	NS	35.0	260	35.1	168	NS	36.7	297
Family Planning	12.9	418	10.4	182	NS	14.8	236	15.1	159	NS	11.6	258
Chiropodist	11.1	289	16.4	110	*	7.8	179	14.0	100	*	9.6	188

7.10.2 Objectives

The objectives of the analyses were to identify whether respondents were aware of the available dental services, of information about the available dental services, and about eligibility for free dental treatment.

7.10.3 Material and method

All respondents were asked whether they knew of a dentist they could attend if they either wanted or needed to. A negative answer was followed by a question about how the respondent would find a dentist if that were necessary. Additionally, all respondents were asked if they were eligible for free dental check-ups or treatment. The test statistic for the comparison of two proportions was used in the analyses.

7.10.4 Results

The vast majority of respondents, i.e. 96.8% (814), reported that they knew of a dentist to attend. Statistical analysis failed to detect any differences between residents of affluent and deprived areas. However, a significant difference ($p<0.01$) was found between regular and irregular attenders. Amongst regular attenders, 99.1% (314) reported that they knew of a dentist, as opposed to 95.4% (497) of irregular attenders who gave the same answer.

When those respondents who reported that they did not know any a dentist were asked how they would find one if needed, 56.0% (14) indicated they would ask a friend, a relative, colleague or neighbour, and 36.0% (9) said they would look up in the Yellow Pages. Five respondents (20.0%) said that they would "keep an eye open", and 8.0% (2) claimed that they would contact the local health board. Only one respondent said that he would ask his General Medical Practitioner.

Among all subjects, 6.9% (59) were uncertain about whether they were eligible for free dental check-ups or treatment. No area of residence or dental attendance pattern could be detected regarding the rate of uncertainty of eligibility status .

Overall, 36.3% (308) of respondents reported they were eligible for free dental treatment. The rate of reported eligibility varied from 12.3% (45) amongst "affluent" respondents, to 54.3% among their "deprived" counterparts, the difference being highly significant ($p<0.001$). For regular attenders, the rate of eligibility for free dental check-ups or treatment was 24.3% (77), and among irregular attenders the corresponding figure was 43.5% (230), the difference being highly significant ($p<0.001$).

7.11 ATTITUDES TO CHARGES FOR DENTAL CHECK-UPS AND COST OF TREATMENT

7.11.1 Introduction

As detailed in the literature review, cost of dental treatment is an issue for concern among lay people, and their attitudes to dental costs have been found to relate to social class[2] and income[124,131]. In the following analyses, attitudes to dental costs exhibited by the study sample are examined.

7.11.2 Objectives

The objectives of the following analyses were:

1. To examine whether charges for dental check-ups acted as a barrier to dental attendance.
2. To examine respondents' attitudes to the cost of dental treatment and payment arrangements.

7.11.3 Material and method

All respondents were introduced with the topic of dental charges by the statement that "some people say that the charges put them off going for regular check-ups, and others say they don't make any difference". They were then asked to choose the phrase which best described their feelings, among the following six alternatives : (a) "Charges have not made any difference to me because I don't really go for check-ups", (b) "charges have not made any difference to me because I get free check-ups", (c) "charges have not made any difference to me because I go for check-ups regardless how much it costs", (d) "charges have encouraged me to go because it's made me realise just how valuable check-ups are", (e) " charges have made me think twice before I go for a check-up", and (f) "charges have made me decide not to go for a check-up". For the analysis of the differences of the proportions, the relevant test statistic was used.

Additionally, respondents were asked to select the alternative answer which expressed their agreement on a 'strongly disagree' (score=1), to 'strongly agree' (score=6) scale their responses to seven phrases relating to the cost of dental treatment, (Table 7.36), which had been raised by participants in the group discussions. The seven items were analysed as being a scale, the score of attitudes to cost of treatment being the sum of the scores of each item. The higher the score, the more negative was the attitude towards the costs of dental treatment. The internal consistency of the scale was tested by examining the Cronbach's α-reliability coefficient, which was 0.66 (n=641). For the comparisons of the mean scores between "affluent" and "deprived" respondents, and

Table 7.36 : Attitudes to cost of dental treatment scale

	Strongly Disagre e	Moderately Disagree	Slightly Disagre e	Slightly Agree	Moderately Agree	Strongly Agree
Going to the dentist should be free when it's part of the NHS	1	2	3	4	5	6
They don't tell you whether you have to pay until after you've had the treatment	1	2	3	4	5	6
Dentists nowadays give you unnecessary treatment so that they can make extra money	1	2	3	4	5	6
I'm a bit apprehensive about what happens if I can't pay	1	2	3	4	5	6
I would like to know exactly waht everything costs so hat I can have my bill itemised	1	2	3	4	5	6
I'm never sure when exactly I have to pay	1	2	3	4	5	6
I would like to know how much I may have to pay before I have any treatment	1	2	3	4	5	6

regular and irregular dental attenders, t-tests were carried out, as the data were normally distributed, and the samples were large.

7.11.4 Results

Charges for dental check-ups appeared to be a barrier to regular attendance for 22.6% (192) respondents, who reported that charges either made them think twice, or made them decide not to go to the dentist. This figure varied from 19.5% (71) among "affluent" respondents, to 24.9% (121) among the "deprived". However, this difference was not found to be significant.

For the regular attenders, 17.6% (56) reported that charges either made them think twice or decide not to go to the dentist, and amongst irregular attenders 25.6% (135) gave the same response. Statistical analysis showed that this proportion of irregular attenders who reported charges as being a barrier to dental attendance, was significantly higher ($p<0.01$) than the corresponding proportion recorded among regular attenders.

For 42.8% (363) of respondents, charges for dental check-ups did not influence their dental visiting behaviour, as they either got free check-ups, or because they never went for a check-up. This figure differed significantly ($p<0.001$) between "affluent" (17.0%) and "deprived" (62.1%) respondents.

For a further 34.6% (294) of respondents charges did not represent a barrier to attendance, as they reported that they either attend the dentist regardless of how much the cost is, or because charges encouraged them to attend as they made them realise how valuable check-ups were. This proportion varied from 63.5% (231) amongst the "affluent", to 13.0% (63) amongst the "deprived", the difference being highly significant ($p<0.001$).

In Table 7.37, the mean attitudes to cost of dental treatment scores are shown by area of residence and dental attendance pattern.

Significantly higher mean scores were recorded among the "deprived" as compared to "affluent" respondents, and among irregular dental attenders as compared to regular attenders, indicating that for all ages the "deprived" and the irregular attenders held a more negative attitude towards costs of dental treatment.

In total, only 1.8% (15) reported that charges for a dental check-up encouraged them to go to the dentist as it made them realise how valuable these were, and 18.4% (153)

Table 7.37 : Mean scores of attitudes to cost of dental treatment for every age group, by area of residence and dental attendance pattern

	AFFLUENT			DEPRIVED			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	28.2	5.0	49	31.7	5.0	59	***
25-34	26.0	5.7	49	29.1	6.3	116	**
35-44	25.3	6.3	58	29.5	5.3	68	***
45-54	23.6	6.2	69	29.8	6.3	66	***
55-65	23.7	7.0	57	31.8	6.6	50	***
All ages	25.2	6.3	282	30.1	6.0	359	***

** : p<0.01
***: p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	28.3	5.2	47	31.6	4.9	61	**
25-34	26.6	6.1	68	29.3	6.2	96	**
35-44	25.3	6.0	54	29.3	5.7	72	***
45-54	23.7	6.0	40	27.9	7.0	95	**
55-65	23.1	6.7	33	29.7	7.6	72	***
All ages	25.7	6.2	242	29.4	6.5	396	***

** : p<0.01
***: p<0.001

strongly agreed with the statement *'paying for your treatment makes you appreciate the value of the treatment you are getting'.* No area of residence or dental attendance pattern bias could be detected.

7.12 STRUCTURAL / ORGANISATIONAL BARRIERS TO DENTAL ATTENDANCE

7.12.1 Introduction

Apart from perceived availability and charges which may act as barriers in the utilisation of dental services, certain issues relating to distance, appointment time, and transport emerged as potential hindrances to dental care during the group discussions. These issues are examined in the following analyses.

7.12.2 Objectives

The objectives of the analysis were to examine the extent to which respondents identified with certain structural / organisational barriers, and to detect differences, if any, between the sub-populations of interest.

7.12.3 Material and method

All subjects were asked whether they had ever been either affected or prevented from going to the dentist, and whether they had ever come across any of the following problems, which had been identified during the qualitative research as barriers to attendance. These were : (a) 'couldn't get a suitable appointment time', (b) 'wasn't able to take the time from work', (c) 'lost pay because appointment was during working hours', (d) 'dentist difficult to get to using public transport', (e) 'didn't have transport to get there', (f) 'when I tried to make an appointment the receptionist was unhelpful', (g) 'dentist was too far away', and (h) 'couldn't find anywhere to park the car'. In the analysis, proportions are reported, and are compared using the relevant test statistic.

In an attempt to identify differences in the number of structural/organisational barriers to dental attendance experienced by respondents, a composite barriers scores was calculated which ranged from 0 to 10. As barriers, the following ten items were identified :

1. 'I do not know of a dentist I can attend if I want or need to'.
2. 'The charges have made me either think twice before I go for a check-up, or decide not to go for a check-up'.
3. 'Dentist was too far away'.

4. 'Couldn't get a suitable appointment time'.
5. 'Lost pay because appointment was during working hours'.
6. 'Didn't have transport to get there'.
7. 'Couldn't find somewhere to park the car'.
8. 'Wasn't able to take the time off from work'.
9. 'When I tried to make an appointment the receptionist was unhelpful'.
10. 'Dentist difficult to get to using public transport'.

Items 3 to 10 were counted as barriers when the respondents had replied that they had affected or prevented their attendance at the dentist.

In the analysis, Mann-Whitney U tests (non-normal distribution of data) were used to compare the mean number of barriers experienced by "affluent" and "deprived" respondents, and by regular and irregular attenders.

7.12.4 Results

In Table 7.38, the proportions of respondents who reported that they were either affected or prevented from visiting the dentist, are listed. The most prevalent complaint was 'couldn't get a suitable appointment time', which was reported by 15.6% (133) of subjects. Of all respondents, 8.1% (69) stated they could not take time from work, 7.1% (60) claimed they lost pay as the appointment was during working hours, and 4.8% (41) said that the dentist was difficult to get to using public transport. For 4.6% (39), the fact that they did not have transport to get to the dentist was a barrier to attendance, and 4.2% (36) complained that when they tried to make an appointment the receptionist was unhelpful. A further 4% (34) said the dentist was too far away, and 3.2% (27) were affected or prevented from going to the dentist because they could not find a place to park their car.

Analysis comparing the proportions of "affluent" to the proportions of "deprived" respondents for whom each of the eight items represented a barrier to attendance, showed that significantly higher proportions of "affluent" respondents reported that they could not get a suitable appointment time, that the dentist was difficult to get to using public transport, that the dentist was too far away, and that they could not find somewhere to park their car.

Of all respondents, 71.3% (599) indicated they had never been affected or prevented from going to the dentist by any one of the eight items. This figure was found to be significantly higher ($p<0.001$) for the "deprived" (78.1%) than for the "affluent"

Table 7.38 : Proportions of respondents who reported that they were *either affected* or *prevented* from visiting the dentist, by the following barriers

	ALL RESPONDENTS		AFFLUENT			DEPRIVED		REGULAR ATTENDERS			IRREGULAR ATTENDERS	
	%	Base	%	Base	p	%	Base	%	Base	p	%	Base
Couldn't get a suitable appointment time	15.6	851	21.1	365	***	11.5	486	16.7	317	NS	14.7	531
Wasn't able to take the time off from work	8.1	849	9.4	363	NS	7.2	486	8.9	316	NS	7.5	530
Lost pay because appointment was during working hours	7.1	850	5.2	365	NS	8.5	485	6.3	317	NS	7.5	530
Dentist difficult to get to using public transport	4.8	848	8.3	362	***	2.3	486	5.4	314	NS	4.5	531
Didn't have transport to get there	4.6	851	6.3	365	NS	3.3	486	5.0	317	NS	4.3	531
When I tried to make an appointment the receptionist was unhelpful	4.2	849	4.7	364	NS	3.9	485	3.8	316	NS	4.5	530
Dentist was too far away	4.0	851	6.6	365	**	2.1	486	4.7	317	NS	3.6	531
Couldn't find somewhere to park the car	3.2	840	5.6	357	**	1.4	483	5.4	312	**	1.9	525

respondents (62.2%), and no such difference could be detected between regular and irregular attenders.

In Table 7.39, the mean numbers of the composite barriers score experienced by respondents, as well as the statistical analysis employed (Mann-Whitney U test), are shown.

"Affluent" respondents (mean number of barriers=0.9), were found to experience a significantly higher ($p<0.01$) number of barriers than their "deprived" counterparts (mean numbers of barriers=0.7). In contrast, no such difference could be detected between regular and irregular attenders.

7.13 DENTAL ANXIETY

7.13.1 Introduction

Dental anxiety was identified during the group discussions as a major barrier to dental attendance. As detailed in the literature review, dental anxiety has been reported to be associated with social class[2], education[60,109,115], and income[115], although not always consistently[110,112]. In contrast, it has consistently been found to be associated with regular attendance pattern.

7.13.2 Objectives

The objective of the following analysis was to examine the prevalence of dental anxiety among respondents, in relation to area of residence and dental attendance pattern.

7.13.3 Material and method

All respondents were asked to report their degree of agreement/disagreement with seven statements relating to dental anxiety, which had been identified during the group discussions. These were : (a) 'I find it difficult even plucking up the courage just to make a dental appointment', (b) 'going to the dentist doesn't bother me that much', (c) 'the waiting rooms I've come across are generally very relaxing', (d) 'when I see the chair and the drill and all the equipment, it makes me nervous', (e) 'I feel a bit embarrassed opening my mouth and letting the dentist look at my teeth', (f) 'when I get into the chair I find it quite easy to relax', and (g) 'when you haven't been to the dentist for a while, you get a bit worried in case he's going to tell you off'.

The seven items were analysed as a scale (Table 7.40), the anxiety score being the sum of the score for each item. The higher the score, the more the anxiety experienced, the

Table 7.39 : Barriers to dental attendance : Statistical analysis (Mann-Whitney U test) comparing affluent to deprived and regular to irregular attenders

	AFFLUENT			DEPRIVED				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	1.2	83.98	66	0.7	68.84	84	2212.5	*
25-34	1.1	113.98	57	0.6	95.13	143	3307.0	*
35-44	1.0	89.05	74	0.8	81.84	95	3215.0	NS
45-54	0.8	90.89	82	0.6	79.45	87	3084.0	NS
55-65	0.5	68.59	75	0.7	74.76	67	2294.0	NS
All ages	0.9	437.92	354	0.7	398.83	476	76315.0	**

NS : not significant
* : $p<0.05$
**: $p<0.01$

	REGULAR ATTENDERS			IRREGULAR ATTENDERS				
Age (yrs)	Mean score	Mean rank	n	Mean score	Mean rank	n	Mann-Whitney U	p
16-24	0.9	75.49	68	1.0	75.51	82	2787.0	NS
25-34	0.8	100.24	76	0.8	99.85	123	4656.0	NS
35-44	0.8	81.32	71	0.9	87.67	98	3217.5	NS
45-54	0.6	82.36	54	0.7	86.24	115	2962.5	NS
55-65	0.5	63.57	43	0.6	73.57	97	1787.5	NS
All ages	0.7	406.19	312	0.8	418.73	515	77902.0	NS

NS : not significant

Table 7.40 : Dental anxiety scale

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
I find it difficult even plucking up the courage just to make a dental appointment	1	2	3	4	5	6
Going to the dentist doesn't bother me that much	6	5	4	3	2	1
The waiting rooms I've come across are generally very relaxing	6	5	4	3	2	1
When I see the chair and the drill and all the equipment, it makes me nervous	1	2	3	4	5	6
I feel a bit embarrassed opening my mouth and letting the dentist look at my teeth	1	2	3	4	5	6
When I get into the chair, I find it quite easy to relax	6	5	4	3	2	1
When you haven't been to the dentist for a while, you get a bit worried in case he's going to tell you off	1	2	3	4	5	6

range being 7 (no anxiety experienced) to 42 (the highest level of anxiety experienced). The internal consistency of the scale was tested with the Cronbach's a-reliability coefficient test. In the comparisons between the sub-populations of interest, t-tests were employed, as the approximate normality of the distribution of the data allowed that. Differences between proportions were examined with the test statistic for the comparison of two proportions test.

7.13.4 Results

When the internal consistency of the anxiety scale was tested, it was found that the Cronbach's α-reliability coefficient was 0.74 (n=823).

In Table 7.41, the mean anxiety scores of "affluent" / "deprived" and regular / irregular attenders, are shown.

"Deprived" respondents were found to score significantly higher ($p<0.001$) on the anxiety scale than their "affluent" counterparts, and irregular attenders were found to score significantly higher ($p<0.001$) than the regular attenders.

Analyses by age group showed that, with the sole exception of the 16- to 24-year-olds, for all the remaining ages "deprived" respondents reported significantly higher levels of dental anxiety than their "affluent" counterparts.

Irregular attenders of all ages apart from the 45- to 54-year-olds, were found to report significantly higher levels of dental anxiety than regular attenders.

Of all subjects, only 3.5% (30) were found have an anxiety score of 7, which indicated that they did not report experience of any dental anxiety. The proportion differed significantly ($p<0.01$) between "affluent" and "deprived". The proportion of "affluent" with no dental anxiety was 5.7% (21), and the corresponding proportion of "deprived" was 1.9% (9).

However, the proportion of regular attenders who reported no dental anxiety was 4.4% (14), and of the irregular attenders it was 3.0% (16), the difference not found to be significant.

Table 7.41 : Mean dental anxiety scores for every age group, by area of residence and dental attendance pattern

	AFFLUENT			DEPRIVED			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	21.6	7.8	67	22.9	7.9	81	NS
25-34	19.5	6.8	57	23.3	8.0	140	**
35-44	19.4	7.4	73	22.2	8.5	96	*
45-54	18.1	7.6	82	20.5	8.6	90	*
55-65	15.6	6.4	74	21.4	8.7	63	***
All ages	18.7	7.5	353	22.2	8.3	470	***

* : p<0.05
** : p<0.01
***: p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	19.8	6.6	68	24.5	8.3	80	***
25-34	19.3	6.6	76	24.1	8.1	120	***
35-44	18.8	6.8	70	22.5	8.8	99	**
45-54	18.1	8.1	55	20.0	8.2	117	NS
55-65	16.0	5.8	43	19.4	8.7	92	**
All ages	18.6	6.9	312	22.0	8.6	508	***

NS : not significant
** : p<0.01
***: p<0.001

7.14 HEALTH LOCUS OF CONTROL

7.14.1 Introduction

The extent to which the study sample believed that they control their own health, or that others, or luck are responsible for their health, was measured by the Multidimensional Health Locus of Control construct. Low internal health locus of control has been reported to correlate with irregular attendance[158]. However, in another study, adolescents' compliance with dental appointments was not found to be associated with health locus of control[32].

7.14.2 Objectives

The objective of the following analyses was to compare the beliefs on the health locus of control of "affluent" and "deprived" respondents and regular and irregular dental attenders.

7.14.3 Material and method

All respondents were asked to report the degree of their agreement / disagreement on a 1 (strongly disagree) to 6 (strongly agree) scale with the statements shown in Table 7.42, which form the three scales (internal, powerful others and chance) of the multidimensional health locus of control. The internal consistency of the scales was tested with the Cronbach's a-reliability coefficient test. For the comparisons of the mean scores t-tests were used as the distribution of the data was approximately normal.

7.14.4 Results

When the internal consistency of the three scales was tested, it was found that the Cronbach's α-reliability coefficient for the internal health locus of control was 0.58 (n=781). For the powerful others health locus of control it was 0.67 (n=781), and for the chance health locus of control scale it was 0.45 (n=781).

In Table 7.43 , the mean internal health locus of control scores for the "affluent" / "deprived" and regular / irregular attenders are shown.

"Deprived" respondents were found to score significantly higher ($p<0.001$) than their "affluent" counterparts, the mean internal health locus of control for the former being 26.7, and for the latter 25.1. Analyses for each age group showed that the "deprived" scored significantly higher only for the 45- to 54-, and 55- to 65-year-olds. No significant difference in the internal health locus of control score between regular and irregular attenders could be detected.

Table 7.42 : The multidimensional health locus of control

INTERNAL HEALTH LOCUS OF CONTROL

1. If I become ill, I have the power to make myself well again.
2. I am directly responsible for my health.
3. Whatever goes wrong with my health is my own fault.
4. My physical well-being depends on how well I take care of myself.
5. When I feel ill, I know it is because I have not been taking care of myself properly.
6. I can usually stay healthy by taking good care of myself.

POWERFUL OTHERS HEALTH LOCUS OF CONTROL

1. If I see my doctor regularly, I am less likely to have problems with my health.
2. I can only maintain my health by consulting my doctor.
3. Other people play a big part in whether I stay healthy or become ill.
4. Doctors keep me healthy.
5. The type of care I receive from other people is what makes me recover from an illness.
6. Following the doctor's orders to the letter is the best way for me to stay healthy.

CHANCE HEALTH LOCUS OF CONTROL

1. Often I feel that no matter what I do, if I am going to be ill, I will be ill.
2. My health is greatly influenced by things that happen accidentally.
3. When I am ill, I just have to let nature run its course.
4. When I stay healthy, I am really lucky.
5. Even when I take care of myself, it is easy to become ill.
6. When I become ill, it is a matter of luck.

Table 7.43 : Mean INTERNAL health locus of control scores for every age group, by area of residence and dental attendance pattern

	AFFLUENT			DEPRIVED			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	25.9	4.1	65	26.7	4.3	83	NS
25-34	25.2	4.7	57	26.4	4.8	143	NS
35-44	25.6	4.8	70	26.8	4.9	97	NS
45-54	24.3	4.8	84	27.1	5.5	89	***
55-65	24.7	5.0	75	26.7	5.5	69	*
All ages	25.1	4.7	351	26.7	5.0	481	***

NS : not significant
* : p<0.05
***: p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	26.0	4.4	65	26.6	4.2	83	NS
25-34	26.3	4.6	76	25.9	4.9	123	NS
35-44	26.1	4.7	68	26.5	5.1	99	NS
45-54	24.6	4.2	56	26.2	5.8	117	*
55-65	25.1	4.0	40	26.0	5.8	102	NS
All ages	25.7	4.4	305	26.2	5.2	524	NS

NS : not significant
* : p<0.05

The mean values of powerful others health locus of control are shown in Table 7.44. Here, "deprived" respondents (mean score=22.0) and irregular attenders (mean score=21.4) scored significantly higher ($p<0.001$) than the "affluent" (mean score=19.1) and regular attenders (mean score=19.6), respectively.

Similarly, the "deprived" had a significantly higher ($p<0.001$) mean chance health locus of control score (22.3), when compared to their "affluent" counterparts (19.9), and irregular attenders (21.8) scored significantly higher ($p<0.001$) than regular attenders (20.3) (Table 7.45).

Table 7.44 : Mean POWERFUL OTHERS health locus of control scores for every age group, by area of residence and dental attendance pattern

	AFFLUENT			DEPRIVED			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	19.6	4.4	64	21.3	6.0	84	*
25-34	19.0	5.7	57	20.6	5.4	141	NS
35-44	17.5	5.0	75	22.2	5.7	95	***
45-54	19.2	5.5	82	22.7	7.4	86	**
55-65	20.2	5.4	72	24.7	6.6	67	***
All ages	19.1	5.3	350	22.0	6.2	473	***

NS : not significant
* : p<0.05
** : p<0.01
***: p<0.001

	REGULAR ATTENDERS			IRREGULAR ATTENDERS			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	20.9	4.5	66	20.3	6.1	82	NS
25-34	19.3	5.6	76	20.8	5.4	121	NS
35-44	18.8	5.4	72	21.2	6.1	98	**
45-54	19.5	5.4	52	21.7	7.2	116	*
55-65	19.8	5.5	38	23.3	6.5	99	**
All ages	19.6	5.3	304	21.4	6.3	516	***

NS : not significant
* : p<0.05
** : p<0.01
*** : p<0.001

Table 7.45 : Mean CHANCE health locus of control scores for every age group, by area of residence and dental attendance pattern

	AFFLUENT			DEPRIVED			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	20.1	3.9	64	21.9	4.5	82	*
25-34	20.1	4.5	55	21.8	5.1	135	*
35-44	19.5	4.6	73	22.8	4.8	95	***
45-54	19.9	5.4	80	22.3	5.2	86	**
55-65	19.7	4.8	69	23.2	5.0	65	***
All ages	19.9	4.7	341	22.3	4.9	463	***

* : $p<0.05$
** : $p<0.01$
***: $p<0.001$

	REGULAR ATTENDERS			IRREGULAR ATTENDERS			
Age (yrs)	x	SD	n	x	SD	n	p
16-24	20.5	3.8	66	21.6	4.7	80	NS
25-34	20.2	4.9	72	22.0	4.9	117	*
35-44	20.7	5.0	70	21.9	4.9	98	NS
45-54	19.7	5.0	52	21.8	5.5	114	*
55-65	20.4	5.1	37	21.8	5.2	95	NS
All ages	20.3	4.7	297	21.8	5.1	504	***

NS : not significant
* : $p<0.05$
*** : $p<0.001$

CHAPTER 8 : AVAILABILITY OF DENTAL SERVICES RESULTS

8.1 Introduction

8.2 Objectives

8.3 Material and method

8.4 Results

8 AVAILABILITY OF DENTAL SERVICES RESULTS

8.1 INTRODUCTION

Increased availability of dental services has been found to lead to increased utilisation[136,137,140], and to reduce inequalities in the uptake of treatment between the social classes[137]. However, lower values of population to dentist ratio have been found in areas of a lower social profile[139]. In the last phase of the study, the availability of dental services in the 11 areas from where the study sample was drawn, was examined.

8.2 OBJECTIVES

The objectives of the analyses were :

1. To assess the availability of dentists, and dental services locations in each of the geographic areas under study.
2. To examine the distance of respondents' residencies from the closest dental service available.
3. To gather information about the workload of the dental surgeries.
4. To assess the availability of information about the available dental services.

8.3 MATERIAL AND METHOD

To assess the availability of dental services, all dental practices and health centres in the areas under study were visited. Dental Receptionists were interviewed, and information was recorded on specially prepared forms (Appendix VI). It concerned: (a) the number of dentists (full- and part-time) working in a surgery and their working hours, (b) the opening hours of the surgery, (c) the average number of appointments they booked per dentist per day (two half-day sessions), (d) the number of broken appointments per day, (e) the number of emergencies per day, (f) within how many days an emergency would be seen by the dentist, (g) within how many days a non-emergency appointment would be arranged, (h) whether they operated a recall system for dental check-ups, and (i) the response to the recall letters.

As there was an overlap between dentists and areas (some dentists were found to work in two or more practices in different areas), the dentists-hour availability per week for every area was calculated, as a more indicative measure of the services available. The mean opening hours per practice per week was found to be 36.5 (S.D.=6.5, n=55), and was considered as the one full-time dentist-hour availability per week. The dentist-hour availability per week for every area, divided by the one full-time dentist-hour availability per week, gave the equivalent number of full-time dentists operating in the area. Thus, in the results two figures are given, the number of dentists per 10,000 population, which refers to all dentists (full- and part-time, General Dental Practitioners and Community Dental Officers) working in an area, and the estimated equivalent of the number of full-time dentists per 10,000 population. For the population of each area, the 1981 Census projections for 1990 were used. The number of dental health service locations refers to both General Dental Practices and Health Centres.

For every respondent, the distance of his residence to the closest surgery was measured in miles. In the statistical analyses, t-tests were employed as the large sample and the nearly normal distribution of the data made such tests acceptable.

In the analyses of the number of appointments seen per day, the number of broken appointments and emergencies, the waiting time for a non-emergency appointment, and the reported response rate to recall letters for check-ups, non-parametric tests (Mann-Whitney U test) were used due to the non-normal distribution of the data and the relatively small sample size.

The availability of information on dental services/dental health, was assessed by the availability of relevant information leaflets in the Post Offices and Libraries of the areas under study, as well as in the waiting rooms of the dental surgeries visited.

8.4 RESULTS

The total number of practices visited was 55, of which seven were Community Dental Service surgeries, one private practice, and 47 General Dental Service surgeries, seven of which were situated within health centre premises. Of the surgeries visited, 13 were in affluent areas and 42 in deprived.

The highest number of dentists working in one area was 19, and it was recorded for the affluent area of Pollokshields (Table 8.1). The lowest number of dentists, was four, these being Easterhouse, a notoriously deprived area. The equivalent number of full-time dentists for these two areas were 16.1 and 3.9 respectively.

In Table 8.2, the numbers of dentists per 10,000 population and full-time dentists per 10,000 population, are shown. The highest number of full-time dentists per 10,000 population was 4.99 in Cambuslang, followed by 4.83 in Parkhead/Dennistoun, both of

Table 8.1 : Number of dentists, dentist-hour availability per week, equivalent number of full-time dentists and population of each area under study

AREA	Number of dentists	Dentist - hour availability per week	Equivalent number of full-time dentists	Population
POLLOKSHIELDS+	19	586	16.1	35629
NEWTON MEARNS+	5	195	5.3	19970
DRUMCHAPEL	13	307.5	8.4	26616
POLLOK	12	381	10.4	36682
CASTLEMILK	6	206	5.6	23911
CAMBUSLANG	12	432	11.8	23658
PARKHEAD	18	575	15.8	32693
RUTHERGLEN	13	408	11.2	38461
BRIDGETON	8	180	4.9	16425
SPRINGBURN	12	455.5	12.5	39166
EASTERHOUSE	4	143.5	3.9	18159

+ : Affluent area

Table 8.2 : Dentists per 10,000 population and full-time dentist per 10,000 population, of each area under study

AREA	Dentists/ 10,000 population	Full-time dentists/ 10,000 population
POLLOKSHIELDS+	5.33	4.52
NEWTON MEARNS+	2.50	2.65
DRUMCHAPEL	4.88	3.16
POLLOK	3.27	2.84
CASTLEMILK	2.51	2.34
CAMBUSLANG	5.10	4.99
PARKHEAD	5.51	4.83
RUTHERGLEN	3.38	2.91
BRIDGETON	4.87	2.98
SPRINGBURN	3.10	3.19
EASTERHOUSE	2.20	2.15
Affluent (mean)	3.92	3.59
Deprived (mean)	3.87	3.27
	NS	NS

+ : Affluent area

NS : not significant

these being deprived areas. The lowest figure was 2.15 in Easterhouse, a deprived area. The mean number of full-time dentists per 10,000 population for the affluent areas was 3.59, and for the deprived areas it was 3.27, the difference not being significant. It is worthy of note that one of the affluent areas (Newton Mearns) was found to have the third lowest figure of 2.65 full-time dentists per 10,000 population.

Figures 8.1 to 8.11, show the areas under study, the main bus routes, and the location of the dental surgeries (General Practices and Health Centres). All dental services were found to be accessible by public transport as they were situated close to the main bus routes.

For every respondent, the distance of his/her residence to the closest dental practice was measured in miles. The highest mean distance to a dental practice was 0.69 miles and was recorded in Castlemilk, a deprived area (Table 8.3). However, statistical analysis revealed that the mean distance to the closest dental surgery was significantly ($p<0.01$) higher for residents of affluent areas. No significant difference in the distance to the closest dental surgery was found between regular and irregular dental attenders.

On average, receptionists booked 25.6 appointments per day (per two half-day sessions) for one dentist (Table 8.4). Statistical analysis failed to detect any significant difference between affluent and deprived areas in the number of available appointments.

The mean number of reported broken appointments was 2.7 per day per dentist, and there were significantly ($p<0.001$) more broken appointments in deprived areas.

The mean number of reported emergencies per day per dentist, was 2.4. The mean number of emergency appointments per day per dentist was significantly higher ($p<0.05$) in deprived areas (2.7) than in the affluent areas (1.7).

The mean waiting time for a non-emergency appointment was found to be 8.9 days (S.D. = 5.9, n = 54). Statistical analysis failed to detect any significant difference in the waiting time for non-emergency appointments between affluent and deprived areas.

Of the 55 practices/community clinics visited, 50 (90.9%) reported they operated a system of recall letters/cards for routine check-ups. The five practices which did not have a recall system, were all found in deprived areas. Of the 50 practices which had such a system, 4 (8%) operated on a 4-monthly recall basis, 15 (30%) operated a 4-monthly

Figure 8.1 : POLLOKSHIELDS (affluent area) - map showing main bus routes and locations of dental services

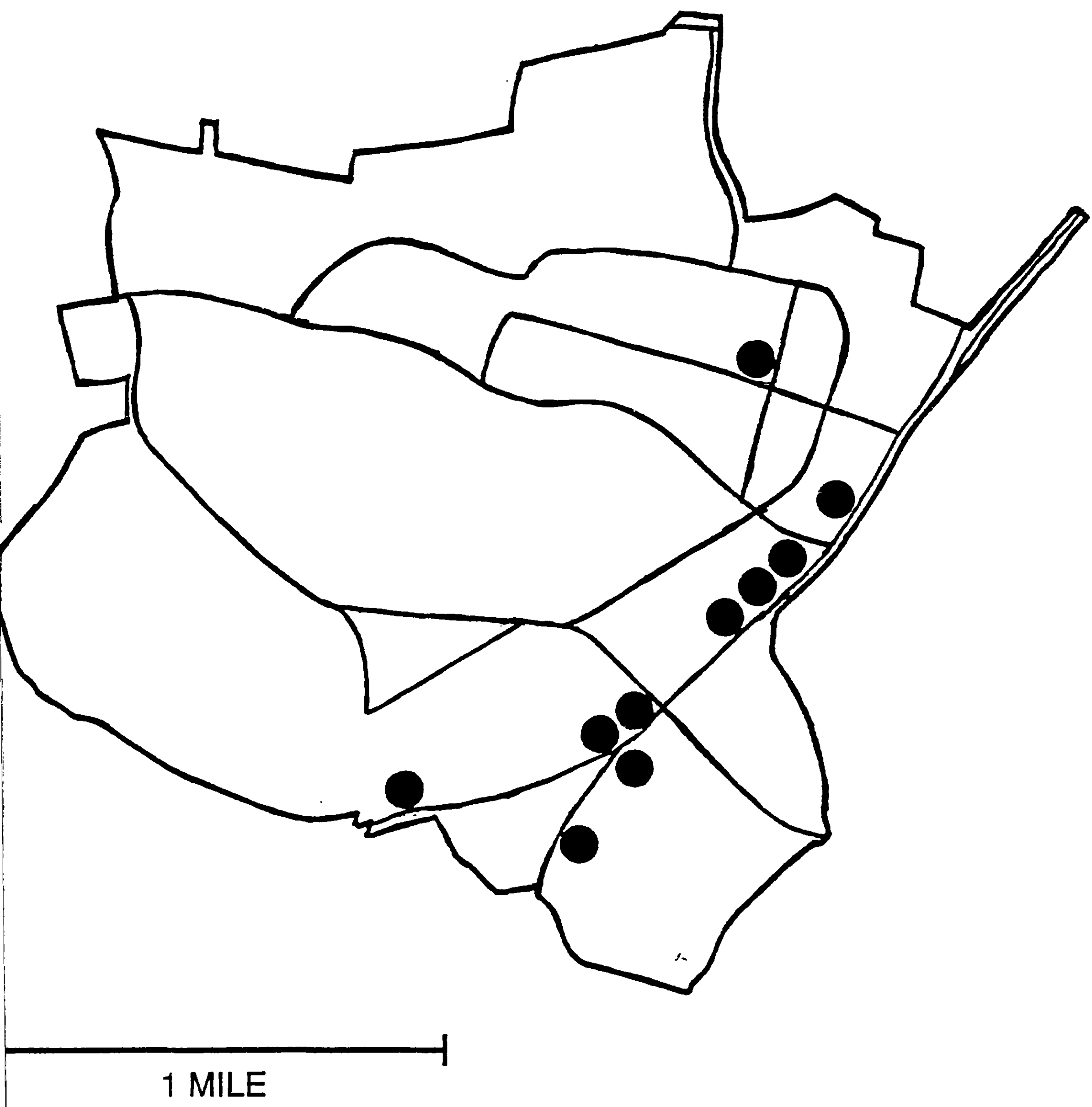


Figure 8.2 : NEWTON MEARNS (affluent area) - map showing main bus routes and locations of dental services

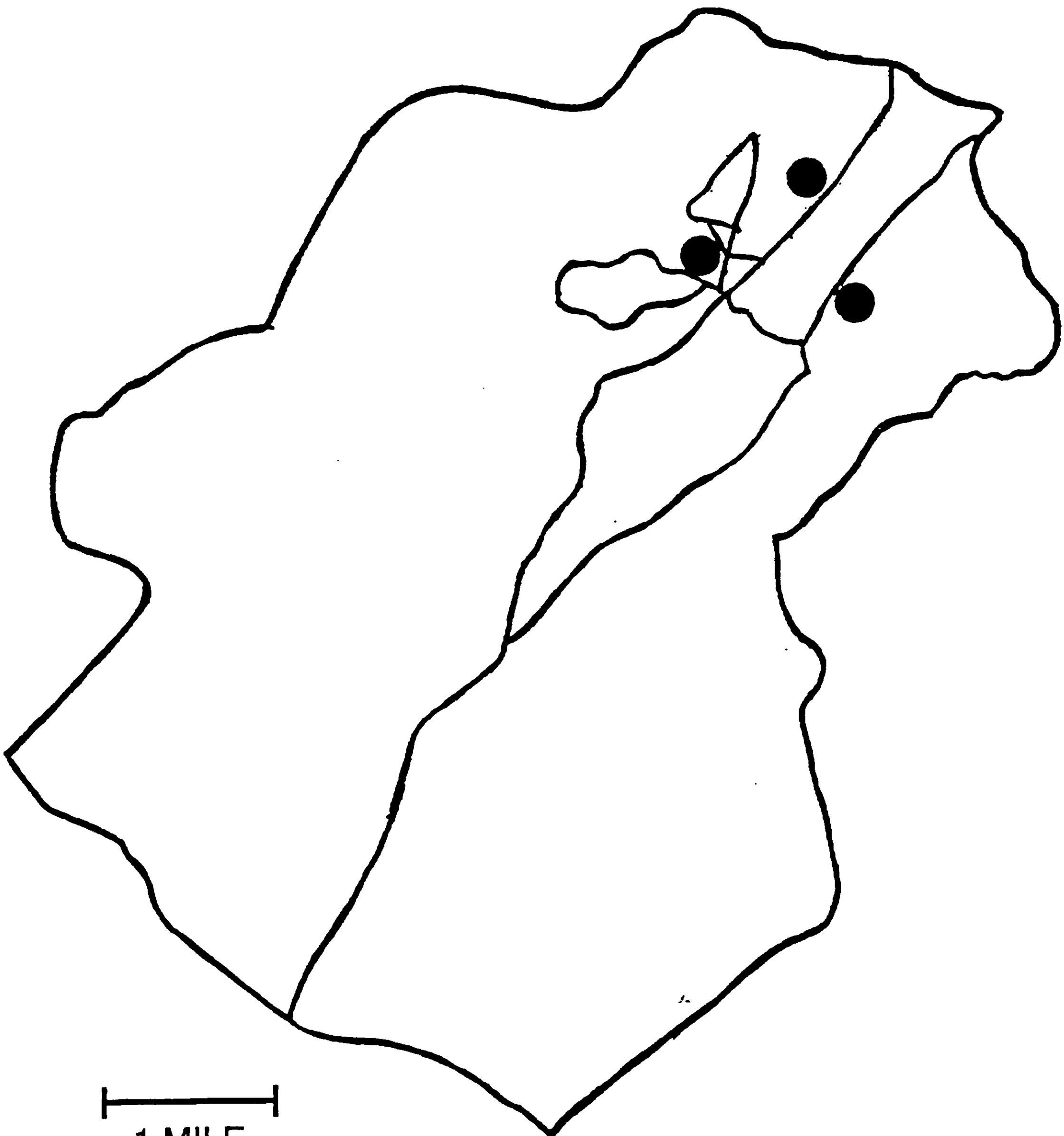


Figure 8.3 : DRUMCHAPEL (deprived area) - map showing main bus routes and locations of dental services

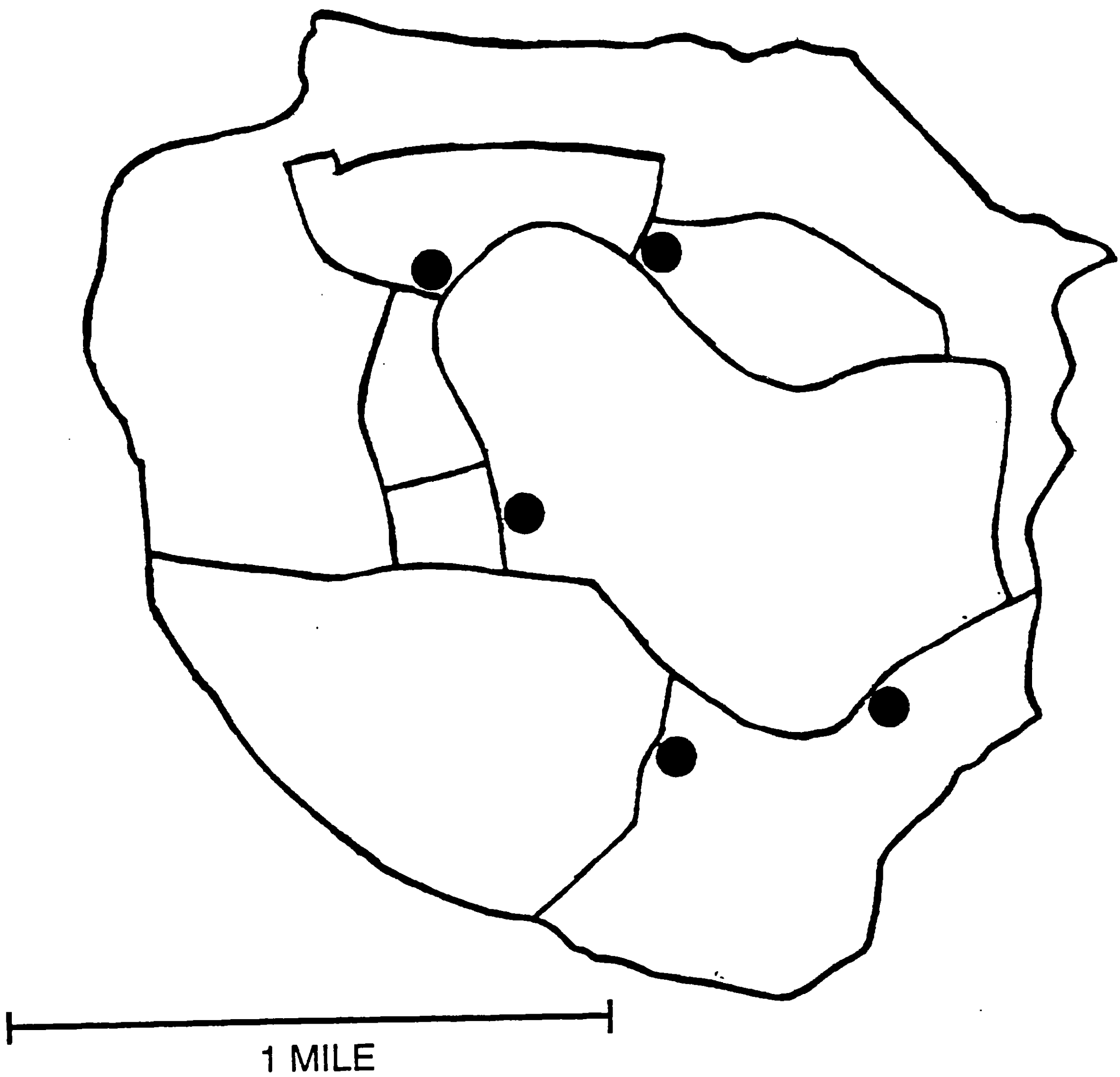


Figure 8.4 : POLLOK (deprived area) - map showing main bus routes and locations of dental services

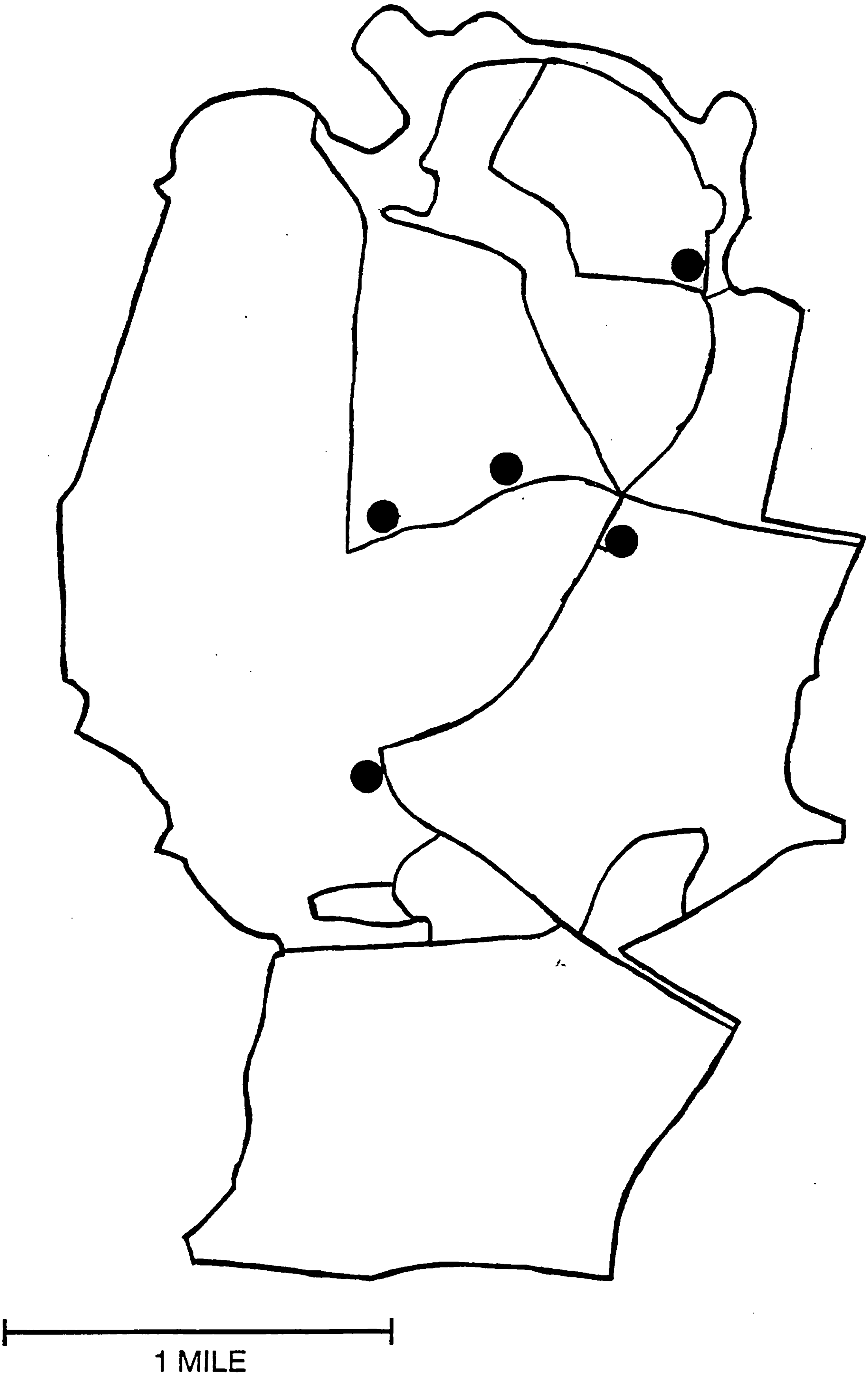


Figure 8.5 : CASTLEMILK (deprived area) - map showing main bus routes and locations of dental services

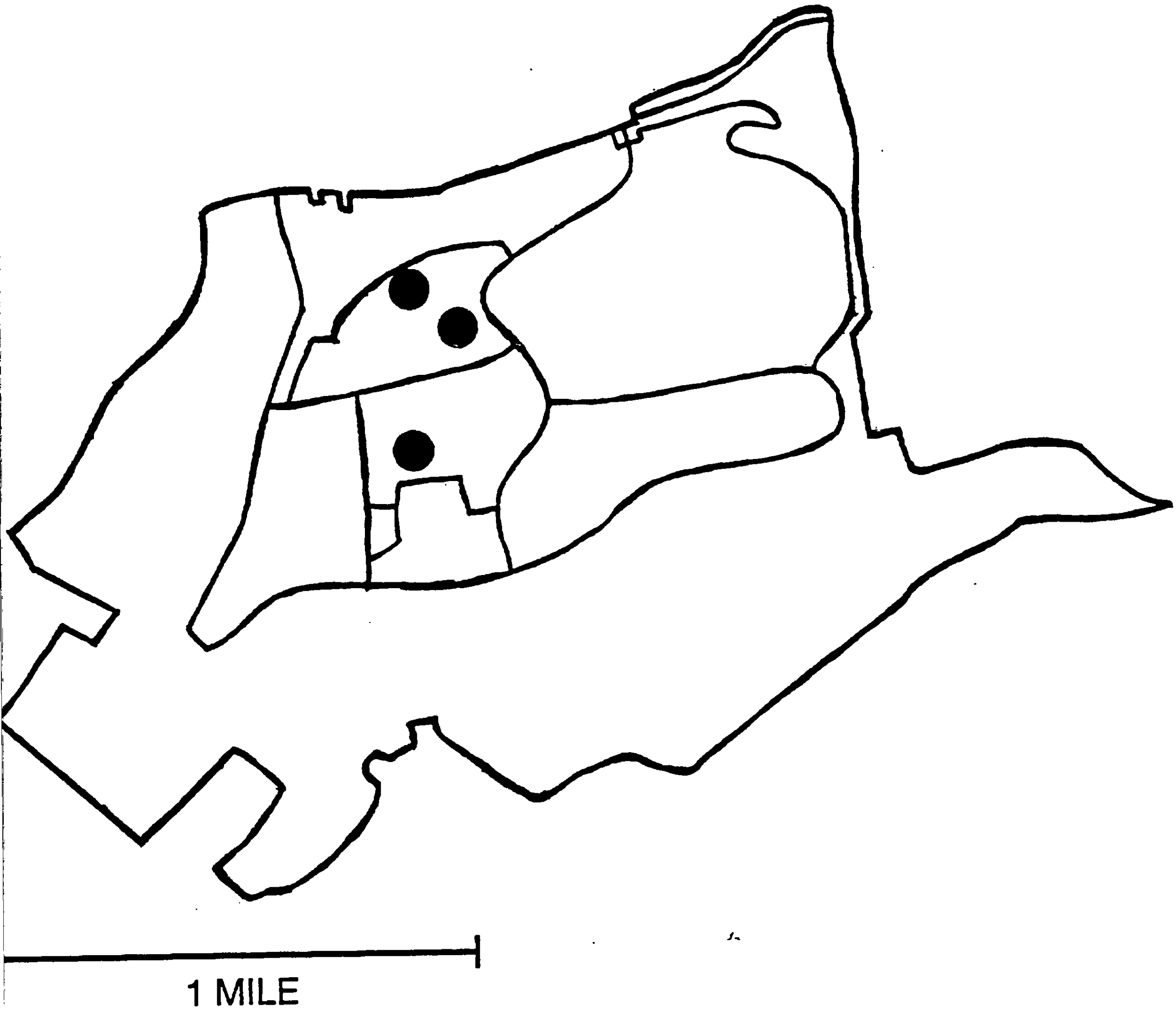


Figure 8.6 : CAMBUSLANG (deprived area) - map showing main bus routes and locations of dental services

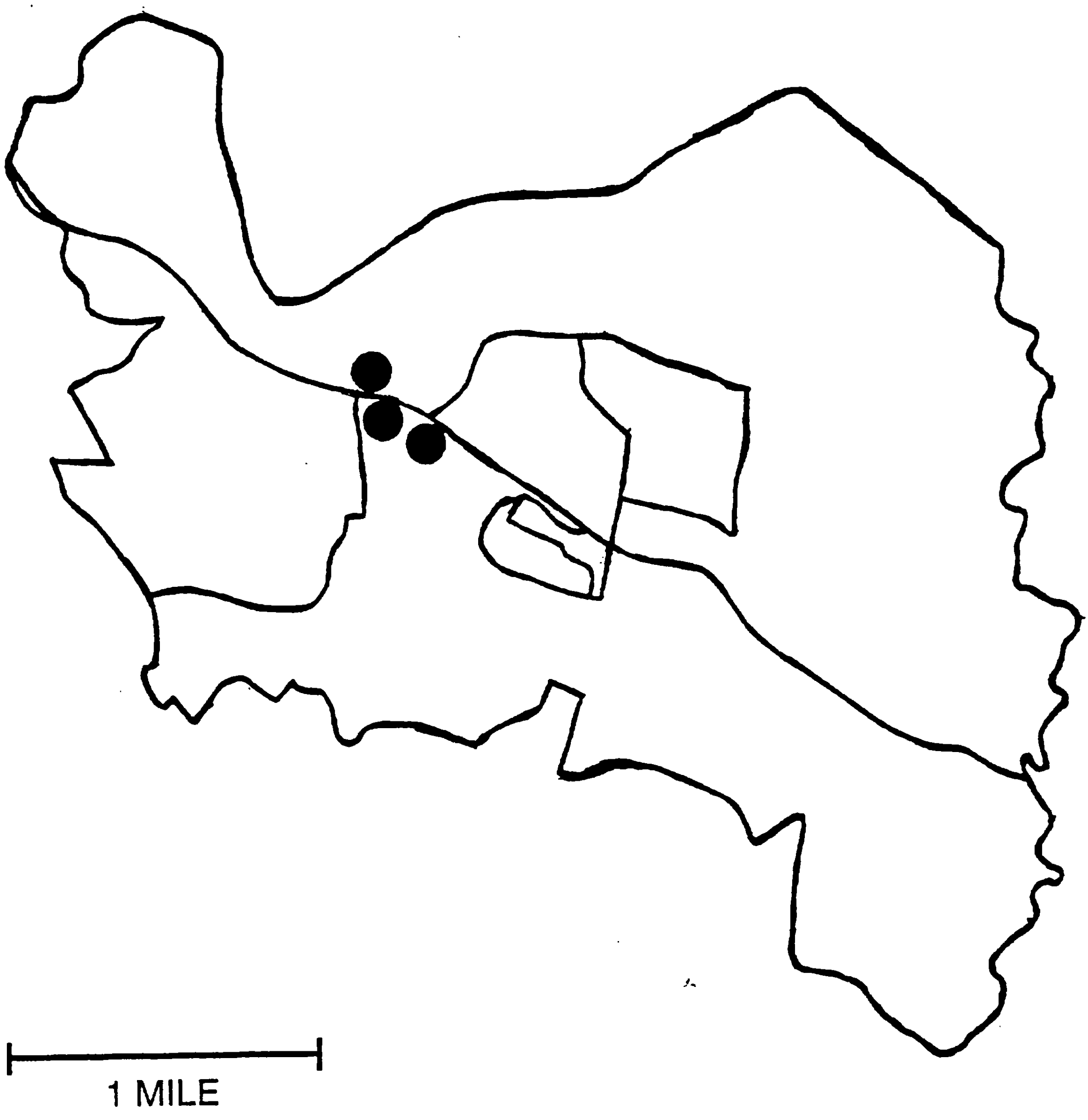


Figure 8.7 : PARKHEAD (deprived area) - map showing main bus routes and locations of dental services

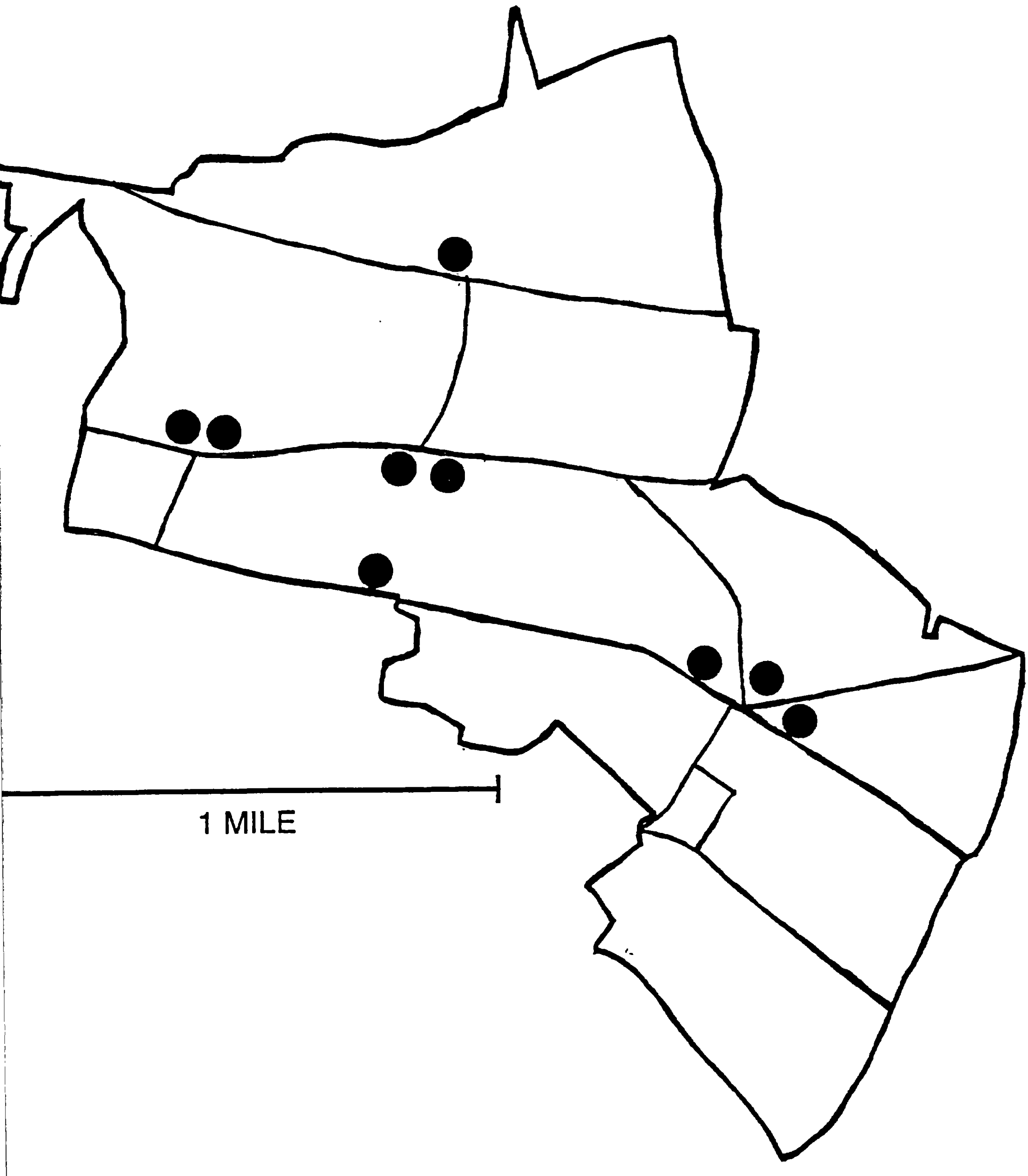


Figure 8.8 : RUTHERGLEN (deprived area) - map showing main bus routes and locations of dental services

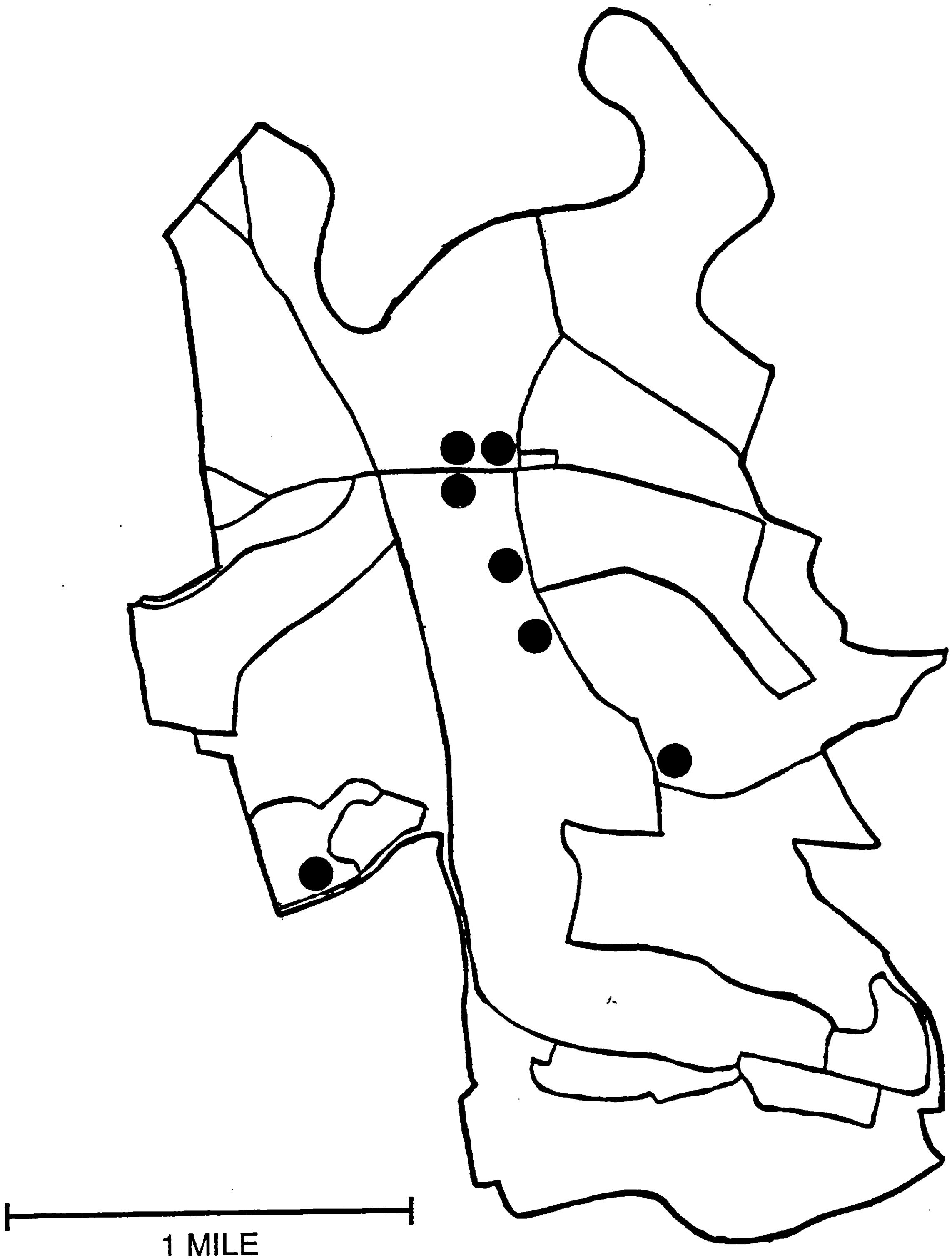


Figure 8.9 : BRIDGETON (deprived area) - map showing main bus routes and locations of dental services

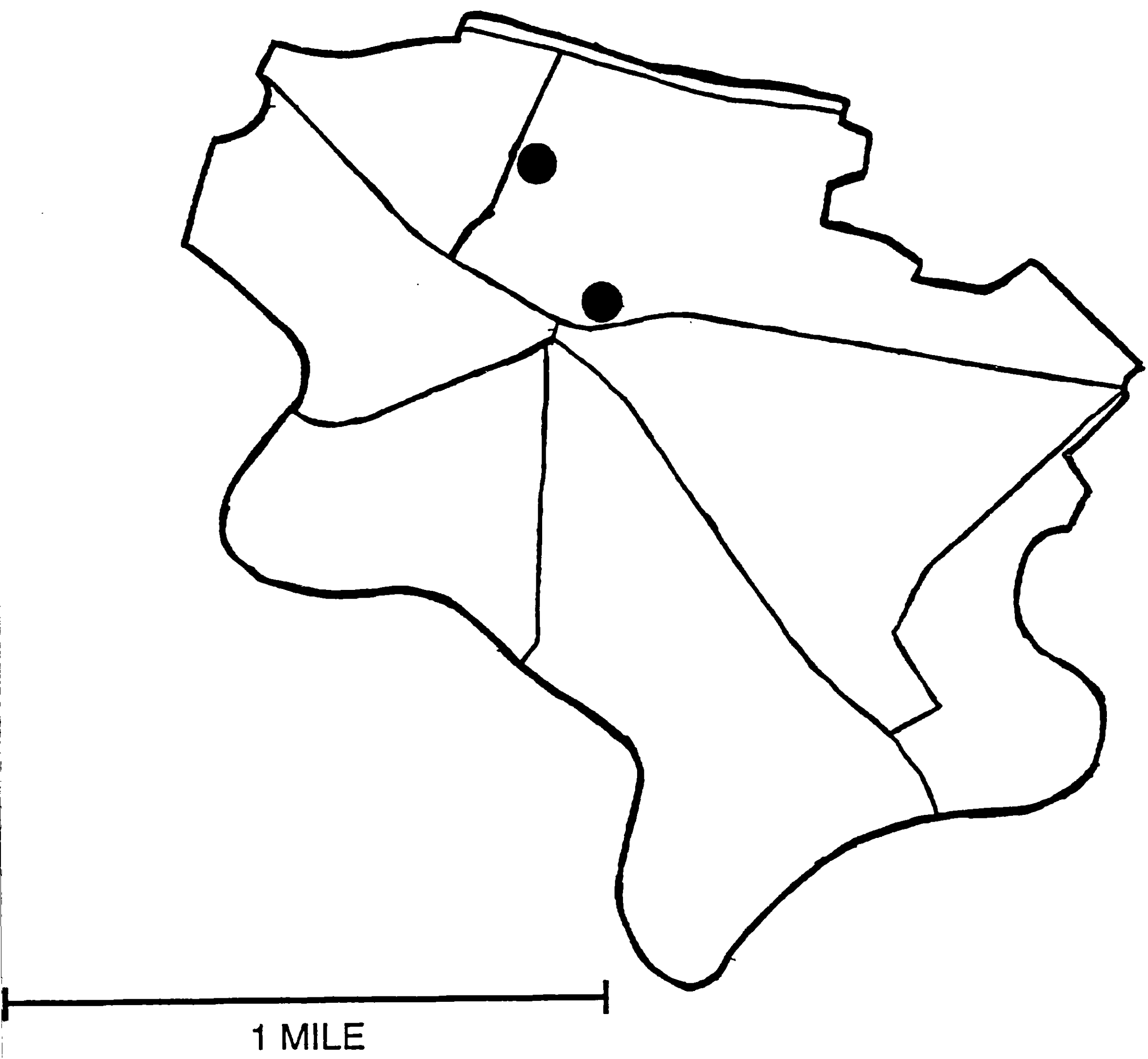


Figure 8.10 : SPRINGBURN (deprived area) - map showing main bus routes and locations of dental services

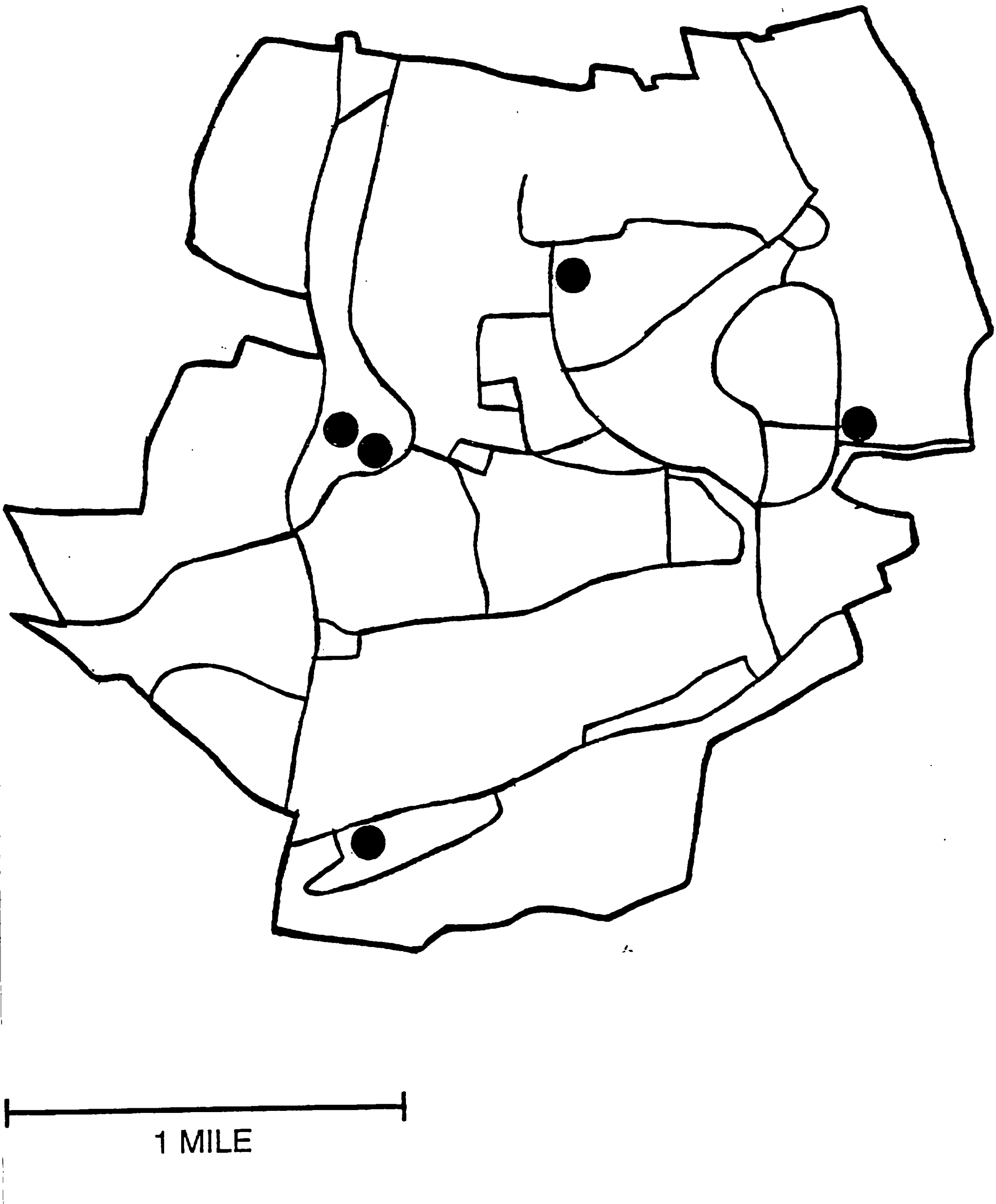


Figure 8.11 : EASTERHOUSE (deprived area) - map showing main bus routes and locations of dental services

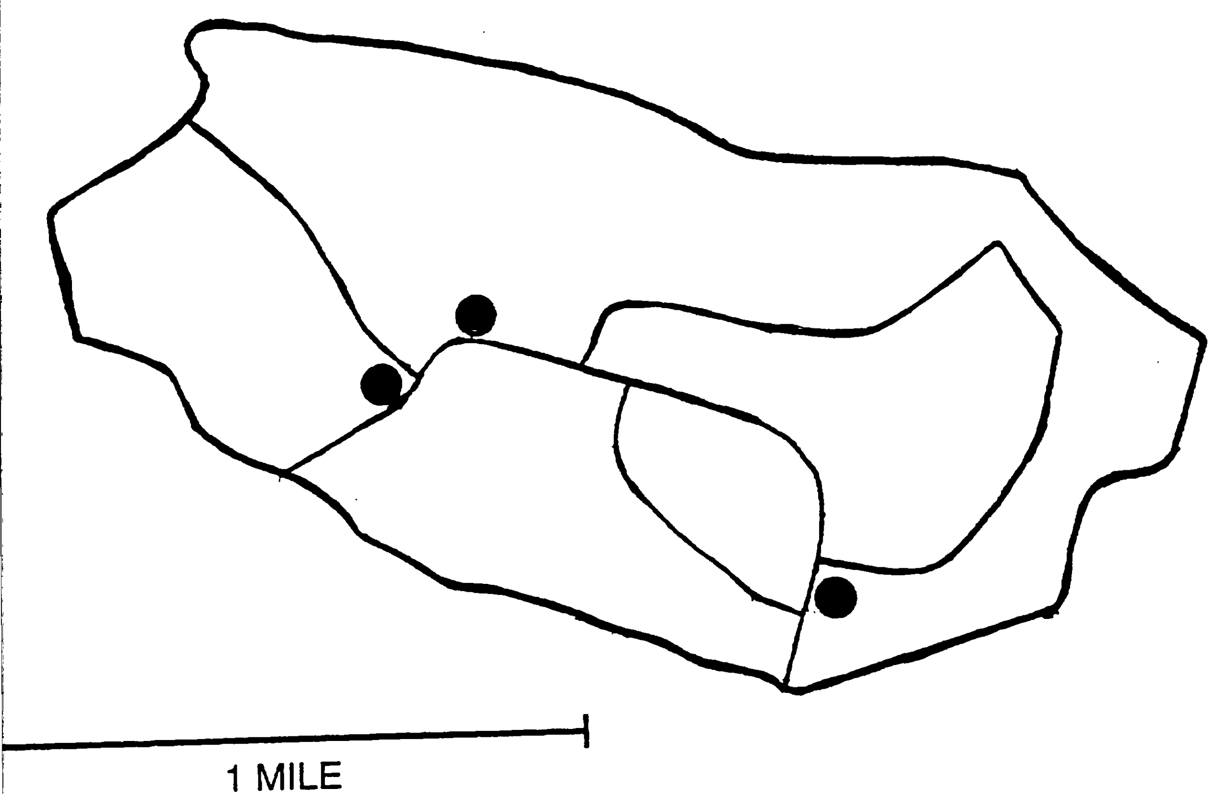


Table 8.3 : Mean distances (in miles) from respondents' residencies to the closest dental surgery

AREA	DISTANCE (in miles) Mean	SD	n
POLLOKSHIELDS+	0.39	0.14	196
NEWTON MEARNS+	0.42	0.23	170
DRUMCHAPEL	0.20	0.03	86
POLLOK	0.31	0.13	91
CASTLEMILK	0.69	0.19	58
CAMBUSLANG	0.19	0.05	74
PARKHEAD	0.21	0.19	38
RUTHERGLEN	0.22	0.04	6
BRIDGETON	0.11	0.02	20
SPRINGBURN	0.39	0.02	36
EASTERHOUSE	0.32	0.21	77

+ : Affluent area

DISTANCE (in miles)						
AFFLUENT			DEPRIVED			
Mean	SD	n	Mean	SD	n	
0.40	0.16	366	0.31	0.20	486	***

*** : p<0.001

DISTANCE (in miles)						
REGULAR ATTENDERS			IRREGULAR ATTENDERS			
Mean	SD	n	Mean	SD	n	
0.36	0.18	318	0.34	0.20	531	NS

NS : not significant

Table 8.4 : Number of appointments booked, broken appointments and emergencies per day per dentist, and waiting time (in days) for a non-emergency appointment, as reported by the receptionists of the practices visited

AREA	Appointments booked x	Appointments booked SD	Broken appointments x	Broken appointments SD	Emergencies x	Emergencies SD	Waiting time (days) x	Waiting time (days) SD	n
All	25.6	6.2	2.7	2.0	2.4	1.4	8.9	5.9	55
POLLOKSHIELDS+	26.3	6.5	1.1	0.8	1.7	0.9	10.7	6.6	10
NEWTON MEARNS+	23.7	3.2	1.7	0.6	1.5	1.3	7.0	0.0	3
DRUMCHAPEL	24.6	5.9	4.8	3.4	3.2	1.3	3.8	2.2	5
POLLOK	28.2	6.9	2.4	1.6	2.3	1.9	5.8	4.6	6
CASTLEMILK	29.5	2.6	3.8	2.6	2.8	1.9	9.8	5.7	4
CAMBUSLANG	23.5	5.5	3.5	1.0	2.3	1.0	10.3	2.9	4
PARKHEAD	26.3	4.9	3.3	1.0	2.8	1.3	5.0	2.8	4
RUTHERGLEN	25.6	5.1	1.6	1.0	1.8	1.0	14.1	9.7	7
BRIDGETON	25.0	10.4	2.5	0.9	1.7	0.6	11.0	3.6	3
SPRINGBURN	23.6	9.5	3.9	2.2	4.0	1.2	8.2	5.1	5
EASTERHOUSE	23.5	7.5	4.0	1.2	3.3	1.0	8.0	1.7	4

+ : Affluent area

	AFFLUENT mean	AFFLUENT mean rank	DEPRIVED mean	DEPRIVED mean rank	Mann-Whitney U	p
Appointments booked	25.7	28.8	25.6	27.8	262.5	NS
Broken appointments	1.2	14.0	3.2	32.3	91.0	***
Emergencies	1.7	19.0	2.7	30.8	156.5	*
Waiting time (days)	9.8	29.9	8.6	26.7	235.0	NS
Number of practices	13		42			

* : p<0.05
*** : p<0.001
NS : not significant

system for children and 6-monthly for adults, and the remaining 31 (62%) worked on a 6-monthly system.

In Table 8.5, the response rates to the recall letters, as reported by receptionists, are shown. On average, 68.1% of patients who received recall letters were reported to attend their routine check-up appointment. Variation in response to recall showed a statistically significant difference ($p<0.05$) between affluent (77.3%) and deprived areas (64.8%).

With respect to the availability of information on dental services/dental health, it was noted that none of the 11 libraries visited in the study areas were found to have dentally-related leaflets on display. Those displayed, concerned mainly unemployment benefit, income support and help with Community Charge payments. The central (main) Post Offices of all areas had available the leaflet AB11 : 'Help with NHS Costs' (Department of Health, Central Office of Information, HMSO), which has a chapter "How to get free NHS dental treatment". The leaflet DII : 'NHS Dental Treatment' (Department of Health, Central Office of Information, HMSO), which, according to information written on it, is available from Dentists, was found in 22 (40%) Practices. The leaflet was available in 35.7% of practices in deprived areas, and in 53.8% of practices in affluent areas.

The leaflet : 'A Change in Dental Care for You' (Central Office of Information, HMSO), was available in 16 (29.1%) practices.

With regard to commercial oral health leaflets, on average, there were 6.9 leaflets in the practices of affluent areas and 4.2 in the practices of deprived areas. However, the commercial leaflets concerned dental health, not dental services.

Table 8.5 : Reported response rate to the recall system for regular check-ups

AREA	RESPONSE RATE (%) Mean	SD	n
All	68.1	17.1	49
POLLOKSHIELDS+	77.5	16.2	10
NEWTON MEARNS+	76.7	2.9	3
DRUMCHAPEL	47.5	26.3	4
POLLOK	73.8	4.8	4
CASTLEMILK	65.0	19.1	4
CAMBUSLANG	63.8	11.1	4
PARKHEAD	62.5	15.0	4
RUTHERGLEN	66.4	20.1	7
BRIDGETON	63.3	11.5	3
SPRINGBURN	75.6	13.8	5
EASTERHOUSE	50.0	0.0	1

+ : Affluent area

	AFFLUENT		DEPRIVED			
	mean	mean rank	mean	mean rank	Mann-Whitney U	p
Response rate	77.3%	32.92	64.8%	22.14	131.0	*
Number of practices	13		36			

* : $p<0.05$

CHAPTER 9: MULTIVARIATE ANALYSES RESULTS : MODELS

9. MULTIVARIATE ANALYSES RESULTS : MODELS

9.1 INTRODUCTION

In the preceding bivariate analyses, all variables were analysed in relation area of residence, and dental attendance pattern, and significant associations were detected. In the following multivariate analyses, the effect of each variable is examined after controlling for the remaining variables, and the importance of each one in predicting dental health or dental behaviour is revealed.

9.2 OBJECTIVES

The objectives of the following analyses were to examine the inter-relationships of: Dental Health Status; Area of Residence; Attitudes / Beliefs / Behaviours, and availability / accessibility of Dental Services, by building prediction models, with Dental Health Status indices being the dependent variables.

9.3 MATERIAL AND METHOD

Only dentate respondents were used in the multiple regression analyses.

9.3.1 The statistical method employed

Multiple regression analysis was used in order to develop mathematical linear models which related Dental Health Status to various independent variables, so that important predictors of the Dental Health Status could be determined. Regression is a very powerful statistical tool for modelling the relationship of a physiological response variable with a number of potentially predictive factors. It is a comprehensive approach to not only identifying both the numerical and categorical factors that relate to the response variable, but to determining the relationship between each factor and outcome, taking into account any interaction that may exist between factors[191]. In linear regression models for response variables with independent normal distributions and homogeneous variance, the estimates of the parameters (intercept and slopes) are maximum likelihood estimates, and so they have optimal statistical properties. Moreover, these properties similarly apply to situations with large samples, regardless of whether the response variables have normal distributions. Where substantial heterogeneity among the variance of the response variable is evident, transformation of the data may yield better estimates for the parameters of the model[192].

The assumptions required for the regression analysis are :

1. Random sample of subjects. The sampling technique used in this study satisfies this requirement.
2. Related samples. All variables (dependent and independent) used, were measurements of the same population, i.e. the study population, thus this requirement is also satisfied.
3. Independent observations for the dependent variables. Dental Health Status indices were used as dependent variables. Independence of observations is satisfied as, for example, the number of decayed teeth of a subject does not say anything about the number of decayed teeth of another participant.
4. Normality of the dependent variable. Histograms of the dependent variables were examined and extreme non-normality was not observed. Even though some deviation from normality was found as expected due to sampling variation, the large sample size (n=285) compensated for that. Additionally, the histograms of the studentized residuals of each model were examined, and no substantial deviation from normality was noted.
5. Homogeneity of variance of the dependent variable was checked by examining the spread of the plots of residuals, and studentized residuals against the predicted values. For the number of decayed teeth, the number of filled teeth and the total-treatment cost, a slight increase in the spread with increasing predicted values was observed, indicating some heterogeneity of variance. In these cases, logarithmic transformation of the dependent variable was undertaken. However, this did not result in an increase of the goodness of fit. Thus, the original untransformed data models are reported.
6. Linearity of association, was checked by examining the scatterplots of residuals against the predicted values for obvious pattern. For the periodontal treatment cost model, and when "importance of dentists and dental services to keeping healthy" was used as a dependent variable, patterns were observed. This suggested violation of the assumption of linearity, and therefore these prediction models were not accepted, and are not reported

As required, categorical dichotomous data were transformed into dummy indicator variables.

The stepwise selection of independent variables to be entered in the model, among all 23 variables, was used (forward selection and backward elimination were tested giving similar results). Adjusted R^2 (i.e. corrected R^2 taking into account the number of cases and the number of independent variables of the equation, so that the goodness of fit of the model in the population is reflected more closely than with the R^2 which is an optimistic estimate) is reported as an indicator of the variance in the dependent variable explained by the model. The probability of the F statistic (testing the null-hypothesis that $R^2=0$, that is, that there is no linear association), is also reported, as well as the number of valid cases (n) used in the analysis.

In the Tables the coefficients labelled B are the partial regression coefficients (the coefficient of each variable adjusted for other independent variables in the model). B's are not appropriate to be interpreted as indicators of the relative importance of the variables of the model, because their magnitude depends on the units in which the variables are measured. Beta coefficients (coefficients of the independent variables when all variables are expressed in standardised Z-score, i.e. that they are normally distributed with mean=0 and standard deviation=1) are somewhat more comparable, and are also reported. However, as Beta's are contingent on the other independent variables in the model and are affected by the correlations of the independent variables, they do not reflect the relative importance in an <u>absolute</u> sense.

Thus, as another indicator of the relative importance, the R^2 change is also reported in the Tables. R^2 change is the increase in R^2 when a variable is entered into an equation that already contains the other independent variables. A large change in R^2 indicates that a variable provides unique information about the dependent variable.

The correlation coefficients of the dependent variable and each one of the independent variables of the model reflect the importance of each variable when it is used alone in order to predict the dependent variable. Significant correlations, from the correlation matrix of the dependent and the independent variables of the models, are also reported, giving information of the inter-relationships of the independent variables of the model, as well as between the independent variables in the model and the remaining independent variables, which are not part of the model.

Tolerance is reported as a measure of collinearity. Collinearity refers to the situation in which there is a high multiple correlation when one of the independent variables is regressed on the other independent variables of the model (i.e. when there is a high correlation between independent variables). Collinear variables provide very similar information and it is difficult to separate out the effects of the individual variables. The tolerance of a variable i is defined as $1-R_i^2$, where R_i is the multiple correlation coefficient when the ith independent variable is predicted from the other independent variables. High tolerance for a variable is expected when there is <u>not</u> a strong relationship between this variable and the remaining independent variables.

9.3.2 The dependent variables

Dependent variables were the number of sound teeth present, number of decayed teeth, number of missing teeth, and number of filled teeth, as well as the DMFT score. Also, prediction models were built for the total cost of treatment, and for each of the treatment cost components, namely cost of periodontal treatment, cost of prosthetic treatment and cost of restorative treatment.

9.3.3 The independent variables

Independent variables which were considered in order to build the models were:

I. <u>AREA OF RESIDENCE VARIABLE</u>

1. Area of residence was constructed as a dummy indicator variable, with residents of "affluent" areas coded as 0, and residents of "deprived" areas coded as 1.

II. <u>DENTAL HEALTH ATTITUDES / BELIEFS / BEHAVIOURS VARIABLES</u>

1. Regular attendance was coded as follows : 4 = attendance twice within last year, and the reason given was either "received reminder card for check-up", or "time for check-up", or "to get teeth cleaned/scaled". 2 = attendance once within last year for the same reasons. 1 = attendance once within last two years for the same reasons. 0 = attendance more than two years ago, or never for a check-up.
2. Brushing behaviour was coded as follows : 21 = brushing three or more times a day. 14 = twice a day. 7 = once a day. 4 = three or four times per week. 1 = once per week. 0.07 = less than once per week. 0 = never.
3. Diet was coded as a dummy indicator variable, with those respondents who reported a change in their diet for dental health reasons being coded as 0, and the remaining who did not report such a change in their diet habits, coded as 1.
4. Importance of dentists (dental services) to keeping healthy variable, was coded from the relevant question so that the higher the score, the less was the importance attached to the dental services/dentists to keeping healthy.
5. Image of the dentist variable (as described in Section 7.8), was such that the higher the score, the more negative the image of the dentist.
6. The attitudes to cost of dental treatment variable (as described in Section 7.11), was such that the higher the score, the more negative the attitude towards cost of treatment.
7. The anxiety variable (as described in Section 7.13), was such that the higher the score, the more the dental anxiety experienced by respondents.

8. The image of the denture - wearer variable (as described in Section 7.6), was such that the higher the score, the more favourable the attitude towards the denture - wearer.
9. The image of the natural teeth person variable (as described in Section 7.6), was such that the higher the score, the more favourable the attitude towards the natural teeth person.
10. The value of a healthy front tooth (as described in Section 7.7).
11. The value of a filled front tooth (as described in Section 7.7).
12. The value of a decayed front tooth (as described in Section 7.7).
13. The value of a decayed and painful front tooth (as described in Section 7.7).
14. The Internal Health Locus of Control score (as described in Section 7.14).
15. The Powerful Others Health Locus of Control score (as described in Section 7.14).
16. The Chance Health Locus of Control score (as described in Section 7.14).

III. AVAILABILITY/ACCESSIBILITY OF DENTAL SERVICES VARIABLES

1. The number of barriers (structural - organisational, as described in Section 7.12) experienced by respondents.
2. Number of dentists working in the area of residence.
3. Dentist : population score of the area.
4. Number of equivalent full-time dentists working in the area of residence.
5. Equivalent full-time dentist : population score of the area.
6. Distance from the residence of each respondent to the closest dental surgery in the area.

9.3.4 Regression models with previously independent variables used as dependent

The independent variables which constituted the regression models of the Dental Health Status and treatment indices (Tables 9.1 - 9.8) can be considered as factors directly related to the dependent variable which they predict. In order to examine indirect associations, the variables which appeared in the models as predictors, were subsequently used as dependent variables, and were regressed on the remaining independent variables (Tables 9.9 - 9.18).

9.4 RESULTS

9.4.1 Number of sound teeth linear model

In the model, two variables were entered, the "image of the denture wearer", and "attitudes to charges/costs" (Table 9.1). The model explains 6% of the variability of the number of sound teeth.

"Image of the denture wearer" was found to be negatively associated with the number of sound teeth (Beta=-0.19), indicating that the higher the score (i.e. the more favourable attitude towards dentures and false teeth), the fewer the sound teeth present. "Attitudes to charges/costs", was found to be positively associated with the number of sound teeth (Beta=0.16), suggesting that the more negative attitude towards charges, the more the sound teeth present.

"Image of the denture wearer" appeared to be a stronger predictor of the number of sound teeth than the " attitudes to charges/cost".

9.4.2 Number of decayed teeth linear model

The prediction model for the number of decayed teeth consisted of four variables: anxiety, tooth brushing, area of residence and powerful others health locus of control (Table 9.2), and explained 14% of the variability of the number of decayed teeth.

Anxiety was found to be positively associated with the number of decayed teeth (Beta=0.18), indicating that the higher the levels of dental anxiety experienced, the more the decayed teeth present. Tooth brushing frequency was found to be an equally strong but negatively associated predictor (Beta=-0.18), suggesting that the lower the tooth brushing frequency, the more decayed teeth present. Area of residence, (Beta=0.15), being positively associated with the number of decayed teeth, indicated that residents of deprived areas were likely to have more decayed teeth, even after standardising for the remaining variables of the model. Powerful Others Health Locus of Control was positively associated (Beta=0.13) with the number of decayed teeth, that is the stronger the belief that others (rather than oneself) have power over one's health, the more the decayed teeth present.

Anxiety and tooth brushing appeared to be stronger predictors of the number of decayed teeth than the area of residence, and powerful others health locus of control.

9.4.3 Number of missing teeth linear model

Here, five variables, i.e. area of residence, distance of residence to the closest dental surgery, "image of the denture wearer", tooth brushing frequency, and the value of a healthy front tooth, constituted the prediction model for the number of missing teeth, explaining 19% of the variability (Table 9.3).

Table 9.1 : Number of SOUND teeth linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Number of SOUND teeth	14.74	-0.31	IMAGE OF THE DENTURE WEARER	-0.19	0.038	0.9999
		+0.17	ATTITUDES TO CHARGES/COST	0.16	0.027	0.9999

n=285
Adjusted R^2 : 0.06
p(F) : 0.0001

Table 9.2 : Number of DECAYED teeth linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Number of DECAYED teeth	-0.02	+0.05	ANXIETY	0.18	0.032	0.9678
		-0.06	TOOTH BRUSHING	-0.18	0.028	0.8702
		+0.60	AREA OF RESIDENCE	0.15	0.017	0.8208
		+0.05	POWERFUL OTHERS HEALTH LOCUS OF CONTROL	0.13	0.016	0.9443

n=285
Adjusted R^2 : 0.14
p(F) : 0.0000

Table 9.3 : Number of MISSING teeth linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Number of MISSING teeth	6.68	+3.86	AREA OF RESIDENCE	0.31	0.079	0.8032
		+5.54	DISTANCE TO DENTAL SURGERY	0.18	0.028	0.9093
		+0.23	IMAGE OF THE DENTURE WEARER	0.14	0.020	0.9785
		-0.15	TOOTH BRUSHING	-0.14	0.017	0.8714
		-0.71	VALUE OF A HEALTHY FRONT TOOTH	-0.13	0.017	0.9839

n=285
Adjusted R^2 : 0.19
p(F) : 0.0000

Area of residence was found to be the strongest predictor (Beta=0.31) and was positively associated with the number of missing teeth, the residents of the deprived areas having more missing teeth. The distance from respondents' residencies to the closest dental surgery was positively associated with the number of missing teeth (Beta=0.18). "Image of the denture wearer" was also positively associated with the number of missing teeth (Beta=0.14), suggesting that the more the favourable attitude towards denture wearing, the more the missing teeth. Tooth brushing (Beta=-0.14), and value of a healthy front tooth (Beta=-0.13), were found to be negatively associated, which indicates that the less the tooth brushing frequency, and the less the value attached to a healthy tooth, the more the number of missing teeth.

9.4.4 Number of filled teeth linear model

In this case, seven variables constituted the model, explaining 27% of the variability in the number of filled teeth. The variables were regular attendance, area of residence, attitudes to charges/costs of dental treatment, number of structural/organisational barriers, tooth brushing behaviour, distance of residence to the closest dental surgery, and importance of dentists to keeping healthy (Table 9.4).

Regular dental attendance appeared to be the strongest predictor of the number of filled teeth, and it was positively associated (Beta=0.21), indicating that the higher the frequency of attendance for dental check-ups, the more the filled teeth present. Area of residence was found to be a negative predictor of the number of filled teeth (Beta=-0.19), suggesting that residents of deprived areas had fewer filled teeth. Attitudes to charges/cost were negatively associated with the number of filled teeth (Beta=-0.16), suggesting that the more negative the attitudes towards charges/cost of dental treatment the fewer the filled teeth present. Structural barriers (Beta=0.15) were positively associated, thus the more the structural/organisational barriers to attendance experienced by respondents, the higher the number of filled teeth. Tooth brushing frequency also appeared as a positively associated predictor (Beta=0.15), the higher the tooth brushing frequency the greater the number of the filled teeth. Distance from the residence to the closest dental surgery (Beta=-0.11), and importance of dentists to keeping healthy (Beta=-0.10), appeared to be negative predictors of the number of filled teeth, indicating that the more the distance to the closest dental surgery and the less the importance attached to dentists, the fewer the filled teeth.

Table 9.4 : Number of FILLED teeth linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Number of FILLED teeth	13.34	-2.24	AREA OF RESIDENCE	-0.19	0.024	0.6540
		0.73	REGULAR DENTAL ATTENDANCE	0.21	0.036	0.8051
		0.16	TOOTH BRUSHING	0.15	0.020	0.8300
		-0.15	ATTITUDES TO CHARGES/COST	-0.16	0.021	0.8613
		+0.77	STRUCTURAL BARRIERS	0.15	0.022	0.9275
		-3.32	DISTANCE TO DENTAL SURGERY	-0.11	0.011	0.8998
		-1.07	IMPORTANCE OF DENTISTS	-0.10	0.010	0.9451

n=285
Adjusted R^2 : 0.27
p(F) : 0.0000

9.4.5 DMFT linear model

Two variables were entered in this model, the "image of the denture wearer", and "attitudes to charges/costs" (Table 9.5). The model explained 6% of the variability of the number of sound teeth.

"Image of the denture wearer" was found to be positively associated with the DMFT score (Beta=0.19), indicating that the more favourable attitude towards dentures and false teeth, the higher the DMFT score. "Attitudes to charges/costs", was found to be negatively associated with the DMFT score (Beta=-0.16), suggesting that the more negative attitude towards charges, the lower the DMFT score.

"Image of the denture wearer" appeared to be a stronger predictor of the DMFT score than the " attitudes to charges/cost".

9.4.6 Total-treatment cost linear model

Regarding this model, four variables were found to explain 20% of the variability (Table 9.6). These were the tooth-brushing behaviour, area of residence, "image of the denture wearer", and value of a healthy front tooth.

Tooth brushing frequency was found to be the strongest predictor and negatively associated (Beta=-0.24) with the total-treatment cost, suggesting that the higher the tooth brushing frequency, the less the cost of the treatment required. After adjusting for tooth brushing frequency, area of residence also appeared as a predictor (Beta=0.22), indicating that residents of deprived areas have greater treatment need costs. Image of the denture wearer (Beta=0.16) was a positive predictor of the total-treatment cost, the more favourable the attitude towards dentures, the higher the treatment cost. In contrast, value of a healthy front tooth was found to be negatively associated (Beta=-0.15), suggesting that the higher the value attached to a healthy tooth, the less the total-treatment cost.

Tooth brushing frequency and area of residence were stronger predictors of the total treatment cost than the image of the denture wearer and the value of a healthy tooth.

9.4.7 Periodontal treatment cost linear model

Two variables were found to constitute this model, explaining 9% of the variability. These were the area of residence and value of a decayed and painful front tooth. However, the plots of residuals and studentized residuals against the predicted values were found to show a pattern, thus indicating that the assumptions of normality, linearity

Table 9.5 : DMFT score linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
DMFT score	17.26	+0.31	IMAGE OF THE DENTURE WEARER	0.19	0.038	0.9999
		-0.17	ATTITUDES TO CHARGES/COST	-0.16	0.027	0.9999

n=285
Adjusted R^2 : 0.06
p(F) : 0.0001

Table 9.6 : Total-treatment cost linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
TOTAL-TREATMENT COST	71.90	+21.67	AREA OF RESIDENCE	0.22	0.040	0.8615
		- 2.09	TOOTH BRUSHING	-0.24	0.049	0.8728
		+2.01	IMAGE OF THE DENTURE WEARER	0.16	0.024	0.9782
		-6.69	VALUE OF A HEALTHY FRONT TOOTH	-0.15	0.023	0.9890

n=285
Adjusted R^2 : 0.20
p(F) : 0.0000

and homogeneity of variance were violated. Therefore this linear model was not considered to be acceptable.

9.4.8 Prosthetic treatment cost linear model

For this model, four variables were found to explain 13% of the variability. These were the area of residence, the value of a filled front tooth, the distance to the closest dental surgery, and the image of the denture wearer (Table 9.7).

Area of residence was the strongest predictor (Beta=0.30) of the prosthetic treatment cost, the residents of deprived areas having higher prosthetic treatment cost. Value of a filled tooth was found to be negatively associated with the prosthetic treatment cost, (Beta=-0.16), the higher the value of a filled tooth, the less the prosthetic treatment cost. Distance to the closest dental surgery (Beta=0.15) and image of the denture wearer (Beta=0.14) were positively associated with the prosthetic treatment cost, the more the distance to the closest dental surgery and the more favourable the attitude towards dentures, the more the prosthetic treatment cost.

9.4.9 Restorative treatment cost linear model

Dental anxiety was found to be the only predictor of the restorative treatment cost, explaining 4% of the variability (Table 9.8). It was positively associated with the restorative treatment cost (Beta=0.21), indicating that the higher the levels of dental anxiety, the higher the costs.

9.4.10 Regular dental attendance as a dependent variable : linear model

Four variables, i.e. area of residence, anxiety, image of the denture wearer and value of a filled front tooth, were found to be significant predictors of the frequency of regular dental attendance, explaining 23% of the variability (Table 9.9).

Area of residence was found to be the strongest predictor (Beta=-0.34), suggesting that residents of deprived areas attended less frequently. Anxiety was found to be negatively associated with the frequency of dental attendance (Beta=-0.18), the higher the levels of dental anxiety experienced, the less the frequency of attending at the dentist for regular check-up. Image of the denture wearer was equally strong in predicting dental attendance (Beta=-0.18), suggesting that the more favourable the attitude towards dentures, the less the frequency of regular dental attendance. Value of a filled tooth was positively associated (Beta=0.13), the higher the value attached to a filled tooth, the higher the frequency of regular dental attendance.

Table 9.7 : Prosthetic treatment cost linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
PROSTHETIC TREATMENT COST	-6.19	+13.89	AREA OF RESIDENCE	0.30	0.082	0.8863
		- 1.94	VALUE OF A FILLED FRONT TOOTH	-0.16	0.025	0.9974
		+17.28	DISTANCE	0.15	0.019	0.8941
		+ 0.83	IMAGE OF THE DENTURE WEARER	0.14	0.019	0.9882

n=260
Adjusted R^2 : 0.13
p(F) : 0.0000

Table 9.8 : Restorative treatment cost linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
RESTORATIVE TREATMENT COST	9.61	+0.56	DENTAL ANXIETY	0.21	0.044	1.0000

n=260
Adjusted R^2 : 0.04
p(F) : 0.0007

Table 9.9 : Regular dental attendance linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Regular dental attendance	3.56	-1.13	AREA OF RESIDENCE	-0.34	0.108	0.9564
		-0.04	ANXIETY	-0.18	0.032	0.9738
		-0.08	IMAGE OF THE DENTURE WEARER	-0.18	0.031	0.9835
		+0.11	VALUE OF A FILLED FRONT TOOTH	0.13	0.017	0.9935

n=285
Adjusted R^2 : 0.23
p(F) : 0.0000

9.4.11 Tooth brushing frequency as a dependent variable : linear model

As predictors of the tooth brushing frequency, three variables were found, explaining 16% of the variability (Table 9.10). These were the area of residence, the importance attached to dentists and dental services to keeping healthy, and the value attached to a filled tooth.

Area of residence was the strongest predictor, and negatively associated (Beta=-0.32), indicating that after adjustment for the remaining variables, residents of deprived areas brushed their teeth less frequently than did residents of affluent areas. Importance of dentists to keeping healthy (Beta=-0.17) was also a significant predictor, the less the importance attached to dentists and dental services to keeping healthy, the less the tooth brushing frequency. Value of a filled front tooth was positively associated with the tooth brushing frequency (Beta=0.11), indicating that the higher the value attached to a filled tooth, the more the tooth brushing frequency.

9.4.12 Attitudes to charges/cost of dental treatment as a dependent variable : linear model

Image of the dentist, area of residence, anxiety, chance health locus of control and structural barriers were found to be the significant predictors of the attitudes to charges / cost, explaining 25% of the variability (Table 9.11). Structural barriers was a less strong predictor (Beta=0.13) than the remaining four variables, which were found to be of similar importance. The Beta coefficient for image of the dentist and area of residence was 0.21, and for anxiety and chance health locus of control it was 0.20.

All variables were positively associated with the attitudes to charges/cost variable. Thus, the more negative the image of the dentist, the more negative the attitude to charges. After standardising for the remaining variables, residents of deprived areas had a more negative attitude towards charges. Furthermore, the higher the dental anxiety experienced and the higher the score of the chance health locus of control scale, the more the negative attitude towards charges and cost of dental treatment. The more the structural barriers faced in the receipt of dental care, the stronger the negative attitude towards charges.

9.4.13 Dental anxiety as a dependent variable : linear model

Two variables constituted this model, explaining 12% of the variability (Table 9.12). These were the attitudes to charges/cost of dental treatment, and regular dental attendance frequency.

Table 9.10 : Tooth brushing linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Tooth brushing	15.8	-3.68	AREA OF RESIDENCE	-0.32	0.102	0.9766
		-1.67	IMPORTANCE OF DENTISTS	-0.17	0.027	0.9756
		+0.33	VALUE OF A FILLED FRONT TOOTH	0.11	0.012	0.9907

n=285
Adjusted R^2 : 0.16
p(F) : 0.0000

Table 9.11 : Attitudes to charges/cost linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Attitudes to charges score	13.39	+0.19	IMAGE OF THE DENTIST	0.21	0.042	0.9391
		+2.59	AREA OF RESIDENCE	0.21	0.040	0.8922
		+0.16	ANXIETY	0.20	0.039	0.9305
		+0.27	CHANCE HEALTH LOCUS OF CONTROL	0.20	0.038	0.9335
		+0.67	BARRIERS	0.13	0.016	0.9555

n=285
Adjusted R^2 : 0.25
p(F) : 0.0000

Table 9.12 : Dental anxiety score linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Anxiety	12.27	+0.35	ATTITUDES TO CHARGES/COST	0.27	0.068	0.9403
		-0.85	REGULAR ATTENDANCE	-0.18	0.030	0.9403

n=285
Adjusted R^2 : 0.12
p(F) : 0.0000

Table 9.13 : Image of the denture wearer score linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Image of the denture wearer	20.30	-0.53	REGULAR ATTENDANCE	-0.23	0.052	1.0000

n=285
Adjusted R^2 : 0.05
p(F) : 0.0001

Attitudes to charges and cost, was the strongest predictor of dental anxiety (Beta=0.27), the more negative the attitude to charges, the higher the dental anxiety. Regular dental attendance was found to be negatively associated with anxiety (Beta=-0.18), the higher the frequency of regular dental attendance, the less the dental anxiety.

9.4.14 Image of the denture wearer as a dependent variable : linear model

Only one variable was found to be a significant predictor of the image of the denture wearer, explaining 5% of the variability (Table 9.13). That was regular dental attendance (Beta=-0.23), the higher the frequency of regular attendance, the less favourable the attitude towards a person with dentures.

9.4.15 Value of a healthy front tooth as a dependent variable : linear model

Value of a filled front tooth was found to be the only predictor of the value of a healthy front tooth, explaining 23% of the variability (Table 9.14). The predictor variable was positively associated with the value of a healthy tooth (Beta=0.48), suggesting that the higher the value attached to a filled tooth, the higher the value of a healthy tooth as well.

9.4.16 Value of a filled front tooth as a dependent variable : linear model

The value of a filled front tooth model consisted of two variables (value of a decayed and value of a healthy front tooth) explaining 42% of the variability (Table 9.15).

Both predictors were found to be positively associated with the value of a filled front tooth, the value of a decayed tooth being a stronger predictor (Beta=0.46) than the value of a healthy tooth (Beta=0.33). Results suggest that the higher the value attached to a decayed and to a healthy tooth, the higher the value also attached to a filled tooth.

9.4.17 Powerful others health locus of control as a dependent variable : linear model

Here, five variables were found to constitute the powerful others health locus of control prediction model, explaining 17% of the variability (Table 9.16). These were, the chance health locus of control, area of residence, full-time-dentist : population ratio, dentist : population ratio, and image of the denture wearer.

The Chance health locus of control variable was found to be positively associated with the powerful others health locus of control (Beta=0.27). Area of residence was also positively associated (Beta=0.22), suggesting that residents of deprived areas had a higher powerful others health locus of control score. Availability of dental services in terms of full-time-dentist : population ratio (Beta=0.49) and dentist : population ratio

Table 9.14 : Value of a healthy front tooth linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Value of a healthy front tooth	5.01	+0.29	VALUE OF A FILLED FRONT TOOTH	0.48	0.231	1.0000

n=285
Adjusted R^2 : 0.23
p(F) : 0.0000

Table 9.15 : Value of a filled front tooth linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Value of a filled front tooth	-0.17	+0.41	VALUE OF A DECAYED FRONT TOOTH	0.46	0.190	0.8980
		+0.56	VALUE OF A HEALTHY FRONT TOOTH	0.33	0.100	0.8980

n=285
Adjusted R^2 : 0.42
p(F) : 0.0000

Table 9.16 : Powerful others health locus of control linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Powerful others health locus of control	6.71	+0.32	CHANCE HEALTH LOCUS OF CONTROL	0.27	0.066	0.9147
		+2.43	AREA OF RESIDENCE	0.22	0.039	0.8050
		+2.66	FULL-TIME DENTIST:POPULATION SCORE	0.49	0.035	0.1475
		-1.67	DENTIST:POPULATION SCORE	-0.40	0.024	0.1534
		+0.15	IMAGE OF THE DENTURE WEARER	0.10	0.010	0.9768NS

n=285
Adjusted R^2 : 0.17
p(F) : 0.0000

NS: not significant

(Beta=-0.40) was also found to be a significant predictor of the powerful others health locus of control. However, the low tolerances of these two variables indicate that they are collinear. Collinear variables provide similar information (in this case contradicting - one has a positive Beta coefficient and the other negative) and it is difficult to separate out the effects of the individual variables. Although their Beta values are higher than those of the chance health locus of control and area of residence, their R^2 change values (the contribution to the model) are lower. Thus, the exact mechanism of the association of availability of dental services and Powerful Others HLC is not revealed from the present results, and furthermore, this association seems to be of less importance than the association of Powerful Others HLC with Chance HLC and area of residence. Image of the denture wearer was found to have a positive Beta value (0.10) indicating that the more favourable the attitude towards dentures, the higher the powerful others health locus of control score. However, the t statistic for the B coefficient gave a non-significant result ($p>0.05$).

9.4.18 Structural barriers as a dependent variable : linear model

Two variables, area of residence and attitudes to charges/cost of dental treatment were found to form this model, explaining 5% of the variability (Table 9.17).

Area of residence (Beta=-0.21) was a stronger predictor than the attitudes to charges/cost, and was negatively associated, suggesting that the residents of deprived areas faced fewer structural/organisational barriers in the receipt of dental care. Attitudes to charges/cost (Beta=0.19) was positively associated, suggesting that after standardising for the area of residence, the more negative the attitude towards charges/cost, the more the structural barriers.

9.4.19 Distance to the closest dental surgery as a dependent variable : linear model

For this model, three variables, i.e. area of residence, dentist : population ratio and number of full-time-dentists, explained 21% of the variability (Table 9.18).

Area of residence was found to be negatively associated (Beta=-0.24), indicating that residents of deprived areas had a smaller distance to travel to the closest dental surgery. Availability of dental services in terms of dentist : population ratio (Beta=-0.65) and number of full-time dentists (Beta=0.41), was found to be significant predictor of the distance. However, low tolerances of these two variables suggests collinearity. It is thus difficult to separate out the contradicting effect of each variable.

Table 9.17 : Number of structural /organisational barriers linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Structural / organisational barriers	0.08	-0.49	AREA OF RESIDENCE	-0.21	0.039	0.9115
		+0.04	ATTITUDES TO CHARGES/COST	0.19	0.033	0.9115

n=285
Adjusted R^2 : 0.05
p(F) : 0.0003

Table 9.18 : Distance to the closest dental surgery linear model

Dependent variable	Intercept	B	Independent variables	Beta	R^2 change	Tolerance
Distance to the closest dental surgery	0.60	-0.10	AREA OF RESIDENCE	-0.24	0.053	0.8959
		-0.10	DENTIST:POPULATION SCORE	-0.65	0.115	0.2734
		0.02	NUMBER OF FULL-TIME DENTISTS	0.41	0.044	0.2601

n=285
Adjusted R^2 : 0.21
p(F) : 0.0000

9.4.20 Importance of dentists and dental services to keeping healthy as a dependent variable : linear model

Tooth brushing frequency and value of a decayed front tooth were found as significant predictors of the importance attached to dentists and dental services. However, the pattern which was evident at the plots of residuals and studentized residuals against the predicted values, indicated that this model could not be accepted.

9.4.21 Number of sound teeth model - direct and indirect associations

In Figure 9.1, the prediction model of the number of sound teeth is given schematically. The two significant predictors, i.e. image of the denture wearer and attitudes to charges/cost, appearing in rectangular frames, are directly associated with the dependent variable. Variables in elliptic frames are the predictors of the image of the denture wearer and attitudes to charges/cost, and are considered as variables indirectly associated with the number of sound teeth.

Area of residence and frequency of regular attendance were found to be indirectly associated with the number of sound teeth, through their association with an attitudinal variable. The higher the frequency of regular dental attendance, the less favourable the attitude towards dentures and false teeth, and the more sound teeth present. Residents of deprived areas were found to be likely to have a more negative attitude towards charges and cost of dental treatment, which in turn was associated with the presence of more sound teeth.

It should be noted that the model explains only 6% of the variability of the number of sound teeth. As also suggested in the U.K. Adult Dental Health Survey 1988[2], where more sound teeth were found to be present among occasional or irregular dental attenders and lower socioeconomic groups, there must be complex interactions between choice of dental attendance, intrinsic state of dental health and treatment outcomes.

9.4.22 Number of decayed teeth model - direct and indirect associations

In Figure 9.2, the variables which are directly and indirectly associated with the number of decayed teeth, are shown.

Area of residence was found to be a directly associated variable with the number of decayed teeth. However, regular attendance was indirectly associated with the number of decayed teeth, through its association with dental anxiety. Higher frequency of regular attendance was associated with lower levels of dental anxiety, which in turn resulted in fewer decayed teeth. Attitudes to charges/cost of dental treatment was indirectly

Figure 9.1 : Number of sound teeth model

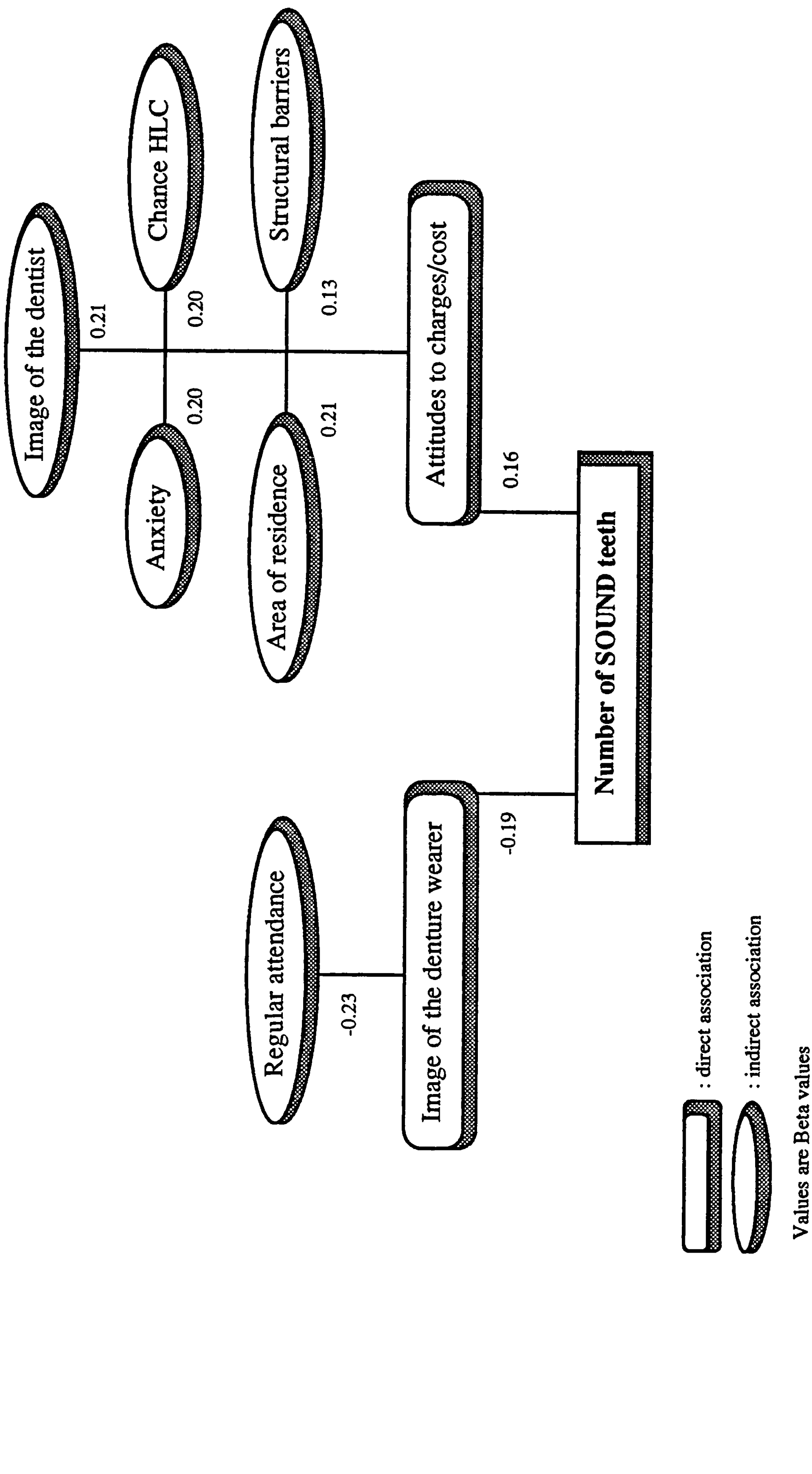
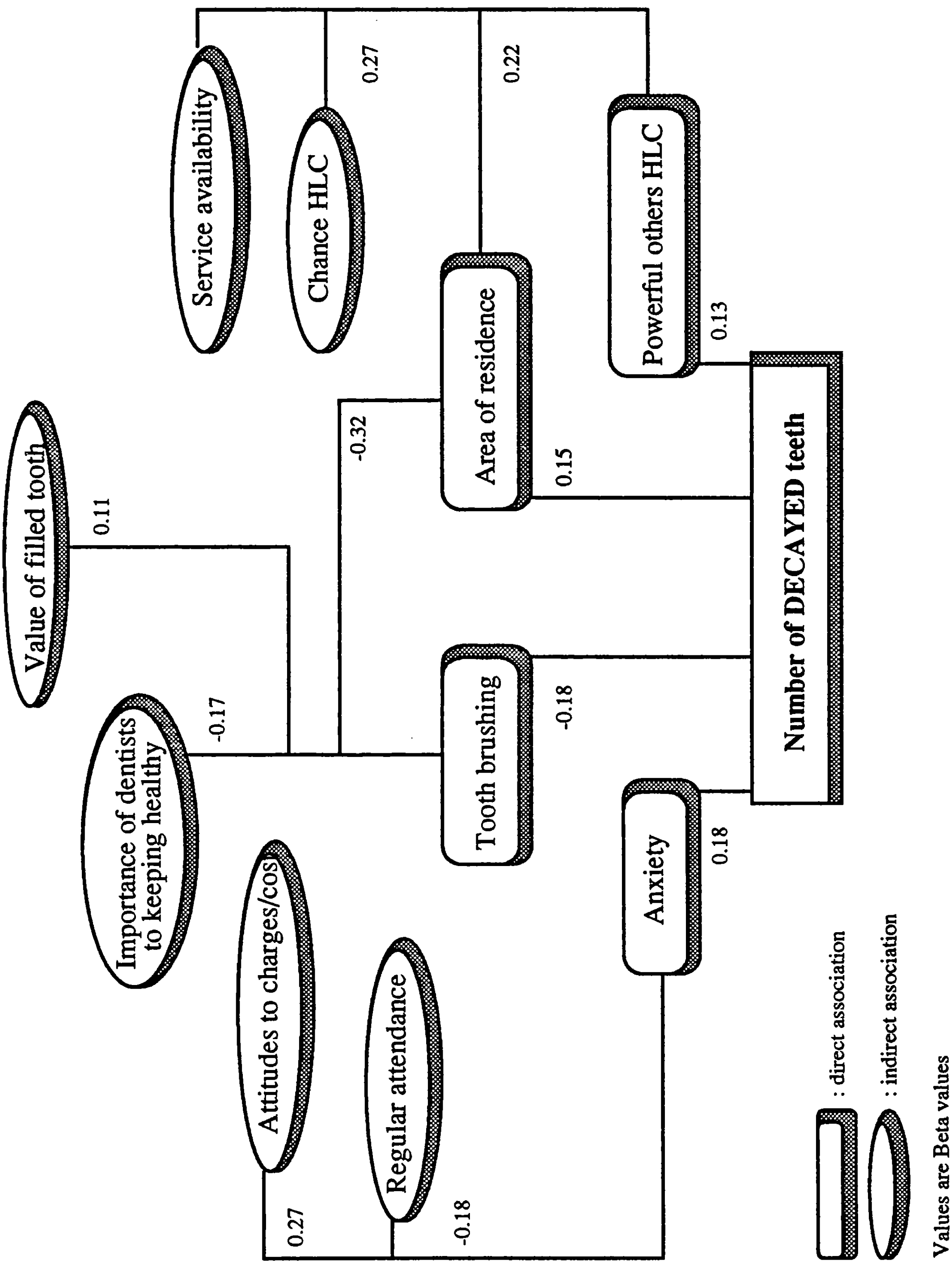


Figure 9.2 : Number of decayed teeth model



associated with the number of decayed teeth, through its association with anxiety. The more negative the attitude towards charges and cost, the higher the dental anxiety experienced, and the more the decayed teeth present.

Thus, it seems that anxiety influences the levels of active dental disease, through a mechanism which involves frequency of regular attendance and anxiety regarding charges and cost of dental treatment.

Toothbrushing was found to be a directly associated variable with the number of decayed teeth, i.e. the higher the toothbrushing frequency, the fewer the decayed teeth present. Toothbrushing was itself found to be associated with the importance attached to dentists and the dental services to maintaining health in general, with the value of a filled tooth, and with area of residence. Thus, a certain preventive behaviour (toothbrushing in this instance), associated with a consciousness of the importance of dentists, and the value of treatment they offer, resulted in less dental decay.

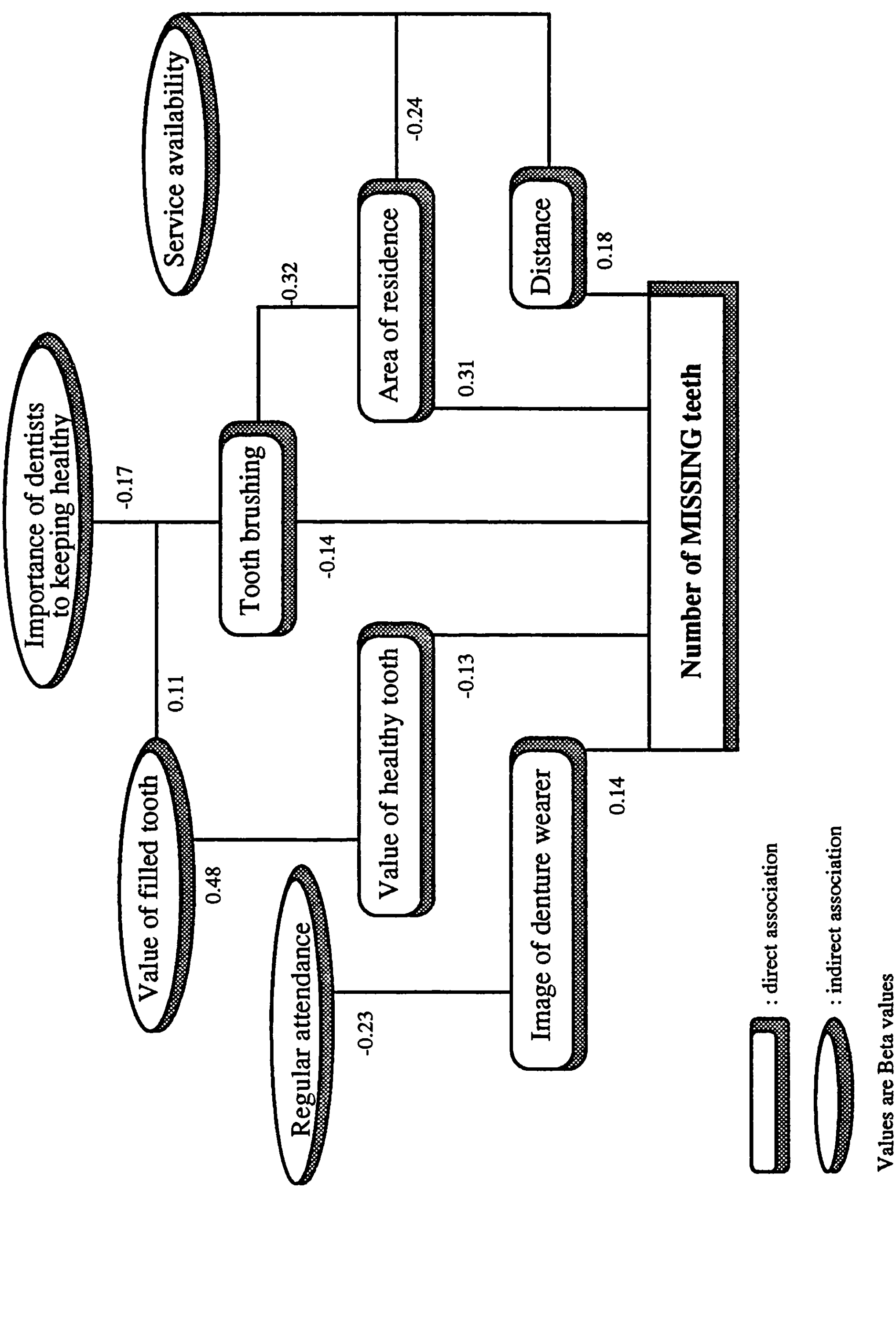
Powerful others health locus of control was directly associated with the number of decayed teeth, and it was also associated with the chance health locus of control. Both variables (Chance and Powerful Others HLC), represent a person's belief about their lack of control over their own health. The belief that the individual does not control his own health relates to higher levels of active dental disease.

9.4.23 Number of missing teeth model - direct and indirect associations

In Figure 9.3, the variables which are directly and indirectly associated with the number of missing teeth, are shown.

Area of residence was the strongest predictor of the number of missing teeth. In contrast, frequency of regular dental attendance was indirectly associated with the number of missing teeth, through its association with the image of the denture wearer. Toothbrushing was also a directly associated variable with the number of missing teeth. Importance of dentists and dental services to keeping healthy was indirectly associated with the number of missing teeth, through its association with toothbrushing frequency. The more the importance attached to dentists, the higher the toothbrushing frequency, and the fewer the missing teeth. Value of a filled tooth was indirectly associated with the number of missing teeth, through its association with both toothbrushing and value of a healthy tooth. Value of a healthy tooth was directly associated with the number of missing teeth, the higher the value, the fewer the missing teeth. Thus, the preventive behaviour of toothbrushing, associated with the belief in the importance of dentists and

Figure 9.3 : Number of missing teeth model



the value of treatment they offer, as well as the value of healthy teeth, resulted in fewer missing teeth. Distance, that is availability of dental services, was also a directly related variable to the number of missing teeth. Hence, the longer the distance from the closest dental surgery, the more missing teeth.

9.4.24 Number of filled teeth model - direct and indirect associations

In Figure 9.4, the variables which are directly and indirectly associated with the number of filled teeth, are shown.

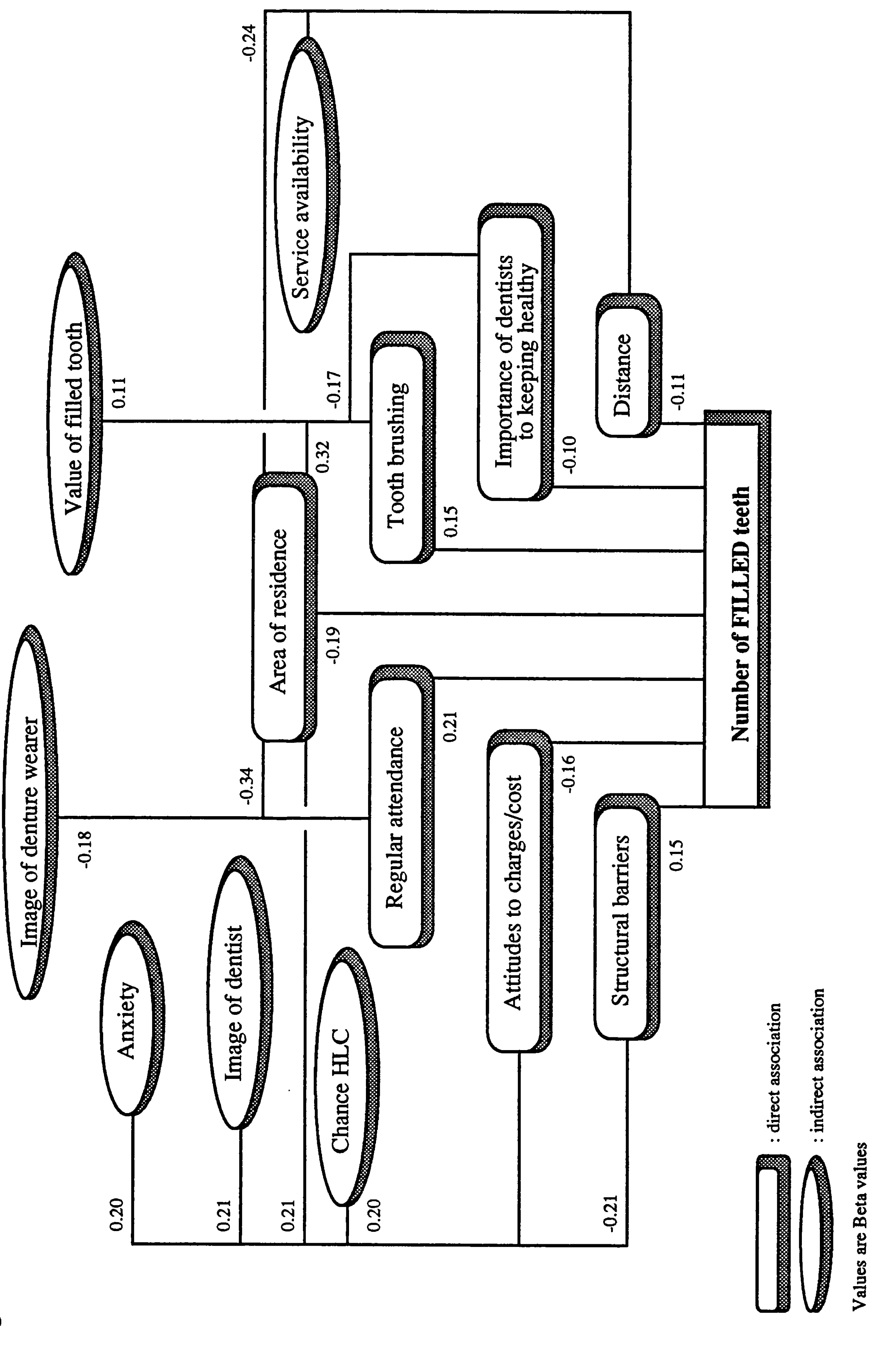
Area of residence was found to be directly associated with the number of filled teeth, the residents of deprived areas being likely to have fewer filled teeth. It was also found to be indirectly associated with the number of filled teeth, through its association with five of the remaining six predictors of the number of filled teeth.

Frequency of regular dental attendance was found to be directly associated with numbers of filled teeth, the higher the frequency of attending at the dentist, the more the filled teeth. Anxiety, image of the denture wearer and value of a filled tooth were found to be indirectly associated with the number of filled teeth through their association with regular attendance. Thus, a high value placed on treated teeth, and low acceptability of false teeth, compounded by lack of dental anxiety, encourage regular attendance and consequently, more receipt of more dental care.

Toothbrushing was also found to be directly associated with the number of filled teeth. The value of a filled tooth was indirectly associated with the number of filled teeth through toothbrushing. The importance of dentists and dental services to keeping healthy, was both directly and indirectly associated (through toothbrushing), with the number of filled teeth. Toothbrushing frequency was found to be positively associated with the number of filled teeth, which is not an adverse finding, as toothbrushing can be considered as a manifestation of a preventive outlook which means more filled teeth rather than decayed or missing ones.

Attitudes to charges and cost of dental treatment, was directly associated with the number of filled teeth, the more negative the attitude towards charges and cost, the fewer the filled teeth present. Negative attitudes towards charges and cost of dental treatment being associated with fewer filled teeth present, may suggest economic inability to purchase dental care. Furthermore, this is reinforced by negative feelings like mistrust and alienation from the dentist, as indicated by the positive associations of attitudes to charges with anxiety (Beta=0.20), and image of the dentist (Beta=0.21).

Figure 9.4 : Number of filled teeth model



Structural barriers and distance were also found to be directly associated with the number of filled teeth, the more the barriers faced and the less the distance from the closest dental surgery, the greater the number of filled teeth. Both variables were found to be associated with the area of residence variable and this could be responsible for the effect observed. Residents of affluent areas reported that they faced more structural barriers, and they tended to attend a dentist further away (not a local). However, this did not prevent them from having a behavioural and attitudinal profile which resulted in more filled teeth.

9.4.25 DMFT model - direct and indirect associations

In Figure 9.5, the variables which are directly and indirectly associated with the DMFT score, are shown.

The DMFT model is similar to the number of sound teeth model, but, with inverse relationships detected. This is to be expected, as DMFT score is equivalent to 32 (teeth) minus the number of sound teeth. The image of the denture wearer was positively, and the attitudes to charges and cost of dental treatment was negatively associated with the DMFT score.

9.4.26 Total-treatment need cost model - direct and indirect associations

In Figure 9.6, the variables which are directly and indirectly associated with the total-treatment cost, are shown.

Area of residence was found to be directly associated with the total-treatment required cost, the residents of deprived areas being likely to have a higher total treatment cost. Frequency of regular attendance, however, was found to be indirectly associated with the total treatment cost, through its association with the image of the denture wearer. Toothbrushing was found to be a directly associated variable with the total treatment cost, the higher the toothbrushing frequency, the less the total treatment cost. Importance of dentists and dental services to keeping healthy was indirectly associated with the total treatment cost, through its association with toothbrushing. The value of a filled tooth was indirectly associated with the total treatment cost, through its association with both toothbrushing and value of a healthy tooth, the latter being a directly associated variable with the total treatment cost. Thus, a certain preventive behaviour (toothbrushing in this instance), associated with the consciousness of the importance of dentists and the value of treated as well as healthy teeth, resulted in reduced total-treatment costs.

Figure 9.5 : DMFT score model

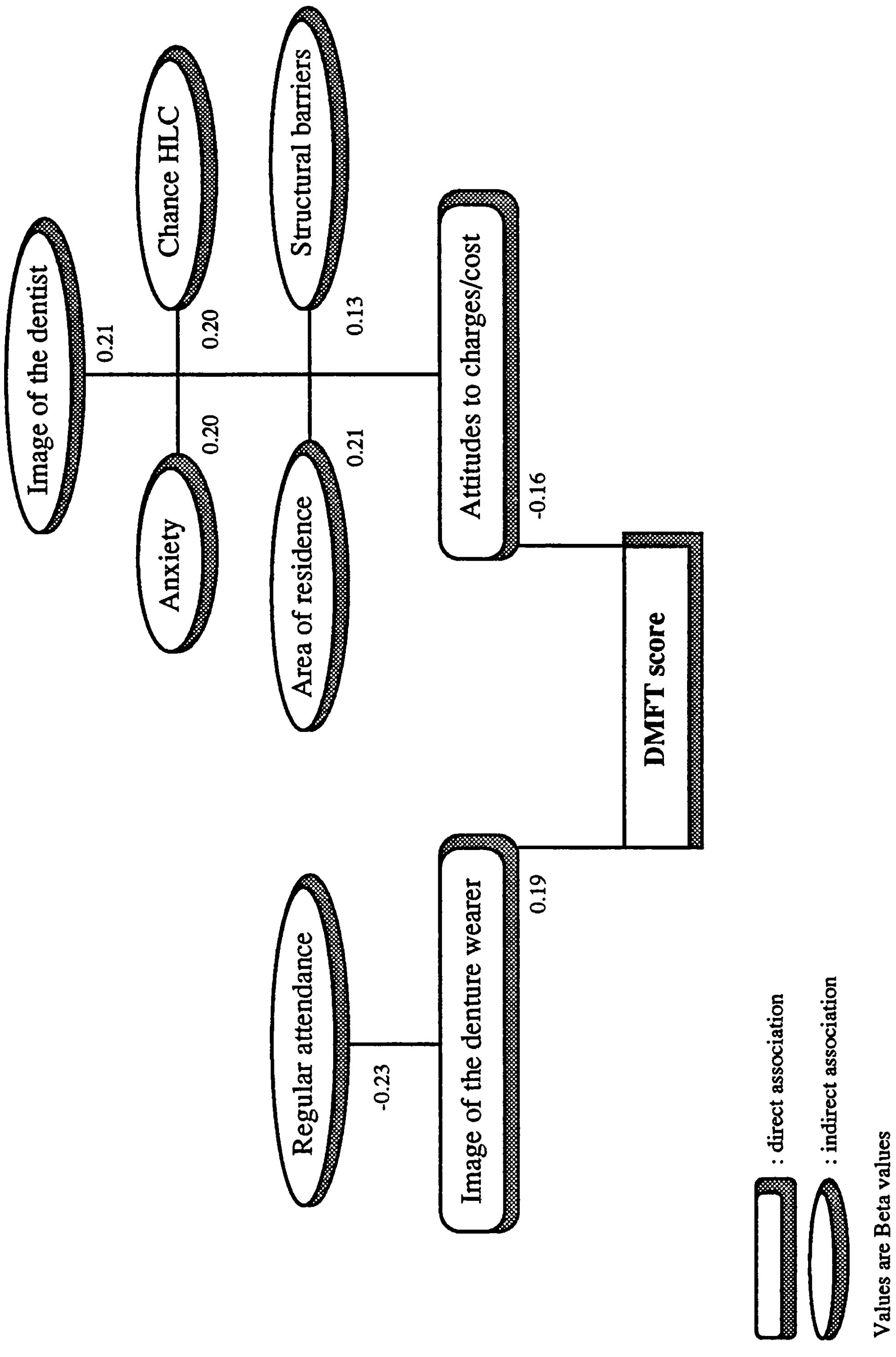
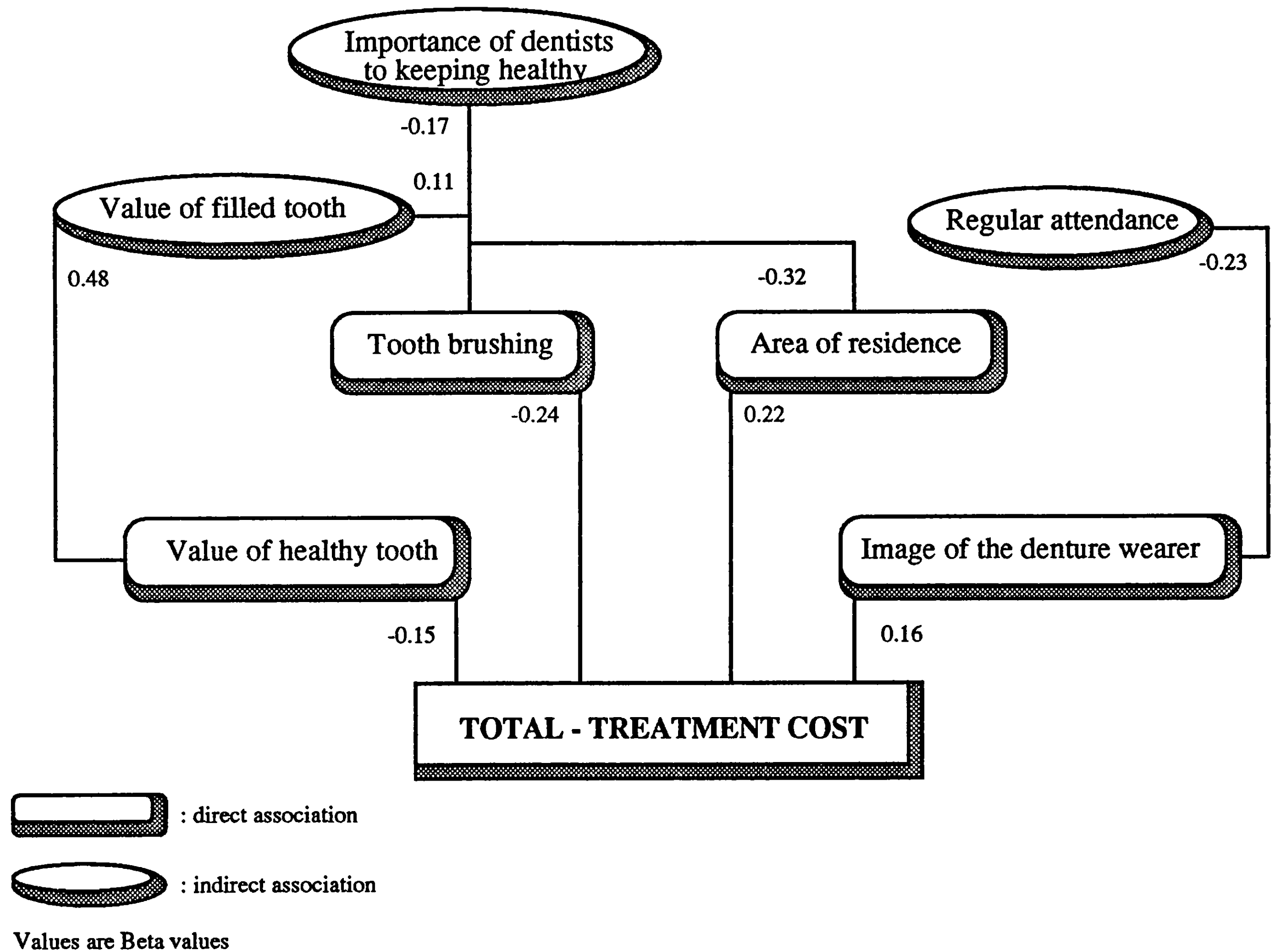


Figure 9.6 : Total-reatment cost model



9.4.27 Prosthetic treatment cost model - direct and indirect associations

In Figure 9.7, the variables which are directly and indirectly associated with the prosthetic treatment cost, are shown.

Area of residence was found to be directly associated with the prosthetic treatment cost, the residents of deprived areas having higher costs. Frequency of regular dental attendance was found to be indirectly associated with the prosthetic treatment cost, through its association with the image of the denture wearer. Thus, a certain attitude towards dentures and false teeth, with its association with a preventive behaviour (dental visiting), was found to influence the prosthetic treatment costs. Value of a filled tooth was directly associated with the prosthetic treatment costs, the higher the value of a filled tooth, the lower the prosthetic treatment costs. Value of a decayed and value of a healthy tooth were found to be indirectly associated with the prosthetic treatment costs, through their association with the value of a filled tooth. It is thus suggested that higher values attached to teeth (in any one of the health states) were associated with lower prosthetic treatment costs. Distance to the closest dental surgery was also found to be directly associated with the prosthetic treatment costs, the longer the distance, the more the prosthetic treatment costs.

9.4.28 Restorative treatment cost model - direct and indirect associations

In Figure 9.8, the variables which are directly and indirectly associated with the restorative treatment cost, are shown.

Anxiety was the only variable directly associated with the restorative treatment cost, the higher the levels of dental anxiety, the higher the restorative treatment cost. Frequency of regular dental attendance was found to be indirectly associated with the restorative treatment cost. Attitudes to charges and cost of dental treatment was also found to be indirectly associated with the restorative treatment cost. Thus it seems that dental anxiety, via its effect on dental visiting and anxiety associated with costs, influences the restorative treatment cost.

Figure 9.7 : Prosthetic treatment cost model

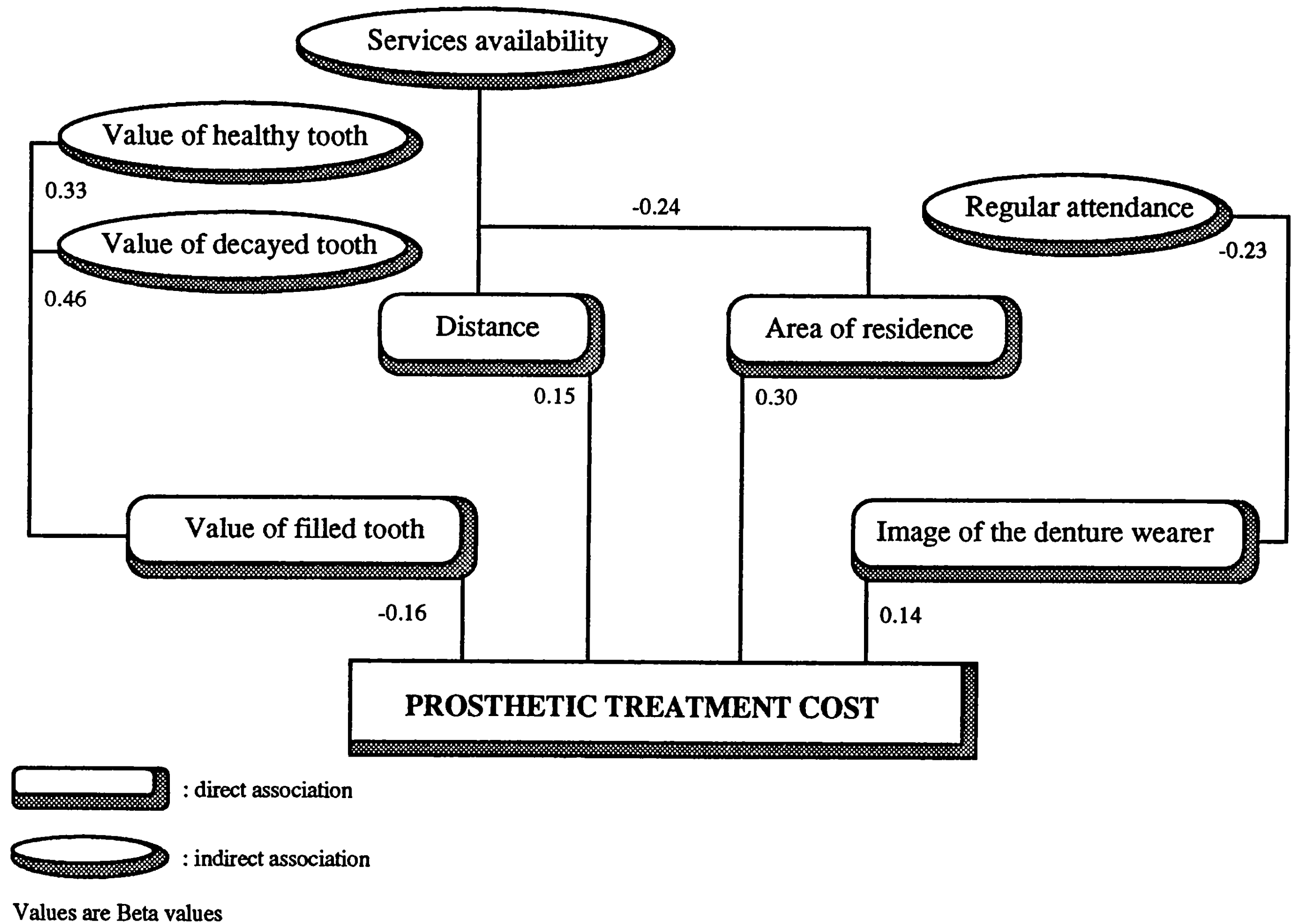
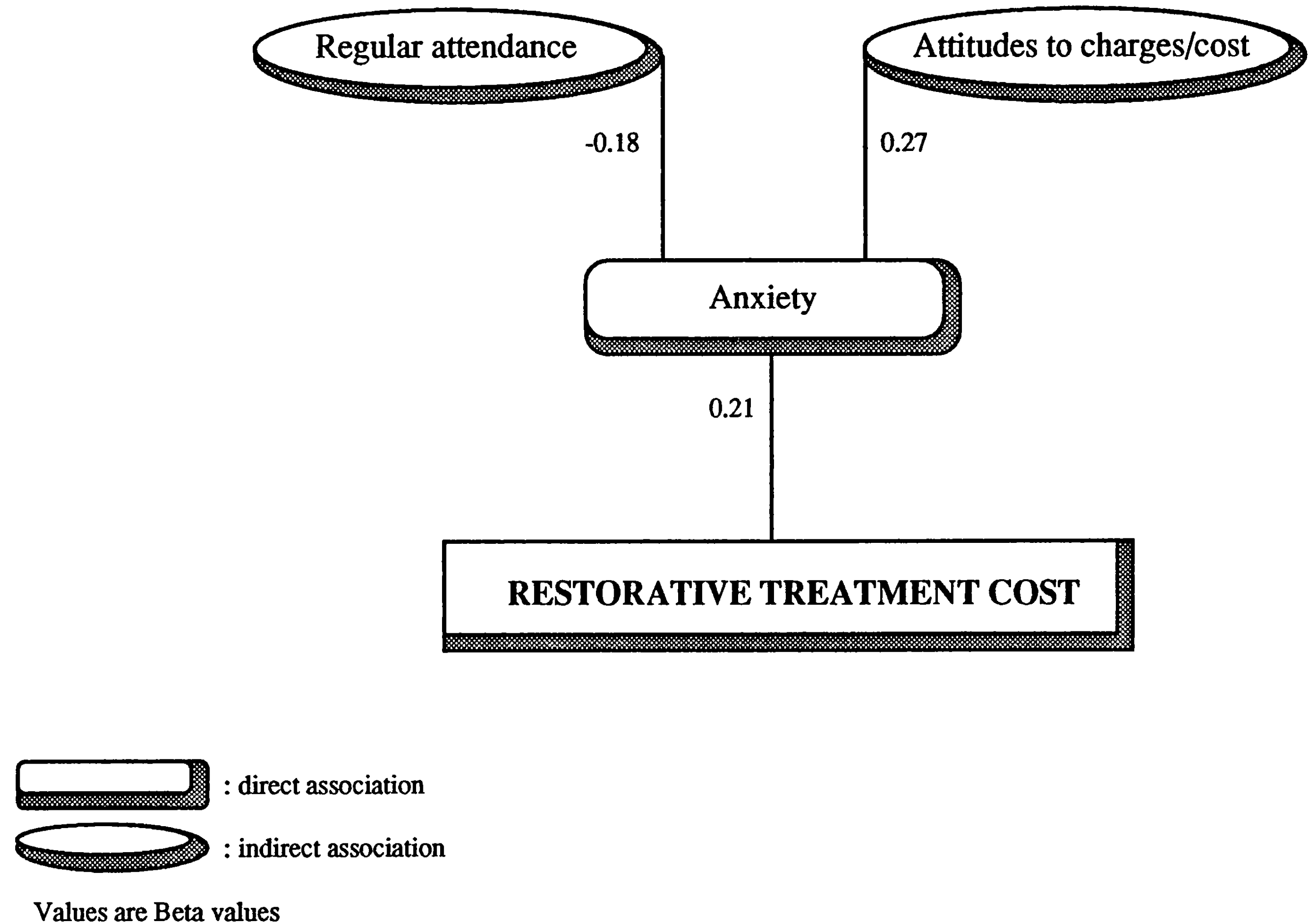


Figure 9.8 : Restorative treatment cost model



CHAPTER 10 : DISCUSSION

10. DISCUSSION

10.1 INTRODUCTION

The present study attempted to explore the dental health needs of socially contrasting populations, by examining the inter-relationships of dental health status, dental health attitudes / beliefs/ behaviours, availability / accessibility, and area deprivation.

It was an exploratory study which had the advantages of both qualitative and quantitative research methodologies. Exploratory studies can identify variables which best predict health behaviour or disease outcomes, and thus, can produce social indicator data, based on the descriptive and epidemiological information presented[193]. These social indicator data may provide valuable information for policy consideration. Inductive inference is the process of deriving general laws and propositions from particular events. Thus, it is a method of building up a theory starting from empirical observations. Exploratory studies, form the empirical basis on which inductive theories and models are built.

Although many other studies have examined one or other of the dimensions raised in this thesis, none has attempted to try to explain the complex web which links social and environmental inequality to poor dental health.

The methodology employed was a cross-sectional (survey) study. The first part of the analyses examined whether dental disease and dental behaviours and attitudes were randomly distributed, or differed between residents of affluent and of deprived areas, and between regular and irregular attenders. Having established significant differences and associations bivariately, the second stage was to put together all the variables, so that multifactorial models could be built, which identified the combinations of variables which best explained the variability in disease levels or in dental behaviours.

However, it has to be emphasised that the models constructed, are by no means risk models inferring causal associations. The cross-sectional design of the study does not allow causality to be established. Temporal associations of the variables would have required a prospective methodology. For example, with regard to the association of the number of missing teeth and attitudes to false teeth and dentures, it cannot be known from the present analysis whether subjects develop a positive attitude to false teeth after they lose many teeth, when dentures become a necessity, or whether the inverse was the case, i.e. environmentally determined positive attitudes to false teeth and acceptance of dentures as inevitable may lead to neglect of dental care and a subsequent preference for extractions of teeth.

Dental health can be considered as deriving from a complex interplay of direct and indirect influences. Indirect relationships were examined at a second stage, by using the predictor variables of the dental disease indices as dependent variables, which were regressed on the remaining behavioural and attitudinal variables. In such a way, complex inter-relationships were identified. While the purpose of the present study was not to identify the changes which should be made in order to improve dental health, (this would be the domain of behavioural change research), the issues that health promotion efforts should tackle when targeting the significantly distinct (in terms of treatment needs and dental attitudes and behaviours) populations under study, will be highlighted in this discussion.

10.2 THE STUDY SAMPLE

Community based studies which sample individuals, rely on the availability of registers of the populations targeted. The task of keeping a register updated is as difficult and resource consuming, as it is important, in the fulfilment of the objectives of establishing such a database. The Community Health Index register which was chosen as the most suitable available sampling frame of individuals, was created for administrative and primary care reasons, and it was also advertised as a useful tool for epidemiological research. However, it was found to be substantially inaccurate, 48.3% of the entries being incorrect. It was not unusual for the interviewers to find that the person to be interviewed had moved or died up to seven to ten years previously. The CHI lists of the areas under study, therefore, appeared to be considerably out-of-date, and this was most noticeable in the deprived areas.

In contrast, to the present findings, use of the CHI had been more successful in identifying a middle-aged cohort for a 14-year follow-up study in the West of Scotland. However, in that investigation, as well as the CHI, General Practitioner records and the National Health Service Central Register were also used, the authors admitting that contact to GPs was generally more successful than direct postal contact to patients using the address recorded on the CHI[164].

In another study in Glasgow, which involved record linkage of 1990 SMR1 data (general hospital discharges) to the CHI, only 59% of the SMR1 records were successfully linked to CHI entries, which was considered as disappointing by the author[194]. The percent success ranged from 44% to 64% among the Greater Glasgow Health Board deprivation areas. The study reported in this thesis, which also used data from 1990, are similarly disappointing as regards the accuracy of the CHI. Of all CHI entries, 51.7% were found to be valid, the proportion ranging from 68.8% in affluent to 41.6% in deprived areas. It is surprising that the CHI appeared to be so substantially inflated, given that it is used for GP's remuneration.

The high proportion of out-of-date entries caused disruption to the interviewers in the day-to-day fieldwork, resulted in delays, and furthermore, in the need to change the sampling methodology two months after the collection of the data had started. Additionally, due to organisational and communication problems, as well as financial implications of this sampling change, the new sampling procedure was not implemented until a further two-and-a-half months had passed. In view of these problems and of the difficulties in home-based research, the 863 successful interviews are considered to be an excellent result.

However, of the individuals sampled who still resided at the address noted on the list, only 55.2% were interviewed. Response rates ranged from 48.1% among the affluent to 62.1% among the deprived population. The remaining individuals either could not be contacted after four attempts, or they were on holiday, or had language problems, or simply refused to take part in the survey. Non-response bias should be attributed to these individuals, rather than to those wrongly recorded on the CHI lists, as Locker *et al.*[195], in their study on response bias, suggested that a distinction should be made between subjects lost due to inaccuracies and subjects lost due to refusals.

In order to examine the nature and magnitude of the differences of responders and non-responders, data are required to be available for both, based on prior knowledge. This was not the case in the present study. Therefore, views on the effect (or lack of any effect) of non-response on the results would only be speculation. However, non-response bias analysis of the Ontario Older Adults study showed that differences between crude and adjusted estimates of the prevalence of oral conditions were negligible, and the effect of non-response on estimates of the relationship between socio-economic status and oral health were also small[196]. The latter finding is particularly relevant to the present study which has as a central issue the relationship of socio-economic status and oral health, and does not attempt to estimate the prevalence of oral disorders in the community, but rather to examine the differences between the two contrasting populations in affluent and deprived areas.

Locker *et al.*[195] stated that it is accepted as a general principle that those with an interest in the content of a study are more likely to respond. If this is true, a possible explanation of the significantly higher response rate achieved in the deprived areas may be that these respondents perceived the study as more relevant to them personally, due to the greater dental health problems that they face. In contrast, affluent respondents, even though they attached more value to their teeth, might not have felt any personal interest in the study, as they enjoyed better oral health. The higher response rate amongst the deprived population, therefore, partly compensated for the higher number of flaws in the CHI lists in the deprived areas.

The higher response rate among the deprived population resulted in a sample, which was representative of the population of the deprived areas under study in terms of age distribution. In the affluent sample, older ages were over- represented, relative to the age distribution of the population of the affluent areas. Thus, given that dental disease is age-related, the affluent sample, overall, may exhibit higher disease scores than the affluent population it was supposed to represent. In both samples, females were over-represented.

The dental examination acceptance rate was 60.1%. However, because there was no bias in the willingness to be clinically examined in relation to age, sex, area of residence, social class, dental attendance pattern, and dentate status, the clinical findings can be considered valid and representative.

During the pilot study, respondents agreed to be clinically examined at a similar rate, i.e. 60.9%. Thus, although the pilot study was small (involving only 23 respondents), it turned out to be highly indicative of the successful examination rates in the main study. While this highlights the importance of piloting a project, it also suggests that efforts to standardise the procedure and the arguments used in order to persuade subjects to accept the clinical examinations, were not successful.

In the interpretation of the results of the present study, the limitations dictated by the shortcomings of the low response rates, the older-age bias of the affluent sample and the female bias of both affluent and deprived samples must be taken into account. However, for the purposes of this study, the sub-groups of interest whose oral health needs are examined, relate to area of residence, and not to age or sex. Thus, the analysis of the behavioural and attitudinal variables was based on the affluent / deprived distinction. However, for the clinical indices analyses, age was taken into account.

10.3 ORAL HEALTH STATUS

The study sample had an overall edentulousness rate of 14.5%, as assessed clinically. However, reported edentulousness was exactly the same, suggesting the validity of a reported measure for this clinical state. In the dental literature, reported measures of dental health such as reported edentulousness or reported denture wearing have been found to correspond well with their clinically assessed relevant measures[71,72].

Total tooth loss showed a highly significant variation in relation to area of residence, being 2.8% amongst affluent and 22.7% amongst deprived. The national figure for edentulousness in Scotland in the 1988 Adult Dental Health Survey[2] for the ages 16-64 years was 16%. This varied among the social classes from 10% for ABC1's, to 20% for C2's, and 21% for DE's. Edentulousness is age- and sex-related, older adults and females exhibiting higher tooth loss. Even though in the affluent study sample, there was an over-representation of older adults and females, as compared to the overall population of these areas, the edentulousness rate appears to be lower than the national figure for the higher social classes. Thus, it may be that affluent Glaswegians enjoy better tooth retention than the high social class Scots on average. In contrast, the edentulousness rate recorded for the deprived (22.7%) was somewhat higher than the national figure for the low social class Scots (21%).

The DMFT index was not found to differ significantly between affluent and deprived samples neither did it differ between regular and irregular attenders. This index has been traditionally and extensively used in the dental literature although its abilities to compare the dental health status of different populations have been criticised[70]. Social status indicators have not been found to be consistently associated with the composite DMF index[58-60], in contrast to its separate D, M, and F components, and alternative indicators suggested like functioning units (FS:filled+sound), or sound equivalent teeth (T-Health: weighted average of sound, filled, and teeth with some decay), and the DMFS index[2,49,51,54,55,61,63].

Similarly, in the present study, the D, M, and F components differed significantly between affluent and deprived, and regular and irregular attenders. The deprived sample had significantly higher mean number of decayed and missing teeth than their affluent counterparts, while the affluent had significantly higher mean number of filled teeth, these differences being nullified when the D, M, and F components were added to form the composite index.

While the national mean numbers of decayed, missing and filled teeth for the ABC1 Scots aged 16-64 years were 0.8, 7.1, and 10.9, respectively, the corresponding figures for the affluent study sample were 0.8, 6.7, and 11.4, suggesting that affluent Glaswegians had fewer missing and more filled teeth. For the DE's, the national mean numbers of decayed, missing, and filled teeth were 1.8, 9.7, and 6.7, respectively, whereas for the deprived study sample the relevant mean values were 1.9, 10.3, and 6.6. That is, deprived Glaswegians appeared to have marginally more decayed, more missing, and marginally less filled teeth than the 'average' Scot.

When the percentage differences between the mean values for the Scottish ABC1's and DE's, and between the study affluent and deprived, was examined, it was found that the gap in disease experience appeared greater between the affluent and deprived Glaswegians, as compared to the gap in dental disease experienced by ABC1 and DE Scots. For example, while the DE Scots had a 125% higher mean number of decayed teeth than their ABC1 counterparts, the deprived Glaswegians had 137.5% higher mean decayed teeth than their affluent counterparts. Similarly, the percentage differences between the extreme Scottish social class groups were 36.6% for the mean missing teeth, and 38.5% for the mean filled teeth, while the corresponding figures for the differences between the affluent and deprived Glaswegians were 53.7% and 42.1%, respectively.

Although it cannot be statistically confirmed that the gap in dental disease experience between the affluent and deprived populations of Glasgow is indeed greater than the gap between the Scottish social groups, it certainly appears that it is not smaller.

According to the CPITN measurements, the most prevalent periodontal problem of the study sample appeared to be the calculus, which was found to be the worst condition present for 62.5% of the sample. The second most prevalent condition was shallow pockets, which was found as the worst condition in 24% of the sample. These figures show a trend opposite from the one recorded for the Scottish population in the Adult Dental Health Survey 1988[2], although direct comparisons cannot be made as the present study sample was drawn from specific areas and is not representative of the overall population of Glasgow. The Scottish and UK national figures show the prevalence of calculus to be substantially lower than the prevalence of shallow pockets. However, a higher prevalence of calculus compared to shallow pockets has been reported by other studies[77,79,197].

When the affluent population was compared to the deprived, significant differences were detected for lack of periodontal disease, prevalence of calculus, and prevalence of shallow pockets. Affluent subjects were significantly more likely to be periodontally healthy. A significantly higher prevalence of calculus was recorded amongst the deprived than amongst the affluent population, while the opposite was true for the prevalence of shallow pockets. Gingivitis and deep pockets were equally prevalent in the two area samples. Higher prevalence of calculus among the deprived is indicative of lack of regular care, and is consistent with the higher prevalence of irregular attendance at the dentist found among this population. Higher prevalence of shallow pockets among the affluent populations than among the deprived, could be attributed to the fact that deprived populations were found to have lower number of standing teeth. Teeth lost early for reasons other than periodontal disease do not offer the opportunity for development of shallow pockets. An alternative explanation of this observation would be that it is genetic or biological factors which determine the development of the advanced periodontal disease, and that these are unaffected by behaviours and attitudes to dental care.

Although some form of periodontal disease was found in almost all (95.8%) subjects, only a relatively small proportion exhibited severe periodontal disease and needed specialist treatment (7.4%). This finding is in accordance with other studies[63,77,79,197]. The need for specialist treatment did not differ between affluent and deprived populations. In contrast, deprived subjects were more likely to be in need of oral hygiene instruction alone, and of oral hygiene and scaling, than their affluent counterparts. This again suggests that it is innate factors, rather than behavioural or environmental ones, which make an individual prone to periodontal disease.

The SPEED periodontal analysis, which was based on partial recording, using index teeth, also showed that the most prevalent periodontal problem was supra-gingival calculus (53%), followed by subgingival calculus (39.4%). A significant difference between affluent and deprived concerned the prevalence of sub-gingival calculus, the rate being higher for the deprived population. The SPEED periodontal analysis, contrary to the CPITN which detected difference between regular and irregular attenders only for gingivitis prevalence, showed a significantly higher prevalence of supra-gingival, and a significantly lower prevalence of sub-gingival calculus among the regular attenders. While the former finding is surprising, the latter highlights the importance of regular visiting and professional intervention in periodontal health.

A significant difference in the proportion of subjects assigned by SPEED for scaling was found in relation to area of residence and dental attendance pattern, deprived and irregular attenders being more likely to require scaling. However, according to this analysis 43.9% were assigned for scaling, while according to the CPITN analysis, oral hygiene instruction and scaling would be required for 94.2% of the study sample.

The SPEED system's criteria for periodontal treatment need assignment were supragingival accretions on at least 11 sites; five or more sites with gingivitis; or two or more sites with subgingival calculus. In contrast, no such criteria existed for CPITN treatment need. Using this index a score other than zero (i.e. other than absence of any periodontal disease) implies a need for treatment. Thus, while CPITN is a treatment need index, the SPEED uses an index to assess the level of periodontal disease, and based on that, subsequently sets criteria as to what level of disease requires treatment.

The literature suggests that periodontal disease is more consistently related to education[55,64,74,75,80-83] than to social class or income. However, the area deprivation measure used in the present study, which incorporates the concepts of access to material resources and the deriving and pertaining social norms, was able to identify differences in periodontal health and periodontal treatment needs.

In the SPEED analysis of the Resource Related Index (RRI) of treatment needs, need and costs for periodontal treatment are based on the SPEED periodontal examination and criteria, and not on the CPITN measurements.

The differences in the disease and care patterns between the sub-groups identified in the analyses, were evident in the total-treatment cost variable. This referred to the cost of the treatment required to render individuals dentally fit. Highly significant differences were detected, the deprived requiring, overall, more costly treatment. Thus, such a measure was more able to reflect the real health needs of the sample. This measure was therefore considered to be superior to the DMFT index, as differences were not masked.

However, an interesting finding was the effect the edentulous population had on the total-treatment cost differences between the affluent and the deprived. When the edentulous were included in the analysis, no significant difference in treatment cost, in relation to area of residence was detected for those over 45 years of age. However, when edentulous people were excluded, significant differences were evident for all age groups. Closer examination of the figures showed that the mean total-treatment need cost for the affluent did not change substantially after the exclusion of edentulous.

However, for the deprived a substantial increase in the total-treatment need costs for the ages 35 to 65 years was noted when the edentulous were excluded. This may be attributed to the fact that there was a small number of edentulous people amongst affluent population. The treatment need costs of these individuals were significantly higher than those of the deprived edentulous, who, additionally, were more numerous. Thus, large numbers of deprived edentulous people with low treatment needs, diluted the high treatment need of the dentate deprived, when both dentate and edentulous were included in the analysis.

This would suggest that when examining treatment need and when planning services, separate analysis of dentate and edentulous people is required. The present study involved only six affluent and 68 deprived edentulous, which limits the ability to extrapolate or conclusively interpret the results. However, it would be interesting for further research to examine what the findings imply: that, for older adults (45 years or older), the sub-groups with greater dental treatment needs are the affluent edentulous, and the deprived dentate.

For the dentates, significant differences were detected in relation to area of residence and dental attendance patterns, for all treatment cost variables, i.e. total-treatment, restorative treatment, periodontal treatment, and prosthetic treatment. Deprived and irregular attenders required higher treatment costs in order for them to be rendered dentally fit than affluent and regular attenders.

In conclusion, the area deprivation measure used in the present study, identified significant differences in the dental health and the treatment needs of the study populations. There were significantly higher levels of disease and unmet needs in the deprived populations. Dental visiting behaviour was also found to be associated with dental disease and treatment needs.

Similar differences in dental health in relation to area deprivation have been reported by three studies[68,69,198] which used the ACORN, an area classification not dissimilar from the one used by Greater Glasgow Health Board employed in the present study. Furthermore, two of these studies[68,69] also used the SPEED system for collection of data and analysis. However, they involved child populations. An adult population was studied by Locker & Ford[65], who examined the effect of a socio-economic area-based measure in relation to dental health, and reported similar findings. Furthermore, they showed that there was an area effect independent of household income.

Thus, it appears that dental health, when measured as a separate entity, is as closely associated with deprivation as general health.

10.4 DENTAL ATTITUDES AND BEHAVIOURS

Dental utilisation and dental visiting behaviour are usually examined by the reported recency of and reasons for the last dental visit[54,60,65,87,91,92,96,97], and by reported regular attendance[88,96-98], using the cut-off point of one year. In the present study, this criterion was relaxed to two years, as this was judged to be more applicable to the study population, and would thus yield sufficient numbers in the groups categorised as regular or irregular attenders, to allow statistical analyses.

Dental services utilisation was found to be associated with area of residence, affluent respondents being significantly more likely to have visited the dentist within the previous two years, and more likely to have visited for an asymptomatic reason, than their deprived counterparts. Recency of last dental visit has been reported to be associated with poverty[54], and education[60,91,92], and asymptomatic reasons for dental visiting has also been reported to be associated with education[60,91].

The vast majority (92.7%) of respondents had visited the General Dental Service (GDS). A trend was evident, in that the affluent population was significantly more likely to have used the GDS, than the deprived, who were more likely to have used the Community, or Hospital dental Service.

Reported regularity of attendance was also found to be related to area of residence, affluent respondents being more likely than deprived to report that they attended regularly for check-ups every two years. However, in reported measures, the effect of social desirability may lead to over-reporting. In the literature, reported regular attendance has been found to be associated with an area-based deprivation classification[65], and consistently associated with social class[2,52,84,87-89], and income[57].

The more objective measure of regular attendance used in the present study, based on recency of and reason for last dental visit, also showed that affluent respondents were more likely to be objectively defined as regular attenders. This showed that there was, indeed, some over-reporting of regular attendance. Of all those who reported themselves as regular attenders, only 57.4% were also objectively defined as regular attenders. In contrast, the vast majority of those who reported themselves as irregular attenders (98%) were also objectively categorised as irregulars.

This finding is in accordance with the findings reported by Eddie[85], who examined the contacts with the dental services of 720 subjects over five years, after they had taken part in the 1978 UK Adult Dental Health Survey. It was found that of the 283 subjects who had reported themselves as regular attenders, only 31% were indeed frequent attenders, while of the 325 who reported that they attended only when in trouble, 94.5% were found to be infrequent or non-attenders. Thus, it seems that reported irregular attendance is a more accurate measure than reported regular attendance.

Dental services utilisation within the previous year was found to be related to area of residence even after adjusting for the importance respondents attached to dental services for keeping healthy. There was an area effect, over and above this attitude to health services. This was translated into behaviour at a differential rate in the affluent and deprived populations.

Tooth-brushing at a frequency of twice a day or more was reported to be practised by 90.7% of the dentates. This figure is higher than the UK national of 67%, and the Scottish of 69%[2]. Toothbrushing behaviour was also found to be significantly related to area of residence, the affluent being more likely to report higher toothbrushing frequency than the deprived. A significant association was also found between regular attendance and toothbrushing frequency, a finding which was also reported in the UK Adult Dental Health[2]. It seems likely that subjects who showed a positive attitude towards their dental health by visiting the dentist regularly, are also likely to show the same dental concern in terms of oral self-care.

As in other studies which suggest that interdental cleaning by the use of dental floss is related to social class[2,102], and education[91,97,100,102], affluent respondents, in the current study, were more likely to use dental floss than their deprived counterparts.

Respondents believed that people should brush their teeth at a certain frequency. However, only 62.6% of all respondents actually brushed their teeth at the frequency they had reported that they considered as the optimal one. This belief - behaviour conversion rate was highest (71.1%) for those respondents who believed that the optimal toothbrushing frequency was twice per day. Thus, it seems that dental health education messages suggesting brushing twice a day have a good chance of being adopted and practised by the study sample. It is important to set a feasible target for subjects to adopt, particularly in view of the fact that deprived respondents were more likely than the affluent to change their brushing behaviour during their life, and in particular to change it for the worse. Easily achievable targets are more frequently established as habits, and thus are more resistant to future change.

In terms of the reasons for brushing teeth, it seems that fresh breath and white teeth are equally appealing to affluent and deprived, thus the grooming and cosmetic message of toothbrushing would be appropriate for both sub-groups. However, it seems that dental health education messages about brushing have been partly understood by the deprived population, who brush in order to put fluoride on their teeth. In contrast, the affluent population understood further that brushing would prevent gum disease, as well as protecting the dentition via fluoride application. While knowledge does not *per se* result in the adoption of a behaviour, it is important to give deprived populations the opportunity to learn and understand the facts and outcomes of preventive behaviours, and then try to reinforce a behavioural change.

Affluent respondents were found to have more established habits of oral self-care, brushing first thing in morning or last thing at night. In contrast, the deprived population tended to brush on a more opportunistic basis, before meals or before going out. This highlights the importance of a message with an easy to remember and precise slogan about when to brush.

Only 6.5% (55) of respondents said that they had changed their diet for dental health reasons, the affluent, and the regular attenders being significantly more likely to give this response than the deprived individuals and the irregular attenders. Of all those who had changed their diet for health reasons, few had also changed for dental health reasons. In contrast, of those who had changed their diet for dental health reasons, the majority had changed also for health reasons. Thus, it seems, that individuals consider dietary habits as important for the prevention of health problems, but this does not necessarily mean that they are also sensitive and motivated in relation to dental health prevention. It is at a higher level of preventive orientation and motivation that the individual will consider dental reasons as important enough in order to change his/her dietary habits.

To assess the extent to which respondents perceived dental health as a health issue, the importance they attached to dental visiting and tootbrushing for "keeping healthy", was examined in relation to the importance attached to other general health items in "keeping healthy". There was a positive and significant association between dental and general health measures, with a correlation coefficient of 0.48. This suggests that although there is an association of dental and general health, the relationship is not particularly strong. However, this coefficient is greater than the one found by Dolan *et al.*[199] who examined the correlation of a three-item dental health scale with a 22-item general health scale (corr. coefficient = 0.22) using data of the Rand Health Insurance Experiment. Those findings suggested that dental health was a separate dimension, and was therefore not perceived as a health issue.

The separation of dental health from other health issues has also been suggested by studies which examined how likely people were to report dental problems[200,201]. Results of the qualitative phase of the present study, also showed that irrespective of social background, dental health was not associated with health or well-being, as it was not life threatening. It was rather associated with personal appearance. These findings concur with a paper which detailed the attitudes of the Scottish young adults, reported by Blinkhorn *et al.*[103].

Attitudes to dentures were found to differ significantly between affluent and deprived, and between regular and irregular attenders. Deprived respondents and irregular attenders had a more positive attitude, i.e. false teeth were more acceptable to them. Similarly, the deprived and the irregular attenders perceived a person who wears dentures more favourably than their affluent and regular attending counterparts. More favourable attitudes to false teeth and dentures, as well as a greater preference for extractions have previously been reported to be related to social background[2,119,120], and dental attendance pattern[2,121-123].

Area of residence and dental attendance pattern were not found to be related to the image of the natural-teeth person, which, as expected, was significantly better than the image of the denture-wearer for all sub-groups. These findings indicate that a natural dentition is more appealing than dentures, and more importantly, equally appealing to all people, irrespective of area of residence or dental attendance pattern. While positive dental health messages which reinforce the ideal image of a full natural dentition may be received equally well by both area sub-groups of the study, interventions which aim at altering the acceptability of false teeth and dentures appear more appropriate when deprived populations are targeted.

An assumption which follows the finding that deprived or irregular attenders have more favourable attitudes to false teeth and dentures may be that these subgroups value their teeth differently from affluent and regular attenders. While results of the present study support this view for irregular attenders when compared to regulars, no such difference in the value attached to teeth was detected between affluent and deprived populations, with only one exception, ie. the value attached to decayed teeth.

Affluent and deprived sub-groups were found to attach equal value to a front healthy tooth, to a front filled, and to a front decayed-and-painful tooth. The exception concerned a front decayed (but not painful) tooth, which was valued less by deprived. This finding might explain delayed demand for care among the deprived population. They are a sub-group characterised by a substantial number of decayed and missing teeth. However, because they assign the same value to a painful decayed and a painless decayed tooth, the stimulus to attend dental services to avoid pain is not present.

In contrast, irregular attenders were found to value every tooth health state less than their regularly attending counterparts.

The attitudes of the respondents to dentists were found to differ significantly in relation to area of residence and dental attendance pattern, deprived and irregular attenders perceiving a more negative image of dentists. This finding is in accordance with results of other studies which found social background[2,116,117,119], educational level[118], or dental attendance[2,116,117] differences in the perception of the dentists.

Health services such as GP's, hospitals, opticians and family planning clinics were perceived as equally 'important to people's health' by the affluent and the deprived groups, as they were by regular and irregular attenders. In contrast, the 'importance to people's health' attached to dentists, differed between the affluent and the deprived groups, and between the regular and the irregular attenders. Furthermore, dentists were assigned less importance than GP's and hospitals, with one exception: regular attenders attached equal importance to dentists as to GP's and hospitals. These attitudes might reflect the fact that dental health is, in general, not perceived as a health issue, apart from among the regular attenders.

Previous studies have shown that attitudes to the cost of dental treatment differ in relation to social class[2,119] and income[124,131]. The current study also showed that attitudes to costs differed between affluent and deprived populations, and furthermore, between regular and irregular attenders. Deprived and irregular attenders exhibited a more negative attitude to dental charges. However, charges for check-ups were not found to act as a barrier to attendance among the deprived group any more than among the affluent population. This could indicate that it is the cost of treatment rather than the cost of a check-up which determines respondents' attitudes to dental costs. Thus, it may be that negative attitudes to costs, relate to the amount of treatment received by patients, rather than to the initial contact with the dental services.

The dental anxiety scale used in the study was derived from the views of the participants of the group discussions, and it can be considered as applicable to the populations under study, which is supported by the high internal consistency of the scale (0.74). Dental anxiety was found to be extremely prevalent in the study sample, with only 3.5% of respondents reporting no anxiety at all. Affluent respondents were significantly more likely than deprived to report no anxiety at all. In relation to the level of dental anxiety amongst sub-groups, deprived respondents, and irregular attenders reported significantly higher levels than affluent, and regular attenders. An association between dental anxiety and regularity of attendance has been consistently shown in others studies[2,106-115]. In contrast, in relation to social and economic variables, while there are studies which have found associations of dental anxiety with social class[2], income[115], or education[60,109,115], results from other studies have not always been consistent[108,110-112,114]. The area-based measure of deprivation used in the present study, was able to identify significant differences in dental anxiety levels, as assessed by the scale of items identified during the qualitative phase, and thus applicable to the study population. This perhaps suggests that the measurement tools - designed almost invariably by professional persons - which have been used in previous studies, may be inappropriate for particular sub-groups of the populations under study.

Contrary to the dental anxiety scale, the Multidimensional Health Locus of Control (HLC) scale was a construct not developed from the results of the qualitative research, but used as found in the relevant literature, and related to general health. When the three scales were developed, the authors had reported high internal consistencies, i.e. 0.71 for the internal HLC scale, 0.72 for the powerful others HLC, and 0.69 for the chance HLC scale[25]. The corresponding internal consistencies for these scales in the present study were lower, being 0.58, 0.67, and 0.45, respectively. The population sub-groups of the study appeared to have the characteristics of internals, i.e. higher internal score, and lower powerful others and chance scores. Their scores suggest that they held a stronger belief that <u>they</u> have control over their own health rather than believing that 'powerful others' or 'chance' controlled their health. In all three scales, the deprived scored higher than the affluent. These results do not confirm the hypothesis that deprived populations would not feel strongly that they control their own health. The low internal consistency found for all scales suggests that the construct may not be as reliable in detecting health locus of control as originally suggested by the authors who developed it. This lack of reliability may account for this result, and may stem, once again, from the fact that professionally developed instruments which are not derived from problem definition research with appropriate populations, may ultimately only be valid when used with populations with similar backgrounds to the researcher.

When scores were analysed in relation to dental attendance pattern, irregular attenders were found to have stronger belief that powerful others and chance control their health, when compared to the regular attenders, even though both groups had the characteristics of internals. This is possible, given that the scales are not mutually exclusive, but form separate dimensions of the construct. Thus, while two groups can have the profile of internals, it is possible for one of them to hold stronger belief than the other group that 'powerful other' people or chance control health. In contrast, no association between any of the scales of the HLC and compliance with dental appointments was found in a study involving low socio-economic status adolescents, whose scores also showed that they were internals[32].

From the findings of the analysis of the attitudinal and behavioural data it is concluded that, when compared to the affluent populations, the deprived, who exhibited higher levels of dental disease and treatment needs, were also characterised by irregular attendance, infrequent and opportunistic toothbrushing and flossing, a behaviour which was prone to change for the worse, and, furthermore, lack of understanding of the role of toothbrushing in the prevention of oral disease. They held a more positive attitude to false teeth and dentures, even though they attached the same value to teeth. However, they did not seem to consider secondary prevention of value, as they did not distinguish between a decayed and a decayed-and-painful tooth. They held a more negative attitude to dentists, whom they considered as of less importance for people's health. They exhibited higher levels of dental anxiety, and were concerned about the cost of dental treatment.

Thus, the area-based measure of deprivation used in the present study identified significant differences in the dental attitudes and behaviours of the sub groups of interest. These findings are of great importance and may offer explanation as to why previous programmes designed to improve oral health have failed, particularly in deprived areas in Glasgow.

10.5 AVAILABILITY - ACCESSIBILITY OF DENTAL SERVICES

The study sample perceived dental services as being easily available. Only 3.2% of respondents reported that they did not know of a dentist to attend in case they needed one. Knowing of a dentist was not associated with area of residence. However, a significant association between regularity of attendance and knowing a dentist was found. As would be expected, irregular attenders were much more likely to report that they did not know a dentist. Similarly, no difference in relation to educational social position was found in the perceived availability of dental services in the WHO International Collaborative Study[60].

Only 4% of respondents reported that they were affected or prevented from going to the dentist by the surgery being "too far away". Affluent individuals were significantly more likely to give this response. Similarly, the affluent were more likely to report that they had been affected or prevented from attending, because "the dentist was difficult to get to using public transport". However, these findings may be due to the fact that affluent respondents tended to, more often, attend dentists outwith their area of residence, while the deprived used the local dental services. This was found during the course of casual conversation with participants, when the dental examinations were taking place. It was characteristic that deprived respondents tended to say that the dentist was "just round the corner", while affluent respondents selected their dentist irrespective of distance, based on recommendations, or they had not changed their dentist after they had moved to a new neighbourhood.

Furthermore, affluent individuals were more likely than deprived to report that difficulty in finding a place to park their car and in finding a suitable appointment time acted as a barrier either affecting or preventing them from visiting the dentist. These findings may be attributed to the fact that the affluent are in possession of a car more frequently than the deprived, and that, possibly due to their lifestyle, the affluent may have increased demands and expectations in relation to the organisation of the appointments. It may be that they expect a more personal contact with the dentists and the receptionists, who are expected to be willing to treat them as individuals with specific needs and demands, and not as just another case to be accommodated in the appointments list in a way which is set by the dentists' and the surgery's priorities.

Thus, as expected, when structural/organisational barriers (Table 7.38) including those mentioned above, were examined in relation to area of residence, the affluent were found to report a significantly higher number of barriers faced. Nevertheless, the affluent are those who make more use of dental services and have better oral health, suggesting that such barriers are of a rather low significance.

A great variation in the availability of services in the 11 areas under study was found from the results of the last phase of the study. The affluent sample was selected from two affluent areas. One (Pollokshields) is situated within the city boundaries, and had the highest number of equivalent full-time dentists (16.1), while the other (Newton Mearns) which is an affluent suburb, had a substantially lower relevant number of full-time equivalent dentists (5.3). This variation was also evident when the population of each area was taken into account, the suburban affluent area having 2.65 full-time dentists/10,000 population, when compared to the more centrally located affluent area (4.52 full-time dentists/10,000 population).

Similar variation was evident amongst deprived areas, where the number of full-time dentists/10,000 population ranged from 4.99 (Cambuslang), which was the highest of all 11 areas under study, to 2.15 (Easterhouse) which was the lowest number of full-time dentists/10,000 population in all of Glasgow's 11 areas.

Although there was this variation within each type of areas, the overall availability of dental services did not differ between affluent and deprived areas. This finding is in accordance with an early study on the distribution of manpower in the UK, where, although lower availability ratios were reported in areas where the social class profile showed a predominance of lower social groups for England and Wales, no such differences were significant for Scotland[139].

The distance to the closest dental surgery was found to be significantly higher for the affluent populations, as the affluent areas, geographically, were more widespread than the deprived. However, this did not pose a problem for them as they tended to have their own means of transport. All dental surgeries were found in central locations within the relevant areas, ie. on main streets, served by public transport, thus, in terms of physical accessibility there did not appear to be any important barriers to attendance.

The daily workload for the dentists did not differ between the affluent and deprived areas, neither did the waiting time for a non-emergency appointment differ significantly. All surgeries under study saw emergency patients on the same day or the day after. However, there was a greater number of emergencies in the deprived areas. This is consistent with the irregular attendance profile of the populations of these areas. However, despite the increased number of emergencies, they could still be seen within the same day. This was because there was a greater number of broken appointments in these areas, thus freeing dentist's time to provide emergency care. Dentists practice organisation, therefore, appeared to accommodate the needs and the demands of the patients in the area.

The interviews revealed that irregular attendance was more prevalent in deprived areas. Lower response rates to the recall letters were reported in the dental surgeries which operated a recall system.

From the findings, it seems that availability of dental services in the areas under study is equally distributed. However, in the deprived areas there was a higher level of untreated disease and treatment needs. If availability is examined in relation to untreated disease, ie. normative need, then, certainly there is a sizeable difference between affluent and deprived areas. If normative needs were translated, first into perceived needs, and further into demand for care, there would be a greater need for more dental services in the deprived areas than in the affluent.

Availability of information on dental services was limited, none of the libraries of the areas under study offering such information. Information about free NHS dental treatment could be found in the Post Offices. In general the dental surgeries of the affluent areas tended to offer more information. This was usually displayed in the waiting rooms, and concerned services or dental health education. However, dental health education information appeared to be entirely covered by the private sector, with only commercial leaflets being available.

10.6 INTER-RELATIONSHIP MODELS

10.6.1 Introduction

The multiple regression models which examined the inter-relationships of the variables of interest predicted the observed variation of the dependent variables to differing degrees. For the models of the dental indices and the treatment cost, the proportion of variation explained ranged from 4% to 27%. The models for behavioural variables explained 23% and 16% of the variation in regular attendance and toothbrushing frequency, respectively. Thus the explanatory power of the regressions indicates that there are other influences not covered, or not covered adequately.

However, it is known that social and behavioural factors are not as successful as clinical/biological factors in producing predictive models[149,150,152,156]. In social science this is to be expected. Social science explanations are only partial explanations, as they are not sufficiently precise to indicate all potential influences, and, consequently, models are only a simplification of the real world. Furthermore, methods of collection of social and behavioural data are imprecise, and ultimately, the exact functional relationships may fail to be accurately specified[193].

Langlie[202] used variables from the Health Belief Model, and variables relating to locus of control, social support, and socio-economic status, to explain preventive health behaviours, one of which related to dental care. She found that socio-economic status (as based on education, income and occupation) was a significant predictor, after adjusting for the behaviour/attitudinal variables. Thus, it is questioned whether the goal to improve a population's health should rely only on efforts directed towards changing individual preventive health behaviour, given the strong influence of the environment. Maizels *et al.*[155] in their interaction model found that a variable relating to region (north-west England or outer London) had a significant effect on both a dental health index (number of filled teeth), and a dental health behaviour (frequency of dental visiting).

In the present study, the area of residence was a variable which, as chosen and constructed, incorporated both above-mentioned concepts of location and socio-economic status. The variable used contained not only the attribute of social class but also the level of deprivation. Thus, access to material resources, which determines lifestyles and prevailing social norms and values, was an important attribute within the models.

Langlie[202] found that although age was related to preventive health behaviours, controlling for age did not alter the relationships between the socio-psychological variables and the preventive health behaviours. In the interactional model of Maizels *et al.*[155], age failed to be a significant predictor of dental attendance behaviour, and it also failed to discriminate between regular and irregular attenders in the model of Sogaard *et al.*[158]. In the present multivariate analyses, in view of these findings and of the fact that area of residence sub-groups were of interest and not age sub-groups, age was not included as a variable.

10.6.2 Dental visiting and toothbrushing models

Regular attendance was found to be predicted by the area of residence, and also by the value attached to a filled tooth, the image of the denture wearer and the level of dental anxiety. Area of residence was the strongest predictor of dental visiting behaviour, and this is a finding also reported by Maizels *et al.*[155]. The model suggests that even after adjusting for dental anxiety, acceptability of false teeth, and dental health value system, the area-deprivation has a separate and strong effect. The deprivation measure reflects access to material resources, and further, the ability of respondents to purchase dental care, and this may be the reason for the association detected between area of residence and dental visiting frequency.

The model also confirms that dental anxiety is an important barrier to dental visiting. Thus, reduction of dental anxiety should be a major goal of dental health promotion interventions. The reciprocal association of dental anxiety and dental attendance suggests that such interventions should also involve the dental profession. Campaigns aiming at encouraging dental attendance will prove ineffective if dental practitioners are not trained to deal with anxious patients. If dentists are able and willing to listen to patients and relieve their worries, and further to perform the clinical procedures in a way which takes into account patients' special needs, it is likely that dental anxiety will be reduced, which in turn will encourage regular dental attendance.

However, dental anxiety was also found to be associated with attitudes to dental charges. Thus, it seems that apart from anxiety which is related to dental issues, there is some uneasiness about the cost of dental treatment. The construction of the attitudes to charges scale suggests that there is both a lack of communication between dentists and patients as regards the financial arrangements, and a demand for lower charges. Here, the role of the dental profession and of the state are evident. The communication skills of the dentists, and an ability to make clear and simple financial arrangements are likely to reduce the lack of trust towards the dentist, and, if coupled with a reduction in charges, the anxiety which relates to the costs will be reduced.

Furthermore, anxiety was found to be associated with the image of the dentist, i.e. the more negative the image of the dentist, the higher the levels of dental anxiety. The effect of dental fear on a patient's perception of the dentist has been reported in the literature[203,204]. However, it may also be that the patient's perceptions alter his fear level. An interesting finding was that the more negative the image of the dentist, the more negative the attitudes to charges. A dentist who is perceived as being overpaid and unfriendly, stimulates negative feelings, creating both more dental anxiety and negative attitudes to charges, thus reinforcing the feeling of loss of control. While with respect to the charges, a solution relies solely on the state and its health insurance policies, with regard to dental anxiety and dentists' image, the dental profession has a major role to play. People have to overcome many barriers in order to go to the dentist. If they know that when they get there they will find a friendly environment and a dentist willing to listen to and solve their dental health problems, a dentist who will spend some time with them, explaining the clinical aspects and the control patients have over their own health, this will relieve patients' fear and (importantly for the dentist) the patient will be less unhappy about any charges. However, dentists are not always able to spend sufficient time with patients, due to the fee-for-item system of remuneration. Therefore, encouragement of visiting, enhancement of positive images of the dentist and reduction of fear are as much in the hands of the state as they are the responsibility of the profession.

The association of dental visiting with the acceptability of false teeth and value of teeth suggests that the dental health value system is important in determining the relevant health behaviour. Thus, interventions aiming at altering dental attendance should take into account such issues. However, the dental health value system is to a great extent socially determined, and the different attitudes to false teeth in the two contrasting areas were more than obvious. The statistical analyses simply confirmed the contrasting acceptability of false teeth which was so evident when visiting the relevant areas. It was not exceptional to find the sugary 'false teeth' sweets, with the shape and colour of dentures, being on sale in the shops of the deprived areas. Thus, individuals in such areas are introduced to the concept of dentures as being something acceptable and even pleasant, from an early age. This highlights how difficult dental health promoting efforts are, as they have to overcome such long established attitudes.

On the other hand, the association of attitudes to false teeth and dental attendance can be seen from the opposite way, that regular dental visiting may influence the acceptability of dentures. It is important to establish programmes which encourage dental attendance from an early age in such areas, given that a certain behaviour can subsequently lead to a change in the relevant attitude, which, in turn, will reinforce further the behaviour.

As regards self-care, toothbrushing behaviour was found to be predicted by the area of residence, the respondents' view about the importance of dentists to keeping healthy, and the value placed upon a filled tooth. Again, area of residence was the strongest predictor, indicating the independent and strong effect of social environment on a preventive behaviour.

Similarly to dental visiting behaviour, the dental health value system, was also associated with toothbrushing behaviour. Furthermore, regular attendance and toothbrushing appeared inter-related in the bivariate analysis, which is consistent with other studies[2], and such an inter-relationship suggests a general preventive orientation of the individual. However, it seems that there are different determinants of these two behaviours. Firstly, dental anxiety acts as a barrier to dental attendance, but it is irrelevant to self-care, which is practised in the absence of the threat of the much feared dentist. Secondly, while attitudes to false teeth are associated with regular attendance (extractions and dentures cannot but be related to dentists who perform the relevant clinical procedures), self-care relates to the value attached to dental health as compared to general health. The variable 'importance of dentist to keeping healthy' which was found to be associated with toothbrushing reflects this attribute, i.e the importance of dental health as equal to general health.

In conclusion, deprived populations appear to be in greater need of programmes aiming at improving dental health behaviours than affluent populations. Such interventions stressing the value of teeth, may influence both dental visiting and toothbrushing behaviours. Additionally, messages stressing the relevance of dental to general health may be more effective in improving self-care, while reduction of dental anxiety and the degree of the acceptance of dentures and false teeth, may prove more relevant in messages aiming at increasing dental attendance.

10.6.3 Number of filled teeth model

The number of filled teeth is a measure of past disease experience, but also of the care received by the individual. It shows that there has been contact with the dental services, and that there may be a behaviour predictive of palliation of disease, which brings the individual to care. This model was the most successful, explaining 27% of the variance in the number of filled teeth.

The associations detected suggest that care received by patients depends mainly on the dental attendance pattern, as this was the strongest predictor. However, toothbrushing had a separate and positive effect, the higher the toothbrushing frequency, the more the number of filled teeth. While this could indicate that greater toothbrushing frequency does not prevent fillings, it seems likely that this association reflects a preventive orientation. Such an orientation, is consistent with regular contact which results in more fillings, due to early detection of disease, or overtreatment, and depends on the treatment preferences of the dentists.

Again, area of residence had a strong effect, and this may indicate the ability of affluent populations to purchase dental care. The model also suggests that the care received is related to service availability, the further someone lives from a dental service, the less the number of filled teeth. It may either be that lower availability protects individuals from overtreatment, or that lower availability results in more disease being left untreated. In order to substantiate which is true, further research is required in order to know whether untreated disease remains, or whether the actual levels of dental disease are lower.

An interesting finding was that structural barriers were positively related to the number of filled teeth. The more the structural barriers that an individual faces, the higher the number of filled teeth. In the bivariate analyses, it was found that the affluent, who are those likely to have received more dental care, also faced a higher number of structural barriers to attendance, and this may explain this apparent paradox. However, given that in the multivariate analysis area of residence is adjusted, it may truly be that structural barriers, even though are significant markers of the number of filled teeth, are not the important barriers which determine receipt of care. In contrast, attitudes to charges appear to be an important barrier to the receipt of care. Negative attitudes to the cost of dental treatment were found to be associated with fewer filled teeth, and it is known from the bivariate analysis that deprived populations had more negative attitudes. In the multivariate analysis, even after adjusting for the area of residence effect, negative attitudes to cost were still associated with lower receipt of care.

From the dental behaviour models detailed in the previous section it was suggested that the dental health value system is a determinant of health behaviour. Given that both dental visiting and toothbrushing behaviours were directly associated with the number of filled teeth, it could be assumed that the dental health values are indirectly associated with the dental care received, mediated by behaviours. However, the importance of dentists to keeping healthy, i.e. the perception of dental health as a health issue, had a separate and direct effect on the number of filled teeth. This indicates the importance of the dental value system, not only in the health behaviours, but in the levels of care as well, which seems to be a function of the appreciation of the value of secondary prevention.

10.6.4 Number of missing teeth model

The number of missing teeth model was found to explain 19% of the variation. Missing teeth, as an indicator, are indicative of availability of dental services and treatment preferences of dentist on the one hand, and on the other they reflect lack of self-care and dental neglect on the part of the individual, with the accompanying attitudes to dental health and patients' treatment preferences.

Area of residence was again the strongest predictor, thus deprivation has a separate effect on the number of missing teeth, independent of the effect of the other variables. Toothbrushing frequency and image of the denture wearer were equally important in predicting the number of missing teeth, but the associations were inverse. Higher toothbrushing frequency was associated with lower number of missing teeth, and thus it can be assumed that regular toothbrushing prevents advanced disease, or that this association reflects a preventive orientation, successful in the preservation of teeth. The association of the image of the denture wearer and the number of missing teeth was positive, suggesting that socially determined greater acceptability of dentures and false teeth, results in greater numbers of missing teeth. However, as no causal associations can be established from the present analyses, it may well be that dental neglect simply leads to extractions, which consequently makes false teeth a necessity, and this leads to a more positive attitude to dentures.

Distance to dental services was also significantly associated with the number of missing teeth, and the association was that the greater the distance to the dental surgery the lower the retention of teeth. Thus, the hypothesis from the findings of the filled teeth model, that lower service availability may protect from overtreatment of healthy teeth, does not seem likely to hold true, as lower numbers of filled teeth may be due to more teeth being lost due to extractions, and not because larger numbers of teeth are healthy.

The dental health value system, again had an indirect association through toothbrushing behaviour, but it was also found to have a direct and separate effect on the number of missing teeth. The higher the value attached to healthy teeth, the lower the number of missing teeth.

10.6.5 Number of decayed teeth model

This model explained 14% of the variation in the number of decayed teeth. Area of residence was found to be directly associated to the number of decayed teeth, confirming the relationship of deprivation and active dental disease, even after adjusting for the remaining variables in the model.

Toothbrushing behaviour was found to be the strongest predictor of the levels of decay, the higher the toothbrushing frequency, the lower the levels of dental decay. While toothbrushing is the means by which fluoride is used, it also suggests a preventive behaviour of the individual which is conducive to the control of dental disease. Anxiety was found to have a separate effect on levels of active disease, highlighting the importance of anxiety reduction programmes, which will not only encourage dental attendance, given that anxiety is an important barrier, but will have a direct effect on levels of dental disease as well.

Finally, the powerful others Health Locus of Control (HLC) variable was a significant predictor of the number of decayed teeth. This finding suggests that individuals who feel that other people control their health, are more likely to exhibit higher levels of dental disease. Furthermore, powerful others HLC was found to be associated with area of residence, chance HLC, and service availability. Thus, it may be that individuals who feel that others or chance control their health have a more passive behaviour in dental health matters. Furthermore, residence in deprived areas is connected with difficult life conditions, and many socio-psychological as well as economic problems. When survival issues are an everyday concern, it is understandable for health and even more so for dental health, to have a lower priority. Furthermore, living in a social environment where individuals experience their lack of control in other aspects of their lives, like work, education, leisure, it is not surprising that they may also feel in lack of control over their health.

The availability of services seems to play a role in this feeling, but the exact nature of the association was not revealed as the statistical analysis gave inconclusive results. Thus, it is not known whether high service availability allows respondents to shift their own responsibility for keeping healthy to the health services, or whether low service availability, like low availability of other services in deprived areas, reinforces feelings of loss and desertion by the state, and respondents' feelings that they are in the hands of others who are powerful and control all aspects of their life. Further research is required to investigate the nature this association, which should not only examine the magnitude of service availability, but also the character of the services, whether they are prevention or cure orientated.

10.6.6 The DMFT model

This model was not found to be powerful, explaining only 6% of the variation of the DMFT score. The associations detected suggest that higher DMFT score relates to a more favourable attitude towards dentures and false teeth, and towards the costs of dental treatment.

However, it is difficult to draw conclusions regarding the meaning of such associations, given that many concepts are incorporated in this composite index. The DMFT score gives equal value to all different tooth health states which reflect actual levels of active disease or disease experience, dental care received and dental behaviour and treatment preferences of the individual. Untreated disease is indicative of certain attitudes towards dental services and dental care, the availability of services, and a propensity to disease development. The missing component of the index, apart from indicating dental neglect and a negative attitude to preservation of teeth, it also reflects the treatment preferences of the dentists.

10.6.7 Total-treatment cost model

The treatment required to render individuals dentally fit represents the normative treatment needs of the populations under study. This model was found to explain 20% of the variation of the total-treatment. Similarly to the other models, area deprivation was found to have an independent effect on total-treatment cost after adjusting for the remaining variables.

Toothbrushing frequency was found to be the strongest predictor of total-treatment cost, which was expected, given that it was found to be associated with all three different tooth health states, and decayed and missing teeth are indicative of a requirement for treatment. The association of higher toothbrushing frequency with lower treatment costs suggests the importance of encouraging good self-care practices, particularly among deprived populations who exhibit higher treatment needs.

The dental health value system was also found to be associated with the treatment needs, both indirectly, mediated by toothbrushing behaviour, and directly, by the separate effect of the value attached to healthy teeth. Furthermore, negative attitudes to dentures, were associated with lower treatment costs. Thus, messages aiming at reducing the acceptability of dentures and false teeth will have a direct effect on treatment costs, while interventions, aiming at increasing the value attached to dental health, will both encourage better self-care habits and reduce the amount of untreated disease.

10.6.8 Concluding remarks

Area of residence was a significant determinant of all the behavioural and attitudinal variables used in this study, apart from the image of the natural-toothed person, and the value attached to healthy, filled, and decayed-and-painful teeth. In multivariate analysis, it was found to be a variable directly associated with the number of decayed, missing and filled teeth, total-treatment cost and prosthetic treatment cost. It was also found to be indirectly associated with the number of sound teeth and the DMFT score. Area of residence only failed to have a predictive influence only on restorative treatment cost.

Thus, it appears that area of residence, when defined in relation to deprivation, has a separate effect on both levels of dental health and on dental behaviours, even after adjusting for the beliefs and attitudes. This suggests that there is susceptibility to dental disease related to social and economic environment. Influencing the part of disease which is attributed to the effect of social environment relies solely on social and economic planning policies of the state. This falls outwith the direct responsibilities of the health planners. They must therefore take the responsibility for showing that health is associated with the socio-economic environment, put pressure on politicians, and use these associations as determinants of appropriate health planning and priority setting.

Regular dental attendance is significantly related to the numbers of decayed, missing and filled teeth, and to total-treatment cost and its components. However, in the multivariate analyses, regular attendance showed a direct association with clinical measures in only one model. It was found to be the strongest predictor of the number of filled teeth. This was similar to the finding reported by Maizels *et al.*[155], where the frequency of dental visits entered their interactional model for the number of filled teeth.

Regular attendance was only indirectly associated with the dependent variables for the other models, and this association was mediated by the image of the denture wearer, and dental anxiety. In contrast, regular dental visits were found to enter models for the number of carious surfaces[149], and of abundant dental caries[154]. However, both the dependent and the independent variables of these studies are not directly comparable to the variables of the study reported here.

The perception of the image of a denture wearer was found to be directly associated with the number of sound and missing teeth, the DMFT score, the total treatment and the prosthetic treatment cost. It was also found to be indirectly associated with the number of decayed and filled teeth. It appeared in seven of the eight models.

Attitudes to charges and cost of dental treatment was directly associated with the number of sound and filled teeth, and the DMFT score. It was also found to be indirectly associated with the number of decayed teeth and the restorative treatment cost. However, it was not found to predict regular attendance, in contrast to the findings of Lissau *et al.*[159], where economic barriers was found to be a predictor of the number of dental visits.

Negative attitudes to charges and cost of dental treatment detected among the deprived was expected, as it is this population who had the least economic ability to face high treatment cost. However, the association of attitudes to charges/cost with the image of the dentist, anxiety and chance health locus of control, even after adjusting for the area of residence, shows that there may be a mechanism of anxiety - image of the dentist - a feeling of lack of control over one's health - attitudes to charges/cost. The nature of these inter-relationships are complex and require further investigation.

Attitudes to cost were reported to influence the confidence subjects had in dentists[117], and the image of the ideal dentist included the concept that he should not be too expensive[116]. Thus, the finding of the present study regarding the association of the image of the dentist and attitudes to cost, is supported by the literature.

The value of a healthy tooth was found to be directly related to the number of missing teeth. Views about the importance of dentists for keeping healthy were associated with the number of filled teeth. Thus, messages like those mentioned above which reinforce the value of teeth and the relevance of dental to general health, may also have a direct effect on levels of dental disease, apart from their indirect effect through their association with dental behaviours.

Reducing anxiety should be a major goal. The dental anxiety variable was found to be directly associated with the number of decayed teeth and the restorative treatment cost, and indirectly associated with the number of sound and filled teeth, and the DMFT score. It has a direct impact on levels of active disease and consequently on costs. It was found to be predicted by regular attendance and attitudes to costs. The inter-relationships of dental anxiety, anxiety about costs, and regular attendance, are a major issue to be faced by dental health promotion efforts.

10.7 CONCLUSIONS

The conclusions which can be drawn as a consequence of the work described in this thesis are as follows:

1. Dental health is related to deprivation, just as general health is.
2. An area-based deprivation measure can be a very useful tool in identifying populations with differing dental health needs and attitudinal and behavioural profiles. This offers the advantage of specifying a spatial distribution of dental needs.
3. There are greater levels of unmet dental health needs among deprived population than among affluent.
4. The difference in disease experience between affluent and deprived Glaswegians appeared somewhat greater than the relevant difference between the extreme social class groups of Scots.
5. The dental health needs of dentate and edentulous groups should be examined separately.

6. Differing dental health behaviours account for a considerable proportion of the different levels of dental health needs.
7. Dental anxiety is a major barrier to dental attendance, and is associated with levels of active disease.
8. There is anxiety amongst all populations, but especially the deprived, regarding the costs of dental treatment.
9. Structural / organisational barriers appear to be of minor importance in relation to dental attendance.
10. Efforts to reinforce healthy dental behaviours should be based on the dental health value system of the targeted populations. Issues to be tackled relate to the perception of dental health as a health issue, acceptability of false teeth, value of teeth and of a natural dentition, value of secondary prevention and of early treatment of already manifest disease, as well as of the outcome of preventive procedures. Clear and easy to remember messages encouraging feasible targets should be employed.
11. Oral health promotional efforts should encourage populations to perceive themselves as the controlling influence over their own health.
12. Both the dental profession and the state have a role to play in encouraging dental attendance. The former by better communication with patients and a consequent enhancement of image, and the latter by reducing patients' cost-sharing and introducing a remuneration system which is conducive to good dentist - patient relationships.
13. While the dental services are perceived as available, and seem to cover equally well the current levels of demand, if unmet need were to be translated into demand for dental care, additional dental services in the deprived areas would be required.
14. There is a noticeable lack of dental health education and information in surgeries which are located in deprived areas.
15. Unless social and economic policies of the state are implemented to improve the socio-economic environment, health promotion efforts will continue to be less effective than their full potential.

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APPENDIX I

Qualitative research report

DENTAL PROJECT: PHASE ONE: QUALITATIVE RESEARCH

INTRODUCTION

The first phase of this project, undertaken by the Advertising Research Unit (ARU) aimed to 'clarify why persons living in differing environments behave differently in relation to preventive dental services'.

METHOD

Group discussions were chosen as the appropriate research tool to conduct this exploratory research. Such a methodology allowed respondents to discuss, at length, specific topics of interest while selecting their own priorities. The discussions were guided by a moderator who used a general discussion outline to ensure coverage of certain topics. This discussion brief can be found in the Appendix III. The discussion group comprised 6 or 7 respondents, selected according to sex, age, and social class (the standard head of the household classification A, B, C1, C2, D or E). They allowed flexibility and in-depth discussion, and also allowed the researcher to explore the "social world" or the respondents. This was of particular importance in this project.

This research involved conducting a series of six qualitative group discussions composed of respondents drawn from the community at large, who lived within defined study areas. Respondents were recruited by trained and experienced market researchers according to the Code of Practice of the Market Research Society, on a door to door basis. Discussions were held in local community centres to ensure that they were as informal as possible. Respondents were told prior to attendance that the discussions would be about "health", and each discussion lasted between one and one and a half hours. Groups were conducted during the period November 1989 to January 1990.

The detailed sample was as follows:-

Group No	Sex	Age	Social class	Area status	Outreach
1	Female	40-60	C2DE	Deprived	yes
2	Male	20-39	C2DE	Deprived	yes
3	Female	20-39	C2DE	Deprived	no
4	Male	40-60	C2DE	Deprived	no
5	Female	20-39	ABC1	Non-deprived	no
6	Male	40-60	ABC1	Non -deprived	no

Deprived areas were:
Bridgeton, Postal Code G40 (with 'Outreach')
Castlemilk, Postal Code G45 (without 'Outreach')

Non Deprived area was: Pollokshields, Postal Code G41 (without 'Outreach').

MAIN FINDINGS

The findings were reported in three sections. These are
- Background Findings (1.0). These are general points that emerged during the discussions, which are pertinent to the project.
- Oral Hygiene (2.0). This covers findings regarding all aspects of keeping teeth, gums and dentures clean on a personal level.
- Dental Services (3.0). This covers findings regarding attendance at dental services.

The findings reported emphasise the differences between those respondents living in the deprived areas (C2DE respondents) and those living in the non deprived areas (ABC1 respondents). They are illustrated with the use of quotes.

A final section (4.0) will summarise and conclude.

1.0 Background perceptions

This section is concerned with dental care in relation to general health, and dental services in relation to health services. Essentially the findings fall into two categories -

- general health (1.1)
- health services (1.2)

1.1 General Health

All respondents regarded health as one's physical and mental well-being and this was affected primarily by illness. Indeed, some defined health as the absence of illness.

Health was considered important by all respondents in determining their quality of life.

Although certain 'events' focused personal attention on health (e.g. pregnancy, over-indulgence at Christmas, deteriorating health of an elderly relative, or personal illness), health was not a high priority in the respondents normal day-to-day lives, i.e. they tended not to be particulary 'health conscious'. C2DEs especially tended to take their health for granted.

1.1.1 Dental Care

This was not regarded as a life or death determinant, nor as directly affecting the quality of life, therefore it was not regarded in the same light as overall/general health. Although the respondents agreed that illness could begin in the the mouth, no one had had any experience of this.

For many respondents, especially C2DE's, their teeth were regarded as the least important part of the body.

> "(Teeth) ... aren't something that's going to cost you your life. The worst you can do is lose your teeth and you'd just get false ones. It's not that important to you."
>
> (Male, 20-39, C2DE, Outreach)

Teeth were regarded as a practical or cosmetic issue, one of basic hygiene, and not of health (especially for children).

1.2 Health Services

Respondents mentioned their local GP, health centres (some were able to list a range of services offered by health centres, e.g. social workers, child psychologist), family planning, optician, dentist, and the chiropodist, as the health services which were available to them. However, the dental services and dentists were often the last service to come to the respondents minds. The medical GP was the most important, i.e. the main point of contact with the health services (either in the health centre or local surgery). Indeed all respondents were registered with a GP. All respondents were aware of health centres (they were regarded as a modern development), and local surgeries. All had attended these services at various stages in their lives, but there was a range of attitudes towards them. This depended to a large extent on past experiences - especially the manner/personality of GP and the practical process of consultation/treatment.

Those with favourable attitudes (no class bias) particularly praised the GP as a friendly, reassuring, and talkative.

> "My new GP is brilliant ... he's so thorough and he told me exactly what he was doing".
>
> (Female, 20-39, ABC1, No Outreach)

Those with negative/unfavourable attitudes expressed complaints about the 'practical process'. This was especially C2DE respondents (i.e. appointment system, waiting time, repeat prescriptions, 'doctor on call' system).

"I don't like the appointment system. I mean you don't take ill by appointment.
(Female, 40-60, C2DE, Outreach)

All respondents visited the GP when there was a problem or when they were ill (this reactive behaviour meant that the services were used for 'cure' rather than prevention). Some respondents (these tended to be women, especially ABC1, were aware of some preventive services, e.g. smear tests/screening or holistic/private practitioners (herbalists, etc.).

1.2.1 Dental Services

A number of factors set the dental services apart from other health services. These were as follows:

Specialist Versus General Function

The dentist was regarded as a specialist because he/she deals with one aspect of the body. (Similar to optician, chiropodist, etc.). In contrast the GP was seen to be concerned with the body as a whole.

Low Versus High Esteem

In relation to the GP, the dentist tended to be held in lower esteem. The GP was seen to deal with potentially life/death situations and be able to save lives. Very few of the respondents felt that problems with teeth could be fatal (this ties in with the idea that dental care was not regarded as a health issue) and hence they felt the dentist did not possess similar 'powers'.

Operational Versus Referral

Visiting the dentist was perceived by some respondents as going for an operation (tended to be C2DEs), whereas visiting the GP was for diagnosis and medication or referral.

Business Versus Medical

Because charges are made for check-ups and treatment at the dentist, he/she was regarded more as a businessman than a medical man (especially by C2DEs). There was much resentment towards the charges and the respondents tended to doubt the dentist's motives. GPs and other health professionals were not seen in this light because there is no exchange of money after consultation.

'Switching' Versus Loyalty

It was generally regarded as easy to switch between dentists (especially C2DE men, who went in the case of an emergency only, worked on the principle that any available dentist would provide the treatment they required). This was not the case with the GP as many had a family doctor and had remained with one doctor for many years.

2.0 Oral hygiene

The findings will be divided into the following sections:

Awareness and knowledge of (2.1)
- oral hygiene
- oral problems
- oral care

Attitudes and behaviour towards (2.2)
- false teeth
- brushing
- products used

2.1. Awareness and Knowledge

2.1.1 Oral Hygiene

A heightened awareness about the importance of oral hygiene was apparent among ABC1 respondents. This was demonstrated by the fact that most mentioned that they had seen TV documentaries and had read articles relating to oral hygiene.

2.1.2 Oral Problems

Problems that respondents generally talked about included, toothache, overcrowding, cavities, dentures becoming loose, gum boils and bleeding gums/gum disease, and bad breath. However, toothache was the main talking point. All respondents talked about the main cause of toothache being decay. Most respondents described the causes of decay as dietary (sweets, sugar, saccharin, carbonated drinks, lack of calcium, acid in apples/fruit).

Most respondents were arare that acid in certain foods can attack teeth and that a build up of plaque could cause decay. Also most recognised that there were things that could be done to help reduce decay, for example: eat less sugary foods; regular brushing; use certain products, eg. toothpastes, mouthwashes ('Plax'), and floss. However, the extent to which respondents actually put this information into practise varied, as did their beliefs about the effectiveness of the dental products available (see Section 2.2).

2.1.3 Oral Care

This section focuses on brushing and the oral health care products used by the respondents both in the past and the present.

Brushing

All respondents were aware of the importance of brushing after every meal. Some ABC1 women were aware that there is a correct method of brushing although they were not sure what this was (although they recognised that brushing techniques were taught by dental hygienists).

Products Used

All were aware of changes over the last 30-40 years in the nature and range of oral care products which are available (especially older respondents). The respondents mentioned that in the past there had been only a limited range of toothpastes (powder and pastes), and that there was a standard design of toothbrush, with no variations.

> "It was always, hardest the best."
> (Male, 40-60, C2DE, No Outreach)

Other cosmetic aids used by teenage girls for vanity reasons e.g. 'Gordon Moore's' chewing gum were also recalled.

The C2DE groups notably placed a high reliance on home substitutes for toothpaste e.g. soot and salt. They had used these before commercial products were available or because the home remedies were a cheap substitute and were considered to be effective.

With regard to current use of oral health care products, all respondents were aware of the vast range of toothpastes (names mentioned: MacLeans, Colgate, Crest, Mantadent P, some containing fluoride) plus 'specialist' toothpastes (for smokers and children). Similarly, all were aware of the vast range of toothbrushes available (angled heads, different textures, different gaps between bristles etc.). A few respondents knew that discarding their toothbrush after a month or two was encouraged.

The respondents were all aware of mouthwashes, floss, mouth sprays and electric toothbrushes.

2.2 Attitudes and Behaviour

Although respondents accepted that there were things which they could do on a personal level to look after their teeth, there was some feeling (tended to be C2DE's) that not everyone is born with the same standard of teeth and hence some people are "luckier" than others.

Generally speaking, C2DE respondents tended to be more fatalistic about their lives. The state of their health was felt to be predetermined, and hence rested on luck or fate.

> "(Health)...is something you get in your genes ... like from your forefathers".
> (Female, 40-60, C2DE, Outreach)

In contrast, ABC1 respondents tended to believe that they had more personal control over their lives and state of health than C2DEs (i.e. exercising, stopping smoking, changing diet could contribute towards better health). ABC1 respondents also tended to place a higher value on their teeth than C2DE's. This was reflected in their attitudes and claimed behaviour towards false teeth and the care of their own teeth (i.e. brushing).

The following subsections will therefore examin attitudes and behaviour towards false teeth (2.2.1) and brushing (2.2.2) in further detail.

There were notable differences between working and middle classes with regard to the oral care products used (2.2.3).

2.2.1 False Teeth

Overall, ABC1s wanted to retain their natural teeth for as long as possible, even if it meant losing one tooth at a time. ABC1 women were especially adamant that they never want to have false teeth.

> "I would like to have them until the day I die. I would hate to have false teeth".
> (Female, 20-39, ABC1, No Outreach)

ABC1 men accepted that they might have to have false teeth at some stage later on in life but were bothered about the 'construction' of the false teeth, i.e. that they would look as natural as possible.

C2DE's were generally unconcerned by the prospect of having false teeth. False teeth were considered to be simply associated with the later stages in life. Indeed, many (even younger respondents) had a false tooth/teeth or a denture. "Hanging on" to the natural dentition was not a major issue. Indeed, some felt it was better to have all their teeth removed at once rather than lose one at a time. It was quite noticeable that C2DEs were more at ease talking about the subject of dentures than were the middle class respondents.

The reasons for social bias in attitudes to dentures which were revealed in the discussions were commonly social reasons. ABC1's seemed concerned about their appearance if they had dentures, especially problems with teeth slipping when talking or eating, which might be noticed and judged by others. They also associated dentures with being unhygienic and a poor upbringing. There was concern that dentures would result in being judged by others as having "let yourself go", and finally, the middle class respondents associate dentures with the older generation and growing old.

> "It's also the thought that when your teeth start to go, everything's going to go".
> (Female, 20-39, ABC1, No Outreach)

There was stigma attached to having false teeth for ABC1 respondents. Many of them had an image of false teeth as being badly constructed, very straight, unnatural looking and obvious. They also gave practical reasons for not wishing to have dentures such as loss of taste of food; being limited in what one can eat (less efficient bite); dentures uncomfortable and difficult to clean.

2.2.2 Brushing Teeth

ABC1 respondents tended to claim to brush more frequently than C2DE participants. The frequency of brushing ranged from 2 or 3 times a day (bias towards ABC1's) to 2 or 3 times a week (more C2DE's). Overall men claimed that they brushed less frequently than women. The men tended to have more casual attitudes.

> "When you're young you don't give a shit 'cos you've got years and years ahead of you".
> (Male, 20-39, C2DE, Outreach)

For all, brushing involved using a toothbrush and toothpaste except the older C2DE's who used home substitutes (see 2.2.3).

Changes Over Time

All respondents had brushed their teeth when young (children/teenagers) but the frequency was difficult to judge. This had been enforced by parents.

> "It's the way you're brought up. My Mum and Dad said 'Right you've got to brush your teeth twice a day'. It was a routine. You got up in the morning, had your breakfast and brushed your teeth before going to school. The last thing you did at night was brush your teeth before you went to bed".
>
> (Female, 20-39, ABC1, No Outreach)

Some C2DE respondents reported that they had become less conscientious about brushing their teeth when they had left home or they had married. They felt that they were too busy and had too many things to think about, therefore teeth became less important.

> "These things all fall by the wayside once you get married. I've never been as fussy".
>
> (Female, 20-39, C2DE, No Outreach)

Some ABC1 women had become more concerned with their teeth over time for social and cosmetic reasons.

Reasons for Brushing

Brushing was regarded by the majority as habitual/routine behaviour, something that was almost subconscious. Indeed, none of the respondents expected to change their behaviour in the future. All the respondents recognised that their brushing behaviour was rooted in early childhood. Many felt it was important for children to brush regularly, although the responsibility for this fell upon wives/mothers.

C2DE respondents tended to have shorter term outlook, i.e. the perceived benefits of brushing were fresh breath and to some extent whiteness (cosmetic reasons). For this reason, some (tended to be C2DE's) only made an effort to brush their teeth on special occasions, e.g. when going out, or if they had been smoking excessively.

> "You always brush them when you're going out at the weekend ..... 'cos it makes your breath smell alright. Everyone at the dance has got gleaming white teeth".
>
> (Male, 20-39, C2DE, Outreach)

Underlying the need to have fresh breath and white teeth, ABC1's tended to have a longer term outlook and brushed to reduce decay ultimately to keep their teeth longer.

2.2.3 Products Used (toothpaste, brushes, aids)

Behaviour

The oral care product most frequently used was toothpaste. However, there were variations by class and age. In most cases women/wives purchased oral care products (very rarely men). They tended to look for the shop's own brand, or the cheapest. ABC1's tended to look for brands with fluoride.

Older C2DE respondents tended to rely more on old fashioned substitutes if they ran out of toothpaste. For whiteness they used diluted bleach, soap, soot and salt, baking soda, cold water or milk. For fresh breath they used peppermints. For toothache they used tobacco or cloves. If they had a gum boil, they used sugar and salt, or baking soda. This was generally not the case for ABC1's (except for a few who had a 'C2DE' background). These differences seem to be a reflection of a different upbringing rather than different values placed on the dentition although it may also be a reflection of the fact that ABC1 respondents appeared to be more able to cope with change compared with C2DE's.

Attitudes

Many C2DE respondents (especially younger women) had an aggressive and cyncal attitude towards the level of television advertising and vast range of products currently on the market, i.e. that manufacturers try to "con" customers with profit motives at heart. This tended to taint their opinions of products. For example, with regard to toothpastes, toothbrushes and other home care aids, many respondents (both ABC1 and C2DE) felt the use of toothpaste was incidental and that you could even use water as a substitute, i.e. the important aspect of cleaning was brushing (the scratching/rubbing action of the brush).

"It is not the actual toothpaste but the brushing that's important".
(Female, 20-39, ABC1, No Outreach)

Many C2DE respondents felt that all toothpastes had the same effect.

"I think they're basically the same formula, in a different tube, with a different name on it and a different price".
(Male, 20-39, C2DE, Outreach)

The perceived benefits of using toothpastes were limited (especially C2DE's), i.e. it was used as a breath freshener/to improve taste in mouth and therefore could be easily and cheaply substituted.

"Put a peppermint in your mouth and you've got toothpaste 'cos thats all it is".
(Female, 40-60, C2DE, Outreach)

Some ABC1's, however, felt that some toothpastes had longer term benefits, i.e. fluoride content was important in reducing decay.

There was generally a favourable attitude to specially designed children's toothpastes, both ABC1 and C2DE. There was an underlying feeling that children's teeth were important, but it tended to be the mothers (rather than the fathers) that actively encouraged dental care with their children.

Many of the smokers (larger number of C2DE's) had tried smokers toothpaste but were wary of stories of the abrasive action "stripping enamel off teeth". They had therefore ceased to use this product.

As stated above, a toothbrush was regarded as doing "the real job", although very few respondents replaced their toothbrush on a regular basis. C2DE respondents especially thought this was too expensive. Many C2DE's felt there were no real benefits or reasons for there being such an extensive range of toothbrushes on the market. They tended to have a cynical attitude towards the range and cost, i.e. that all brushes performed one basic function for everyone, although some ABC1 women recognised the importance of angled heads to reach difficult areas.

"The shape of the brush is important, to get to the back".
(Female, 20-39, ABC1, No Outreach)

Other Oral Care Aids

If used, these tended to be for cosmetic reasons. For example, many had tried Mouthwashes (Plax, Listermint) (ABC1 and C2DE) but the benefits were thought to be short term. 'Good but wears off'. Many C2DE's felt that mouthwashes were expensive.

Only a few had attempted to floss their teeth and no one claimed they 'flossed' regularly. Again the benefits of this habit were thought to be short term.

Mouthsprays were used only on occasion by women. They were not regarded as 'manly/matcho' by the male respondents.

"Can you imagine if you were with your mates and you pulled that out of your pocket, you'd just die of embarrassment".
(Male, 20-39, C2DE, Outreach)

3.0 Dental services

This section will look at:

Awareness and knowledge (3.1), and attitudes and behaviour (3.2) in relation to utilisation of dental services.

3.1 Awareness and Knowledge

The areas which emerged in the discussions were:

Dentists (3.1.1)
Dental staff (3.1.2)
Attendance (3.1.3)
Charges (3.1.4)
'Outreach' (3.1.5)

3.1.1 Dentists

The majority of respondents identified the following as the dental services available to them and their children:

Dental Hospital (Sauchiehall Street), local dental surgery, and school dentist (resident and visiting)

The different service outlets were characterised by the activities or the types of treatment undertaken in each (no school bias).

The Dental Hospital was seen as being for emergencies/operations only, and as a training centre for dentists.

Local dentist (in health centre or individual practice): was seen as being available to provide check-ups (including polishing and cleaning) and major treatments (e.g. capping, crowning, filling, extractions, corrective appliances such as braces, dentures and root canals treatment).

The school dentist was thought to be available to school children only. The school service was thought to provide check-ups, advice and education about how to look after teeth.

3.1.2 Dental Staff

The dental staff was seen to consist primarily of dentists, but some respondents talked about the receptionist and the dental hygienist (ABC1 women). The dental hygienist was seen to have an advisory/teaching role, e.g. showing patients the correct way to clean teeth.

3.1.3 Attendance

All respondents were aware that the recommended frequency of attendance was once every six months for a check up and the majority of respondents knew that the purpose of attending for a check-up was to highlight any problem areas, recommend further treatment, or receive a general clean and polish. However, attitudes towards attending the dentist varied and will be examined in more depth in the following section (3.2).

3.1.4 Charges

There was a general lack of knowledge about the charges which was exemplified by the range of fees that respondents quoted as being the cost of check-ups or a filling (many respondents thought that check-ups were free, others thought they were £5 or £10). This is a reflection of the fact that many (especially C2DE) had little experiencee of the dental services. However, it was generally recognised that services were free if the patient was unemployed or a child (but they were unsure about the age limit). Pregnant women knew that treatments were free for one year.

3.1.5 'Outreach'

None of the respondents were aware of any changes to the services they received, or of a scheme designed to encourage attendance - namely the 'Outreach' scheme.

However, it was recognised that children received a different type of service to adults, i.e. they received a free teeth cleaning pack, posters to encourage regular brushing, and when needed, the respondents claimed that a silent drill was used. Some mothers mentioned that their child had been allowed to operate certain pieces of equipment, e.g. pressing the x-ray button. This was regarded as gradual change over the years, although some young respondents (20-39) remembered similar experiences as children.

3.2 Attitudes and Behaviour

This section will look at the respondents' claimed behaviour and underlying attitudes with regard to visiting the dentist. The following areas will be covered:

The Surgery (3.2.1)
Registration (3.2.2)
Attendance (3.2.3)
Appointment System (3.2.4)
Dental Staff (3.2.5)
Treatment (3.2.6)
The Charges (3.2.7)

3.2.1 The Surgery

The three types mentioned were the dental hospital (Sauchiehall Street, Glasgown), the local dental surgery and the school dentist.

Dental Hospital

Most of the respondents (especially the C2DE men) had unfavourable attitudes towards the dental hospital.

> "That's the house of pain".
> (Male, 20-39, C2DE, Outreach)

and it was often regarded as a last resort in an emergency.

The respondents had been particularly influenced by word of mouth and bad experiences in the past. There was some feeling among C2DE respondents that because students used patients as "dummies" there was a high risk of faults being made.

> "I just remember you always heard stories of the dental hospital ..... bad reports ...the mere fact that they were training".
> (Female, 20-39, C2DE, No Outreach)

The hospital was generally regarded as an old development and therefore not at the forefront of technology and it was described as a physically large place. Those who had attended the dental hospital had felt like "numbers on a conveyor belt". They all had expected and experienced a long wait, with a general feeling that nobody was particularly concerned about their welfare.

Local dental surgery

Those who claimed they regularly attended (tended to be more ABC1's) went to a local surgery. C2DE respondents who did attend tended to go to a health centre.

The respondents attitudes depended very much on the characteristics of each individual surgery.

There were generally favourable attitudes towards:

Music playing in the waiting room.
Attractive posters (not just dental posters).
Toys for children.
Silent drill/drowning out of sounds in treatment rooms.
More homely atmosphere (some mentioned an open fire).

There were generally unfavourable attitudes towards:

Silent waiting room (felt to create an atmospher of nervousness).

Overcrowded waiting room or extended period of waiting because of overbooking/overrunning by dentist.
Walls covered with dental posters.

"Everything just screams 'DENTIST!' at you".
(Female, 20-39, C2DE, No Outreach)

Sounds of the drill which were associated with treatment and pain.
Unpleasant smells (gas, disinfectant).

"As soon as you walk in, it's the smell. It makes me ill .... I'm climbing the walls to get out".
(Female, 20-39, C2DE, No Outreach)

Huge amount of equipment (lack of knowledge as to what each piece does lead to feelings of apprehension).
Treatment room because it was seen to be similar to an operating theatre.

These unfavourable attitudes were expressed mostly by C2DE's who had bad experiences in the past. Non-attenders (particularly C2DE men and older respondents) had a very negative, sometimes over exaggerated, image of the dentist's. This tended to be a stereotyped view that had been influenced by word of mouth and horror stories. Those who expressed favourable attitudes tended to me more regular attenders who has seen gradual changes over the years (they tended to be ABC1's and mothers).

School Dentist
All respondents felt it was a positive development to encourage children to attend the dentist and many recognised that it was a role that schools were now more involved with than in the past.

Change over Time - The school dentist in the past was associated with negative images ('bad' dentist - see 3.2.5), partly, it seemed because the visit to the dentist was commonly paired with a visit to the "nit nurse". Attendance at the school dentist was something which was dreaded.

In contrast, nowadays, many respondents had children who were not frightened to go to the school dentist. It was much more of an enjoyable experience with 'freebies' (posters, toothbrushes, red dye tablets to show plaque). This was in line with the general image of a 'good' dentist (see 3.2.5).

Many respondents were aware that the school plays a greater part in dental education now, and this was regarded as a change for the better. Also, changes in the manner of the dentist and how the children are treated was regarded as a good thing, (e.g. more friendly, talkative, and reassuring).

"Now the dentist chats away to the kiddies. See that grandson of mine of five years old, he loves going to his dentist ....When I was young the dentist used to just say what was wrong and that was it".
(Female, 40-60, C2DE, Outreach)

3.2.2 'Registering' with a Dentist
The majority of respondents (ABC1 and C2DE) were able to name their local dentist and describe the location of the surgery (except some older C2DE respondents who last went about 25 years ago). Access to the surgery was not generally considered to be a difficult issue. It was generally regarded as being easy to 'register' with a dentist. However, it was recognised that due to the nature of the service it was not absolutely necessary to be 'registered' with a dentist to be given treatment.

"You can pick your dentist a lot easier than you can pick your GP. It is easier to go along to a dentist and say, 'I need this work done'".
(Female, 20-39, ABC1, No Outreach)

Being 'registered' with a dentist did not necessarily mean that the respondents attended. However, those most likely to attend were ABC1 women and mothers (ABC1 and C2DE) who took their children.

C2DE men especially did not usually have a specific dentist and only actively sought a dentist in an emergency, relying on word of mouth recommendations.

Some respondents (tended to be older C2DE's) who had grown up and continued to live in a particular area, had been 'registered' for many years (in some cases up to 25 years) but attended very infrequently, when they had a particular problem and realised that they needed treatment.

The length of time 'registered' with a dentist was not generally considered important (whereas there was a recognised importance with the GP in terms of his/her knowledge and familiarity with medical records).

Some respondents found that lifestyle changes had influenced their attendance at a dentist, e.g. leaving home and/or getting married.

3.2.3 Attendance

Behaviour

ABC1's more often claimed that they were regular attenders (i.e. at least once a year), compared with C2DE's, but often attendance was prompted by reminders. However, mothers (ABC1 and C2DE) took their children to the dentist on a regular basis for check-ups.

Those least likely to attend regularly were 40-60 year old C2DE's (some had not been for up to 30 years). As children, however, respondents could remember attending the dentist (more ABC1 than C2DE) but this behaviour was enforced by parents.

Reasons for Behaviour and Underlying Attitudes

C2DE respondents tended to visit the dentist only when they had a major problem or were in severe pain, i.e. short term, reactive behaviour. Visiting the dentist was therefore seen as going for an operation or treatment (extraction, fillings, etc.) rather than for a check-up or preventive dentistry.

C2DE respondents tended to minimise contact with the dentist by putting off treatment for as long as possible. There were also underlying feelings that increased "meddling" with teeth by a dentist led to increased problems and that the dentist often gave unnecessary treatment if one was visiting for a check-up (i.e. it was a dentist's perogative to find trouble).

Finally, there was a general fear of reprimand by the dentist.

ABC1's tended to value their teeth more highly and were more likely to attend regularly as a form of preventive, long term behaviour. There was also some feeling that this was socially acceptable behaviour.

The level of attendance also depended on whether the respondent had false or natural teeth. Many C2DE's (especially older respondents) had a denture and therefore felt that attendance was not necessary. For them, having false teeth meant their dental problems had been solved.

C2DE men were especially lazy about dental care "never have been, never will" idea. They perceived the type of person who regularly attends as someone quite different to themselves.

> "Somebody that's well off, and goes to church every Sunday".
> (Male, 20-39, C2DE, Outreach)

3.2.4 Appointment System

For those who did not attend regularly (C2DE's), it was regarded as an emotional hurdle to actually make an appointment. It was not a habit but an event. Many of these respondents admitted that having made the appointment they did not have the courage to go through with it. This tied in with the feeling that going to the dentist was like going for an operation with all the related apprehensions.

Some respondents (no social class bias) complained about the surgeries only being open during business hours. It would be more convenient for them to be able to make an appointment for a weekend or evening. Those who had missed an appointment, and were then charged for wasting the dentist's time (mostly C2DE's) were very aggressive towards the whole system.

3.2.5 Dental Staff

Dentist

Non-attenders (especially C2DE men) had a stereotyped image of the dentist. Some of this attitude seemed to be influenced by experiences as children. The dentist was seen to be an older man who enjoyed inflicting pain, who rarely talked or explained what he was doing and who had a cold, unfriendly manner.

Those who had attended, but not on regular basis (generally C2DE's) tended to have negative and unfavourable attitudes. They complained about being treated like a number not a name and feeling like a "piece of meat" on a conveyor belt, because the dentist wanted the patient in and out as quickly as possible.

They were also concerned about unscrupulous behaviour on behalf of the dentist i.e. giving unnecessary treatment to earn more money (associations with the dentist being a business man).

The above characteristics were generally felt by all respondents to be traits of a bad dentist.

Those who attended on a more regular basis (tended to be ABC1's and mothers) recognised that changes had occurred over the years. These were seen to be positive changes and the dentist was seen to be:

talkative (explaining treatment, being honest by saying "this might hurt", for example).
friendly
reassuring (building the trust of the patient)
relaxing the patient
very much "one-to-one" rather than "them and us" situation.
often a younger person.

These characteristics were generally felt by all respondents to be traits of a good dentist.

> "Somebody who understands the fear of patient .... relaxes them tells them exactly what's gonnae happen".
>
> (Male, 40-60, ABC1, No Outreach)

Dental Hygienist

Tended to be mainly ABC1 women who were aware of the dental hygienist but they expressed favourable attitudes towards hygienists.

> "She cleans the plaque around your teeth which prevents gum disease. She shows you how to clean your teeth properly. You usually see her first. Then if you've got a filling or an extraction, you'd see the dentist".
>
> (Female, 20-39, ABC1, No Outreach)

Receptionist

All respondents were aware of a receptionist but no strong opinions were expressed, unlike the strong negative attitudes which had been expressed towards doctor's receptionists.

The dental receptionist was not seen as being directly related to the treatment process.

3.2.6 Treatment

Behaviour

Those respondents who had had major treatment (false teeth, root canals etc.) tended to be older C2DE's. This may be a reflection of the fact they tend not to be regular attenders and were more likely to 'let their teeth go', and then require complex restorative work.

Change over Time

All respondents with experience of the dental services, talked about changes in treatment which had occurred over time.

Past: The respondents were aware many more extractions had taken place in the past when compared to the present.

> "I think dentists were in the business of taking out teeth in those days. That's all they did. They were mechanics, but there was a bit more professionalism about it".
> (Male, 40-60, ABC1, No Outreach)

Present: The respondents believed that advances in modern technology meant that dentists were able to do more now to save and correct teeth (crowning, capping, braces) and many ABC1 women noticed that children were more likely to have braces (correction, preventive dentistry).

Many C2DE respondents (who tended to want as little contact as possible with the dentist) complained about the treatment being spread over time. They wanted it to be completed in one visit.

> "Come back in six weeks and all that. Why not just get it all done in the one?".
> (Male, 20-39, C2DE, Outreach)

Many respondents expressed fears and apprehensions about the treatment, such as a feeling of loss of control. This was related to a feeling of discomfort and embarrassment when the dentist 'invades' the mouth (especially felt by women) and a feeling of confusion because they did not understand what was happening was prevalent.

> "It's the fear of not knowing what they're gonnae do".
> (Female, 40-60, C2DE, Outreach)

Fears also focused on the equipment, such as the dental chair, which the respondents felt had a daunting appearance. Non-attenders had images of a "torture chamber", being strapped in, scenario. It was clear that lying horizontal increased the feeling of "loss of control" and the emotions associated with lying on an operating table.

Many respondents felt that there was too much frightening equipment in one room. Again this brought out feelings of 'loss of control' and of being in a foreign environment. The drill (sight, sound and smell) was much feared.

Many found the light blinding, which enhanced the feeling of loss of control.

> "It's the fear of sitting in that seat and seeing the pliers and that ....the light - you cannae actually see what's going on when they enter your mouth".
> (Male, 40-60, C2De, No Outreach)

Both gas for anaesthesia and injections were uncomfortable and unpleasant, especially the smell of the gas. Many non-attenders expressed a fear of being given an overdose and dying in the chair.

Prevention versus Extraction

Although it was widely accepted that there have been advances in modern technology, ABC1's were more intent on keeping their own teeth compared with C2DE's (e.g. if the root system was intact, ABC1's tended to favour tooth being built up. C2DE's tended to favour extraction.

The reasons for this difference seemed to be that C2DE respondents felt that extraction would put an end to their dental problems (i.e. toothache). A false tooth or denture meant that the need for future visits to the dentist was reduced. Also, because C2DE respondents tended to leave any problems until the last possible moment, (especially men) the disease process seemed to have reached a stage when extraction was the only option.

Also related to treatment preferences was the fact that C2DE's tended to accept false teeth as part of their culture (a social norm), because people around them were having teeth extracted, while ABC1's felt it was less socially acceptable to have teeth extracted. In all, immediate removal of pain for C2DE's was more important than longer term cosmetic considerations. ABC1's tended to oppose extraction for social and cosmetic reasons. They did not want to be judged by others, as having unnatural looking teeth.

<u>3.2.7 The Charges</u>

The majority of respondents (no social class bias) complained about the charges involved. They felt that because the dentist is part of the National Health Service the service should be free and that the charges were unnecessarily high.

> "I think the dental charges have increase a lot more than prescription charges. You have to plan when to go".
>
> (Female, 20-39, ABC1, No Outreach)

Another important consideration was that there was nothing available that itemised the costs involved.

> "They don't give you a break down of your treatment. If you put your car in for a M.O.T. or service, you get that".
>
> (Female, 20-39, ABC1, No Outreach)

Many C2DE's felt that it was almost ludicrous to pay someone who willl inflict pain and there was some feeling that it was unacceptable to have to pay for a check-up, especially when no 'treatment' was involved.

There was confusion among C2DE's as to how the prices are set. Some thought it was the responsibility of the dentist and expressed unease about unscrupulous dentists giving unnecessary treatment, and charging too much to make as much money as possible. Those who claimed they attended less frequently claimed that the high costs put them off going to the dentist.

<u>4.0 Summary and conclusions</u>

The following conclusions can be drawn from the findings:

Differences between the groups where 'Outreach' had been implemented and those groups where it had not, were not experienced.

<u>'Dental Health' is not a health issue</u>

For all respondents (i.e. no social bias), it emerged that dental health was associated with personal appearance (something cosmetic and almost superficial). It was not regarde as a health issue, because there were no associations with living or dying, general well-being.

Notable differences did emerge on comparing ABC1 with C2DE respondents with regard to oral health behaviours.

<u>Oral Hygiene</u>

Looking after the teeth emerged as routine/habitual behaviour, rooted in childhood and is hence difficult to influence and the extent to which respondents looked after teeth depended to a large degree on the <u>value</u> they placed on their teeth.

ABC1's tended to value their teeth more than C2DE's. This was exemplified by their attitudes towards natural and false teeth.

It tended to be more important for ABC1's to be <u>seen</u> to have their own natural looking teeth and ABC1's judged those with decaying or false teeth as having "let themselves go" or as unhygienic. They did not want to be judged in the same light. Although some ABC1's recognised they might have to have false teeth, they were concerned that they should look as natural as possible. Again, they were concerned that they would be judged by others. C2DE's tended not to have these concerns. It was more acceptable to them to have false teeth.

This value difference was also manifested in attitudes and behaviour towards brushing teeth:

ABC1's tended to claim they -
- brushed more frequently
- brushed to reduce decay (longer term outlook)

C2DE's tended to claim they -
- brushed less frequently
- brushed for breath freshness and whiteness
  (shorter term outlook)

<u>Dental Services</u>
Visiting the dentist emerged as behaviour influenced in childhood. Although it was difficult to judge how often respondents attended as children, it was apparent that many went because they were forced to by their parents. As adults, however, attendance was a matter of <u>choice</u>. Differences emerged on a social class level in that ABC1's tended to claim that they visited more frequently than C2DE's, i.e. attending regularly for check-ups, and C2DE's tended to claim they visited much less frequently (especially men). Many older respondents had false teeth and therefore did not go to the dentist.

The social class differences in the use of services seemed to again be due to the fact that ABC1's tended to <u>value</u> their teeth more highly than C2DE's.

ABC1's tended to have a more preventive outlook, i.e. regular visits and check-ups highlighted problems and corrective steps could be taken by the dentist. They wanted to keep their own teeth for as long as possible.

C2DE's tended to leave any problems they were experiencing with their teeth for as long as possible. This was not so much a preventive outlook. They were forced to go to the dentist when their pain was so extreme that they could do nothing to ease it and could no longer bear it.

Behaviour as adults also tended to be a reflection of respondents' <u>childhood and upbringing</u>. Many C2DE's rarely visited the dentist (or had been very infrequently/in the case of an emergency) and hence never will. They tended not to be receptive to change. The same C2DE respondents tended to have stereotyped images of going to the dentist, which were reinforced by bad past experiences, and horror stories.

<u>Barriers</u>
As well as the fundamental reasons, certain factors emerged as barriers towards attendance, i.e. fear/anxiety and cost. In a sense, these are the most controllable and hence removable.

These were generally expressed by the majority of respondents but tended to be heightened in cases where respondents attended less frequently (C2DE's, especially men and older respondents).

<u>Fear and Anxiety -</u>
For some, anxiety built up before setting foot in the dental surgery. Indeed, making an appointment was an emotional hurdle in itself. Many fears and apprehensions focused on the <u>treatment</u> such as:

the pre-treatment experience, i.e. waiting. Fear increased over time.

the pain (certain treatments were associated with pain, such as denture fitting, extraction).

the feeling of losing control.
the invasion of the mouth (embarrassing, especially for women who thought of their mouth as private and intimate.

Many focused their anxiety on aspects of the <u>surgery environment</u> such as the:
atmosphere
chair
light
drill (and huge amount of equipment)
smell of gas, disinfectant
needle (injection)

Anxiety also focused on the <u>dentist</u>:
fear of reprimand
manner and age of the dentist
feeling of being on a 'conveyor belt'

They also recognised that this fear can be passed on to children, and, indeed, some mothers talked about "putting on a brave face" for their children's sake.

<u>Cost</u>
Many respondents (especially C2DE's) claimed that the costs involved acted as a barrier towards attendance.

However, many were unaware what these costs actually were. This reflected the fact that they tended to visit less frequently.

this tends to suggest that the cost issue played a much less significant part in deterring these respondents from visiting the dentist.

<u>Changes over time</u>
Respondents recognised there is more emphasis now on children visiting the dentist, especially in schools. They felt this was a positive thing. However, it was generally left to the mothers to encourage their children to look after their teeth and take them to the dentist.

Those respondents who visited more frequently (tended to be ABC1's and mothers) talked about the following changes (which had occurred primarily in local dental surgeries):

a more relaxed atmosphere (music, no smells of gas, no sounds of drill while waiting, more "homely").

less equipment seen by patients (less like an operating theatre).

younger, friendly dentists, with a reassuring manner (seen to be replacing old, abrupt, unfriendly dentists of the past).

being told what was happening (and told that there might be some pain involved).

These were regarded as positive changes and ways of encouraging more people to attend the dentist.

APPENDIX II

Questionnaire and stationery

ADVERTISING RESEARCH UNIT
DEPARTMENT OF MARKETING, UNIVERSITY OF STRATHCLYDE
173 CATHEDRAL STREET, GLASGOW G4 0RQ
Tel: 041 552 4400 Extn 3060/3192

HEALTH STUDY (PHASE 2)

Office Use Only (1-4)

Date ....

Interviewer ....

Name of Respondent ....

Address .... Area Code (1,2 or3) (5)

....

Post Code .... Interviewer Code (6) (7)

Telephone No ....

Sex	(8)
Male	1
Female	2

Age of Respondent

Date of Birth ....

Age Group	(9)
16-24	1
25-34	2
35-44	3
45-54	4
55-65	5
Refused	6

Occupation of Head of Household

....

....

Social Class	(10)
A	1
B	2
C1	3
C2	4
D	5
E	6

Smoking Status (cigarettes, cigars and pipes)	(11)
Tobacco smoker	1
Non-tobacco smoker	2

Working Status of Respondent	(12)
Unemployed	1
Non-working (eg. housewife)	2
Part-time work (8-29 hours per week)	3
Full-time work (30+ hours per week)	4
Retired	5
Full-time education	6

Childhood Status

Can you tell me whether you were brought up in the Glasgow area or not? (13)

Glasgow area	1
Outwith Glasgow	2

16 and 17 Year-olds Interviews

Parental permission obtained (tick box)

health and different aspects of health.

Q1 Here is a list of things that people have said can be important to keeping healthy. Could you tell me how important you think each of them is to keeping healthy, by choosing your answer from this card.
SHOW CARD 1

	(1) Very Important	(2) Quite Important	(3) Not very Important	(4) Not at all Important	DK	
a) Getting enough sleep	1	2	3	4	5	(14)
b) Looking after your feet	1	2	3	4	5	(15)
c) Eating a good diet	1	2	3	4	5	(16)
d) Brushing your teeth regularly	1	2	3	4	5	(17)
e) Not drinking too much alcohol	1	2	3	4	5	(18)
f) Storing fresh foods correctly	1	2	3	4	5	(19)
g) Visiting the dentist regularly	1	2	3	4	5	(20)
h) Keeping your weight at a reasonable level	1	2	3	4	5	(21)
i) Avoiding too much stress	1	2	3	4	5	(22)

Q2 Now, I'm going to read out a list of health services. Can you tell me how often you've visited each over the last twelve months by choosing your answer from this card?
SHOW CARD 2

Q3 Now, can you tell me how important you think they are to people's health by choosing your answer from this card.
SHOW CARD 1 AGAIN

	Q2 Not at all	Q2 Once	Q2 Twice	Q2 Three times or More	Q2 DK		Q3 (1) Very Import-ant	Q3 (2) Quite Import-ant	Q3 (3) Not very Import-ant	Q3 (4) Not at all Import-ant	Q3 DK	
a) Hospitals	1	2	3	4	5	(23)	1	2	3	4	5	(29)
b) GPs	1	2	3	4	5	(24)	1	2	3	4	5	(30)
c) Dentists	1	2	3	4	5	(25)	1	2	3	4	5	(31)
d) Opticians	1	2	3	4	5	(26)	1	2	3	4	5	(32)
e) Chiropodists	1	2	3	4	5	(27)	1	2	3	4	5	(33)
f) Family Planning	1	2	3	4	5	(28)	1	2	3	4	5	(34)

Q4 Now can you tell me if you have ever tried to change your diet for any reason? (35)

Yes	1
No	2
DK	3

IF 'YES' CONTINUE
IF 'NO' OR 'DK' GO TO Q6

Q5 Can you tell me more about this?
PROBE - What did you try to change? AND for what reason did you do this?

.... (36)(37)

....

.... (38)(39)

Q6 Have you ever tried to change your diet for dental health reasons? (40)

Yes	1
No	2
DK	3

IF 'YES' CONTINUE
IF 'NO' OR 'DK' GO TO Q8

Q7 What changes did you make specifically for dental health reasons?
PROBE - 'What did you try to change?' AND 'for what dental health reasons did you do this?'

.... (41)

.... (42)

.... (43)

Now I'm going to ask you some questions about dentists and dental services.

Q8 Do you know of a dentist you can attend if you want or need to? (44)

Yes	1
No	2
DK	3

IF 'YES' GO TO Q10
IF 'NO' OR 'DK' CONTINUE

Q9 If you needed to go to the dentist, how do you think you would find one?
MULTICODE POSSIBLE
WRITE IN (45)

....

....

....

Ask a friend/relative/work colleague/neighbour	1
Ask the doctor	2
Ask Citizen's Advice	3
Ask at the Post Office	4
Ask at the library	5
Look up Yellow Pages	6
Pick up a leaflet	7
Contact the local health board/ authority	8
Keep an eye open for one	9
Other	0
DK	X

Q10 When was the last time you visited a dentist, either for treatment or a check-up? Could you choose your answer from this card.
SHOW CARD 3
SINGLE CODE (46)

(A) Less than 2 years ago	1
(B) Between 2 and 5 years ago	2
(C) Between 5 and 10 years ago	3
(D) Between 10 and 15 years ago	4
(E) More than 15 years ago	5
DK	6

Q11 Thinking about the last time you went to a dentist, did you go to a local dentist, a health centre dentist, a school dentist or to the Glasgow Dental Hospital?
SINGLE CODE (47)

Local dentist (GDS)	1
Health centre dentist (CDS)	2
School dentist (CDS)	6
Glasgow Dental Hospital (HDS)	3
Other (WRITE IN)	4
....	
....	
DK	5

Q12 Still thinking about your last visit to the dentist, can you tell me what made you decide to go?
MULTICODE POSSIBLE
WRITE IN (48)(49)

....

....

....

Encouraged or referred by other health professional	1
Encouraged or persuaded by parent/partner/child/friend	2
Time for check-up	3
Received reminder card for check-up	4
In pain or discomfort	5
Part of course of treatment	6
Broken/loose tooth	7
Filling fell out/loose	8
Other	9
DK	0

Q13 Now can you tell me how often you go for <u>regular check-ups</u> by choosing your answer from this card. By check-ups, I mean a visit to the dentist <u>not because</u> you are in pain or have a specific problem with your mouth, <u>but because</u> you simply wish to see what condition your mouth is in.
<u>SHOW CARD 4</u>
SINGLE CODE (50)

(A) Never been	1
(B) Have not been for many years	2
(C) Go about every 2 years	3
(D) Go about once a year	4
(E) Go about every 6 months	5
DK	6

IF 'NEVER BEEN' GO TO Q15
OTHERWISE CONTINUE

Q14 Now I'm going to read out some things that people have said changed how often they attended the dentist for regular check-ups. Could you tell me by choosing a number from this card, whether any of the following had any effect on how often you went for check-ups?
SHOW CARD 5

	(1) Started going	(2) Started going more often	(3) Made no Difference	(4) Started going less often	(5) Stopped going	DK	NA	
a) When I got married	1	2	3	4	5	6	7	(51)
b) When I left home	1	2	3	4	5	6	7	(52)
c) When my children started going to the dentist	1	2	3	4	5	6	7	(53)
d) When I moved house	1	2	3	4	5	6	7	(54)
ALL MEN GO TO Q15 WOMEN CONTINUE								
e) When I had my first child	1	2	3	4	5	6	7	(55)

Q15 Can you tell me whether you are currently eligible or not for any free check-ups or treatment? (56)

Eligible	1
Not eligible	2
Not sure	3

Q16 Some people say that the charges put them off going for regular check-ups, and others say they don't make any difference.

Could you choose a phrase from this card which best describes your feelings about the subject?
SINGLE CODE
SHOW CARD 6 AND READ OUT (57)

The charges have ...

(A)	"... not made any difference to me because I don't really go for check-ups"	1
(B)	"... not made any difference to me because I get free check-ups."	2
(C)	"... not made any difference to me because I go for check-ups regardless how much it costs."	3
(D)	"... encouraged me to go because it's made me realise just how valuable check-ups are."	4
(E)	"... made me think twice before I go for a check-up."	5
(F)	"... made me decide not to go for a check-up."	6
	DK	7

Q17 Here is a list of things people have said made it difficult for them to see the dentist. Can you tell me if they have ever affected your ability to get dental treatment by choosing your answer from this card.
SHOW CARD 7

	Never Come Across	Affected Me A Little	Affected Me A Lot	Prevented Me Going	DK	
a) Dentist was too far away	1	2	3	4	5	(58)
b) Couldn't get a suitable appointment time	1	2	3	4	5	(59)
c) Lost pay because appointment was during working hours	1	2	3	4	5	(60)
d) Didn't have transport to get there	1	2	3	4	5	(61)
e) Couldn't find somewhere to park the car	1	2	3	4	5	(62)
f) Wasn't able to take the time from work	1	2	3	4	5	(63)
g) When I tried to make an appointment, the receptionist was unhelpful	1	2	3	4	5	(64)
h) Dentist difficult to get to using public transport	1	2	3	4	5	(65)

Q18 Now I'm going to read out a list of things that other people have said about going to the dentist. Please can you tell me how much you agree or disagree with them, by choosing your answer from this card.
SHOW CARD 8

	(1) Strongly Disagree	(2) Moderately Disagree	(3) Slightly Disagree	(4) Slightly Agree	(5) Moderately Agree	(6) Strongly Agree	DK	
a) You tend not to go unless its necessary because you know they're going to find something wrong with you	1	2	3	4	5	6	7	(66)
b) I find it difficult even plucking up the courage just to make a dental appointment	1	2	3	4	5	6	7	(67)
c) Personally, I find it better to go to the dentist only when I have to	1	2	3	4	5	6	7	(68)
d) Going to the dentist doesn't bother me that much	1	2	3	4	5	6	7	(69)
e) I think that the more you allow a dentist to meddle with your teeth, then the more problems you'll end up with	1	2	3	4	5	6	7	(70)
f) The waiting rooms I've come across are generally very relaxing	1	2	3	4	5	6	7	(71)
g) When I see the chair and the drill and all the equipment, it makes me nervous	1	2	3	4	5	6	7	(72)
h) I feel a bit embarrassed opening my mouth and letting the dentist look at my teeth	1	2	3	4	5	6	7	(73)
i) When I get into the chair, I find it quite easy to relax	1	2	3	4	5	6	7	(74)
j) When you haven't been to the dentist for a while, you get a bit worried in case he's going to tell you off	1	2	3	4	5	6	7	(75)
k) If I see my dentist regularly, I feel I am less likely to have problems with my teeth	1	2	3	4	5	6	7	(76)

Q19 Here are some things that people have said about the prices charged when you go to the dentists. Can you tell me how much you agree or disagree with them by choosing your answer from the same card.
SHOW CARD 8

	(1) Strongly Disagree	(2) Moderately Disagree	(3) Slightly Disagree	(4) Slightly Agree	(5) Moderately Agree	(6) Strongly Agree	DK	
a) Going to the dentist should be free when it's part of the National Health Service	1	2	3	4	5	6	7	(77)
b) They don't tell you whether you have to pay until after you've had the treatment	1	2	3	4	5	6	7	(78)
c) Dentists nowadays give you unnecessary treatment so that they can make extra money	1	2	3	4	5	6	7	(79)
d) I'm a bit apprehensive about what happens if I can't pay	1	2	3	4	5	6	7	(80)
e) I would like to know exactly what everything costs so that I can have my bill itemised	1	2	3	4	5	6	7	(10)
f) Paying for your treatment makes you appreciate the value of the treatment you are getting	1	2	3	4	5	6	7	(11)
g) I'm never sure when exactly I have to pay	1	2	3	4	5	6	7	(12)
h) I would like to know how much I may have to pay before I have any treatment	1	2	3	4	5	6	7	(13)

Q20 Now I'm going to show you a list of words that could be used to describe dentists. As you'll see, they are all opposites.

Thinking about your own experiences with dentists, please can you place a tick in the box which best describes what you think of them. In the first one, box number 1 equals unfriendly, and 7 friendly.

	1	2	3	4	5	6	7		
Unfriendly	☐	☐	☐	☐	☐	☐	☐	Friendly	(14)
Modern	☐	☐	☐	☐	☐	☐	☐	Old-fashioned	(15)
Formal	☐	☐	☐	☐	☐	☐	☐	Informal	(16)
Underpaid	☐	☐	☐	☐	☐	☐	☐	Overpaid	(17)
Reliable	☐	☐	☐	☐	☐	☐	☐	Unreliable	(18)
Uncaring	☐	☐	☐	☐	☐	☐	☐	Caring	(19)
Impatient	☐	☐	☐	☐	☐	☐	☐	Patient	(20)

Q21 Do you have any children of your own at home under the age of 16? (21)

Yes	1
No	2
DK	3

IF 'YES,' CONTINUE
IF 'NO' OR 'DK,' GO TO Q25

Q22 Have you ever taken your child or children to see the dentist? (22)

Yes	1
No	2
DK	3

IF 'YES,' CONTINUE
IF 'NO' OR 'DK,' GO TO Q24

Q23 The last time you took your child or children to the dentist, can you tell me what made you decide to go?
MULTICODE POSSIBLE
WRITE IN

....

....

....

	(23)(24)
Encouraged or referred by other health professional	1
Encouraged or persuaded by parent/partner/child/friend	2
Time for check-up	3
Received reminder card for check-up	4
In pain or discomfort	5
Part of course of treatment	6
Broken/loose tooth	7
Filling fell out/loose	8
Other	9
DK	0

Q24 Can you tell me how your child or children feel about going to the dentist, by choosing your answer from this card?
SHOW CARD 9

	(25)
(A) Enjoy going	1
(B) Not bothered about going	2
(C) A bit bothered about going	3
(D) Hate going	4
DK	5

Q25 Finally, before I go onto the next section, can you tell me how you think the dental services might be improved to encourage more people to attend?
PROBE

.... (26)(27)

....

....

.... (28)(29)

....

....

....

Q26 Now I'd like you to think about ways of preventing <u>tooth decay</u>. I'm going to read out a list of things people have said might <u>reduce</u> tooth decay. Can you tell me whether you think they are true or false.

... helps prevent decay?

Q27 Again, thinking about these things I've just read out, some people have said they might reduce <u>gum disease</u>. Can you tell me whether you think they are true or false.

...helps reduce gum disease?

	Q26 True	Q26 False	Q26 DK		Q27 True	Q27 False	Q27 DK	
a) Cutting down how often you take sugary foods and drinks	1	2	3	(30)	1	2	3	(39)
b) Increasing the amount of calcium rich food and drink such as dairy products	1	2	3	(31)	1	2	3	(40)
c) Avoiding caffeine rich products like coffee	1	2	3	(32)	1	2	3	(41)
d) Avoiding foods rich in citric acids such as fruit	1	2	3	(33)	1	2	3	(42)
e) Using a fluoride toothpaste	1	2	3	(34)	1	2	3	(43)
f) Using a non-fluoride toothpaste	1	2	3	(35)	1	2	3	(44)
g) Brushing teeth even if without toothpaste	1	2	3	(36)	1	2	3	(45)
h) Drinking tap water <u>with</u> fluoride in it	1	2	3	(37)	1	2	3	(46)
i) Drinking tap water <u>without</u> fluoride in it	1	2	3	(38)	1	2	3	(47)

Q28 Now I'd like to ask you some questions about looking after teeth and dentures. Some of the questions are about dentures and some are about teeth. To make sure I ask you the correct ones, can you tell me first of all, do you have any of your own teeth? By your own teeth I mean natural teeth.

	(48)
Yes	1
No	2
DK	3

Q29 And, could you tell me whether you have any dentures or dental plates? By 'a denture or dental plate,' I mean false teeth that you can remove.

	(49)
Yes	1
No	2
DK	3

IF RESPONDENT HAS A DENTURE OR DENTAL PLATE, CONTINUE
OTHERWISE GO TO Q32

Q30 Thinking about brushing dentures and dental plates, how often do you think <u>people</u> should brush them, by choosing a letter from this card?
SHOW CARD 10

		(50)
(A)	Never	1
(B)	Less than once a week	2
(C)	Once a week	3
(D)	Three or four times a week	4
(E)	Once a day	5
(F)	Twice a day	6
(G)	Three or more times a day	7
	DK	8

Q31 Thinking about <u>your own</u> denture or dental plate, can you tell me what condition you feel it is in, using this card where 1 equals very good condition and 7 equals very bad condition?
SHOW CARD 11

Very good condition 1 2 3 4 5 6 7 Very bad condition (51)

Q32 IF RESPONDENT HAS NO NATURAL TEETH, GO TO Q42
OTHERWISE CONTINUE

Thinking about brushing teeth - by 'teeth' I mean natural teeth, how often do you think <u>people</u> should brush them, by choosing a letter from this card?
SHOW CARD 10

		(52)
(A)	Never	1
(B)	Less than once a week	2
(C)	Once a week	3
(D)	Three or four times a week	4
(E)	Once a day	5
(F)	Twice a day	6
(G)	Three or more times a day	7
	DK	8

Q33 Thinking about <u>your own</u> teeth, can you tell me what condition you feel they are in, using this card where 1 equals very good condition and 7 equals very bad condition?
SHOW CARD 11

Very good condition 1 2 3 4 5 6 7 Very bad condition (53)

Q34 Now thinking about <u>your</u> gums, can you tell me what condition you feel they are in, using the same card?
SHOW CARD 11

Very good condition 1 2 3 4 5 6 7 Very bad condition (54)

Q35 Now I'm going to read you a list of situations in which people have said they might brush their teeth. By 'teeth,' I mean their natural teeth. Can you tell me how likely you are to brush your teeth in each situation, by choosing a number from this card.
SHOW CARD 12

	(1) Very Likely	(2) Quite Likely	(3) Not very Likely	(4) Not at all Likely	DK	
a) First thing in the morning	1	2	3	4	5	(55)
b) Last thing at night	1	2	3	4	5	(56)
c) After meals	1	2	3	4	5	(57)
d) Before meals	1	2	3	4	5	(58)
e) When getting ready to go out for the evening	1	2	3	4	5	(59)

Q36 Now I'm going to read out a number of reasons people have given for brushing their teeth. Can you tell me by choosing a phrase from the card, how important each is to you personally?
SHOW CARD 1

	(1) Very Important	(2) Quite Important	(3) Not very Important	(4) Not at all Important	DK	
a) To remove plaque	1	2	3	4	5	(60)
b) To have fresh breath	1	2	3	4	5	(61)
c) To put fluoride on my teeth	1	2	3	4	5	(62)
d) To prevent decay	1	2	3	4	5	(63)
e) To have attractive white teeth	1	2	3	4	5	(64)
f) To reduce gum disease	1	2	3	4	5	(65)

Q37 Now can you tell me, if you use a toothbrush, when was the last time you changed it for a new one? Can you tell me by choosing a letter from this card.
SHOW CARD 13

(66)
(A) Within the last month 1
(B) Between 1 and 3 months ago 2
(C) Between 3 and 6 months ago 3
(D) Between 6 and 12 months ago 4
(E) Over 12 months ago 5
(F) Never use a toothbrush 6
DK 7

Q38 Now I'm going to read out a list of products people have said they use on their teeth and gums. Can you tell me by choosing a number from this card, how often <u>you</u> use them?
SHOW CARD 14

	(1) Use Regularly	(2) Use Occasionally	(3) Tried Once or Twice	(4) Used in past but Not Now	(5) Never Used	DK	
a) A fluoride toothpaste	1	2	3	4	5	6	(67)
b) A non-fluoride toothpaste	1	2	3	4	5	6	(68)
c) Smokers toothpaste	1	2	3	4	5	6	(69)
d) Mouth spray	1	2	3	4	5	6	(70)
e) Dental chewing gum	1	2	3	4	5	6	(71)
f) Dental floss	1	2	3	4	5	6	(72)
g) Mouth wash	1	2	3	4	5	6	(73)

Q39 Now I want to ask you some questions about brushing teeth. By 'teeth,' I mean your own natural teeth. By choosing a letter from this card, can you tell me how often you brush your teeth?
SHOW CARD 10

(74)
(A) Never 1
(B) Less than once a week 2
(C) Once a week 3
(D) Three or four times a week 4
(E) Once a day 5
(F) Twice a day 6
(G) Three or more times a day 7
DK 8

IF CODE 1, GO TO Q41
OTHERWISE CONTINUE

Q40 Do you brush your teeth more or less often than you did when you were younger, or hasn't it changed?

(75)
More often 1
Less often 2
Not changed 3
DK 4

Q41 Now I'd like to do something slightly different. I'd like you to imagine for a minute that you have four <u>front teeth</u> that show different signs of wear and tear. One is perfectly healthy, one <u>is</u> decayed but not giving you any pain, one is decayed and giving you a lot of pain and one has a filling and is not giving you any pain.
SHOW CARD 15. ROTATE START, TICK START

Thinking about the front tooth that ..., can you tell me how bothered you would be about losing it, by choosing a number from this card, where 1 equals not at all bothered and 7 equals very bothered?

a) ... is decayed and giving you a lot of pain

Not at all bothered	1	2	3	4	5	6	7	Very Bothered	(76)

b) ... is perfectly healthy

Not at all bothered	1	2	3	4	5	6	7	Very Bothered	(77)

c) ... is decayed but <u>not</u> giving you any pain

Not at all bothered	1	2	3	4	5	6	7	Very Bothered	(78)

d) ... has a filling and is not giving you any pain

Not at all bothered	1	2	3	4	5	6	7	Very Bothered	(79)

Q42 IF RESPONDENT HAS A DENTURE OR DENTAL PLATE, CONTINUE
OTHERWISE GO TO Q47

Now thinking about your denture or dental plate, using this card, can you tell me how often you soak them overnight?
SHOW CARD 16

		(80)
(A)	Never	1
(B)	Sometimes	2
(C)	Always	3
	DK	4

IF 'SOMETIMES' OR 'ALWAYS,' CONTINUE
IF 'NEVER' OR 'DK,' GO TO Q44

Q43 Do you ever <u>soak</u> them in any of these?
SHOW CARD 17
ASK: 'Do you soak them in anything else?'
MULTICODE POSSIBLE
WRITE IN

....

....

		(10)(11)
(A)	Cold water	1
(B)	Hot water	2
(C)	Diluted bleach	3
(D)	Dental cleaner dissolved in water	4
	Other	5

Q44 Do you ever brush your denture or dental plate?

	(12)
Yes	1
No	2
DK	3

IF 'YES' CONTINUE
IF 'NO' OR 'DK,' GO TO Q47

Q45 Can you tell me if you ever brush them with any of these?
SHOW CARD 18
ASK: 'Do you ever brush them with anything else?'
MULTICODE POSSIBLE
WRITE IN

....

....

....

		(13)(14)
(A)	Water	1
(B)	Soap and water	2
(C)	Toothpaste	3
(D)	Scouring powder	4
(E)	Diluted bleach	5
(F)	Dental cleaner dissolved in water	6
	Other	7

Q46 And, can you tell me how often you brush them by choosing a letter from this card?
SHOW CARD 19

		(15)
(A)	Less than once a week	1
(B)	Once a week	2
(C)	Three or four times a week	3
(D)	Once a day	4
(E)	Twice a day	5
(F)	Three or more times a day	6
	DK	7

ASK ALL

Q47 This time I'm going to read out a list of things people have used to help relieve pain and clean their teeth, by 'teeth,' I mean natural teeth. Can you tell me if you have heard of them before?

Q48 Now, could you tell me by choosing a number from this card, whether or not you have used any of them?
SHOW CARD 14
ONLY ASK FOR THOSE 'HEARD OF BEFORE'

	Q47 Heard of	Q47 Never Heard of		Q48 (1) Use Regular -ly	(2) Use Occas- ionally	(3) Tried Once or Twice	(4) Used in past but not now	(5) Never Used	DK	
a) Using salt to clean teeth	1	2	(16)	1	2	3	4	5	6	(26)
b) Using soot to clean teeth	1	2	(17)	1	2	3	4	5	6	(27)
c) Using baking soda to clean teeth	1	2	(18)	1	2	3	4	5	6	(28)
d) Using diluted bleach to clean teeth	1	2	(19)	1	2	3	4	5	6	(29)
e) Using milk to clean teeth	1	2	(20)	1	2	3	4	5	6	(30)
f) Using cloves to relieve toothache	1	2	(21)	1	2	3	4	5	6	(31)
g) Using tobacco to relieve toothache	1	2	(22)	1	2	3	4	5	6	(32)
h) Using baking soda to treat mouth ulcers	1	2	(23)	1	2	3	4	5	6	(33)
i) Using alcohol such as whisky to relieve pain.	1	2	(24)	1	2	3	4	5	6	(34)
j) Putting an asprin on the gum or tooth to relieve pain	1	2	(25)	1	2	3	4	5	6	(35)

Q49 Now I'd like you to stop for a minute. I want you to imagine the kind of person you imagine wears dentures.
PAUSE TO LET RESPONDENT THINK

Thinking of the kind of person who wears dentures, please can you place a tick in the box which best describes who you imagine them to be.

	1	2	3	4	5	6	7		
Old	☐	☐	☐	☐	☐	☐	☐	Young	(36)
Poor	☐	☐	☐	☐	☐	☐	☐	Well-off	(37)
Clean	☐	☐	☐	☐	☐	☐	☐	Dirty	(38)
Not bothered about appearance	☐	☐	☐	☐	☐	☐	☐	Bothered about appearance	(39)
Fit	☐	☐	☐	☐	☐	☐	☐	Unfit	(40)

Q50 Now I'd like you to do the same thing again, but this time I want you to imagine the kind of person who has all their <u>own teeth</u>.

	1	2	3	4	5	6	7		
Old	☐	☐	☐	☐	☐	☐	☐	Young	(41)
Poor	☐	☐	☐	☐	☐	☐	☐	Well-off	(42)
Clean	☐	☐	☐	☐	☐	☐	☐	Dirty	(43)
Not bothered about appearance	☐	☐	☐	☐	☐	☐	☐	Bothered about appearance	(44)
Fit	☐	☐	☐	☐	☐	☐	☐	Unfit	(45)

Q51 Now I'm going to read out some things people have said about <u>health</u>. Can you tell me how much you agree or disagree with them by choosing your answer from this card.
SHOW CARD 8

	(1) Strongly Disagree	(2) Moder-ately Disagree	(3) Slightly Disagree	(4) Slightly Agree	(5) Moder-ately Agree	(6) Strongly Agree	DK	
a) If I become ill, I have the power to make myself well again	1	2	3	4	5	6	7	(46)
b) Often I feel that no matter what I do, if I am going to be ill, I will be ill	1	2	3	4	5	6	7	(47)
c) If I see my doctor regularly, I am less likely to have problems with my health	1	2	3	4	5	6	7	(48)
d) My health is greatly influenced by things that happen accidently	1	2	3	4	5	6	7	(49)
e) I can only maintain my health by consulting my doctor	1	2	3	4	5	6	7	(50)
f) I am directly responsible for my health	1	2	3	4	5	6	7	(51)
g) Other people play a big part in whether I stay healthy or become ill	1	2	3	4	5	6	7	(52)
h) Whatever goes wrong with my health is my own fault	1	2	3	4	5	6	7	(53)
i) When I am ill, I just have to let nature run its course	1	2	3	4	5	6	7	(54)
j) Doctors keep me healthy	1	2	3	4	5	6	7	(55)
k) When I stay healthy, I am really lucky	1	2	3	4	5	6	7	(56)
l) My physical well-being depends on how well I take care of myself	1	2	3	4	5	6	7	(57)
m) When I feel ill, I know it is because I have not been taking care of myself properly	1	2	3	4	5	6	7	(58)

Q51 cont

		(1) Strongly Disagree	(2) Moderately Disagree	(3) Slightly Disagree	(4) Slightly Agree	(5) Moderately Agree	(6) Strongly Agree	DK	
n)	The type of care I receive from other people is what makes me recover from an illness	1	2	3	4	5	6	7	(59)
o)	Even when I take care of myself, it is easy to become ill	1	2	3	4	5	6	7	(60)
p)	When I become ill, it is a matter of luck	1	2	3	4	5	6	7	(61)
q)	I can usually stay healthy by taking good care of myself	1	2	3	4	5	6	7	(62)
r)	Following the doctor's orders to the letter is the best way for me to stay healthy	1	2	3	4	5	6	7	(63)

IF RESPONDENT HAS NATURAL TEETH ONLY, CONTINUE
OTHERWISE END INTERVIEW AND ARRANGE TIME FOR INSPECTION

Q52 I'm going to read out some things people have said about dentures. Can you tell me how much you agree or disagree with each of them by choosing your answer from this card.
SHOW CARD 3

		(1) Strongly Disagree	(2) Moderately Disagree	(3) Slightly Disagree	(4) Slightly Agree	(5) Moderately Agree	(6) Strongly Agree	DK	
a)	When I get older, I expect I'll eventually have to wear dentures	1	2	3	4	5	6	7	(64)
b)	You tend to think people who wear dentures have let themselves go a bit	1	2	3	4	5	6	7	(65)
c)	I'll do almost anything to hold on to my own teeth	1	2	3	4	5	6	7	(66)
d)	When you think of dentures you tend to think of the elderly	1	2	3	4	5	6	7	(67)
e)	People who try to hang on to their teeth for as long as they can are really just being vain	1	2	3	4	5	6	7	(68)
f)	You tend to think that people who wear dentures haven't been brought up properly	1	2	3	4	5	6	7	(69)
g)	The thought that I might have to wear dentures doesn't really bother me too much	1	2	3	4	5	6	7	(70)
h)	When you've got bad teeth and you have a lot of bother with them, then you're better just to have them out than try to hold on to them	1	2	3	4	5	6	7	(71)

Follow up dental inspection: (72)

Agreed	1
Refused	2

If 'agreed' (make an appointment):

Day and Date ....

Time ....

Address ....

....

....

Telephone No ....

If 'refused', ask: Is there any reason why you object to this?

PROBE .... (73)(74)

....

....

....

....

CARD 1

(1)	(2)	(3)	(4)
VERY IMPORTANT	QUITE IMPORTANT	NOT VERY IMPORTANT	NOT AT ALL IMPORTANT

CARD 2

(A) NOT AT ALL

(B) ONCE

(C) TWICE

(D) THREE TIMES OR MORE

CARD 3

(A) LESS THAN 2 YEARS AGO

(B) BETWEEN 2 AND 5 YEARS AGO

(C) BETWEEN 5 AND 10 YEARS AGO

(D) BETWEEN 10 AND 15 YEARS AGO

(E) MORE THAN 15 YEARS AGO

CARD 4

(A) NEVER BEEN

(B) HAVE NOT BEEN FOR MANY YEARS

(C) GO ABOUT EVERY 2 YEARS

(D) GO ABOUT ONCE A YEAR

(E) GO ABOUT EVERY 6 MONTHS

CARD 6

(A) "The charges have not made any difference to me because I don't really go for check-ups."

(B) "The charges have not made any difference to me because I get free check-ups."

(C) "The charges have not made any difference to me because I go for a check-ups regardless of how much it costs."

(D) "The charges have encouraged me to go because it's made me realise just how valuable check-ups are."

(E) "The charges have made me think twice before I go for a check-up."

(F) "The charges have made me decide not to go for a check-up."

CARD 5

(1) STARTED GOING

(2) STARTED GOING MORE OFTEN

(3) MADE NO DIFFERENCE

(4) STARTED GOING LESS OFTEN

(5) STOPPED GOING

(A) NEVER COME ACROSS THIS PROBLEM

(B) HAVE COME ACROSS THIS PROBLEM AND IT AFFECTED ME A LITTLE

(C) HAVE COME ACROSS THIS PROBLEM AND IT AFFECTED ME A LOT

(D) HAVE COME ACROSS THIS PROBLEM AND IT PREVENTED ME GOING

CARD 9

(A) ENJOY GOING

(B) NOT BOTHERED ABOUT GOING

(C) A BIT BOTHERED ABOUT GOING

(D) HATE GOING

CARD 10

(A) NEVER

(B) LESS THAN ONCE A WEEK

(C) ONCE A WEEK

(D) 3 OR 4 TIMES A WEEK

(E) ONCE A DAY

(F) TWICE A DAY

(G) 3 OR MORE TIMES A DAY

VERY GOOD CONDITION	1	2	3	4	5	6	7	VERY BAD CONDITION

CARD 12

(1)	(2)	(3)	(4)
VERY LIKELY	QUITE LIKELY	NOT VERY LIKELY	NOT AT ALL LIKELY

CARD 13

(A) WITHIN THE LAST MONTH

(B) BETWEEN 1 AND 3 MONTHS AGO

(C) BETWEEN 3 AND 6 MONTHS AGO

(D) BETWEEN 6 AND 12 MONTHS AGO

(E) OVER 12 MONTHS AGO

(F) NEVER USE A TOOTHBRUSH

(1) USE REGULARLY

(2) USE OCCASIONALLY

(3) TRIED ONCE OR TWICE

(4) USED IN THE PAST BUT NOT NOW

(5) NEVER USED

CARD 15

NOT AT ALL BOTHERED	1	2	3	4	5	6	7	VERY BOTHERED

CARD 19

(A) LESS THAN ONCE A WEEK

(B) ONCE A WEEK

(C) 3 OR 4 TIMES A WEEK

(D) ONCE A DAY

(E) TWICE A DAY

(F) 3 OR MORE TIMES A DAY

(1)	(2)	(3)	(4)	(5)	(6)
STRONGLY DISAGREE	MODERATELY DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	MODERATELY AGREE	STRONGLY AGREE

CARD 16

(A) NEVER

(B) SOMETIMES

(C) ALWAYS

CARD 17

(A) COLD WATER

(B) HOT WATER

(C) DILUTED BLEACH

(D) DENTAL CLEANER DISSOLVED IN WATER

(A) WATER

(B) SOAP AND WATER

(C) TOOTHPASTE

(D) SCOURING POWDER

(E) DILUTED BLEACH

(F) DENTAL CLEANER DISSOLVED IN WATER

UNIVERSITY · OF STRATHCLYDE

Advertising Research Unit
Director: Dr G B Hastings

Department of Marketing
Stenhouse Building, 173 Cathedral Street,
Glasgow G4 0RQ
Tel: 041-552 4400 Ext
Secretary Ext:

Dear Respondent,

We would like to thank you for your co-operation in the completion of this survey.

The information gained from this survey will be used to plan future provision of dental services in Glasgow.

Yours faithfully,

GBHastings

Dr. G. B. Hastings,
Director.

This Unit specialises in research on health education, social marketing and social advertising.

Principal sponsor: The Scottish Health Education Group

You are invited to take part in a questionnaire survey

I will call back:

On *(day and date)*...

At *(time)*...

It will take about 30 minutes of your time.
If you cannot make this time, please ring this number

....

Thank you..................................

Thank you for agreeing to undergo a dental check

I will call back with the dentist:

On *(day and date)*...

At *(time)*...

It will only take up to 10 - 15 minutes of your time.
If you cannot make this time, please ring this number

....

Thank you..................................

APPENDIX III

IIIa : Dental inspection data card

IIIb : CPITN and dentures assessment card

DATA COLLECTION CHART

FORENAME.......................... INITIALS .... SURNAME .... DATE OF BIRTH ___ ___ ___ day mon. year

ADDRESS.. DATE OF EXAM ___ ___ ___ day mon. year

IDENTITY NUMBER	1	2	3	4	5 (1)

EXAMINER 6

EXAM TYPE 1 = routine, 2 = replicate 3 = training, 9 = absentee 7

SEX 1 = male, 2 = female 8

AGE (years and months) 9 10 11 12

AGE GROUP 13

RESIDENTIAL DISTRICT 14 15

ETHNIC CLASSIFICATION 16

DENTIST ATTENDED DURING LAST YEAR? 1 = yes, 2 = no, 3 = don't know 17

TYPE OF TREATMENT RECEIVED 1 = routine 2 = emergency 3 = non-attender 18

SOURCE OF TREATMENT 1 = GDS, 2 = CDS, 3 = HDS, 4 = other, 5 = none/don't know 19

PLACE OF TREATMENT 20 21
(enter place of treatment)

SCHOOL NUMBER 22

SCHOOL DISTRICT 23

SCHOOL CLASS 24 25

SOCIAL CLASS 26

INTENDING TO CONTINUE EDUCATION 1 = yes 2 = no 3 = don't know 27

PERIOD OF RESIDENCE (years) 1 – 9 (including 9+) 28

OPTIONAL EXTRA DATA 29 30 31 32 33 34 35 36

PERIODONTAL EXAMINATION

	6	2	1	1	2	6	6	2	1	1	2	6	
SOFT DEPOSITS AND SUPRAGINGIVAL CALCULUS	37	38	39	40	41	42	43	44	45	46	47	48	0 = tooth missing 1 = absent 2 = soft deposits 3 = supragingival calculus
GINGIVITIS	49	50	51	52	53	54	55	56	57	58	59	60	
SUBGINGIVAL CALCULUS	61	62	63	64	65	66	67	68	69	70	71	72	0 = tooth missing 1 = absent 2 = present

1	2	3	4	5
				2

Identity no. Card

ORTHODONTIC EXAMINATION

6	Cleft palate	1 absent 2 present
7	Mesioclusion	
8	Distoclusion	
9	Deep overbite	
10	Anterior open bite	
11	Anterior cross-bite	1 absent 2 present
12	Posterior cross-bite	
13	Severe anterior crowding	
14	Severe posterior crowding	
15	Spacing	
16	Other	1 absent 2 present
17	Treatment (if any)	1 none 2 extraction only 3 removeable appl. ≤ 1 yr. 4 removeable appl. > 1 yr. 5 fixed appliance
18	Orthodontic appliance worn	1 no 2 removeable appl 3 fixed appliance

CARD 2 CONTINUED OVERLEAF

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50

1 unerupted
2 sound
3 decayed
4 restored, recurrent caries
5 extracted, carious
*6 restored, no caries
7 fractured (with or without repair)
8 missing
9 banded

*restored = filled or crowned for caries

51 Denture worn (1–9)

52 Denture required (1–9)

53 Supernumerary tooth requiring treatment 1 = no 2 = yes

Name

54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72

1	2	3	4	5
				3

Identity No. Card

PERMANENT TOOTH TREATMENT

	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
tens	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
units	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37

	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
tens	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
units	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69

00 no treatment
01 – 13 fillings
31 – 32 crowns (anterior teeth)
41 extraction
51 – 53 root filling and restoration (anterior teeth)

1	2	3	4	5
				4

Identity no. Card

DECIDUOUS TOOTH DESCRIPTOR

E	D	C	B	A	A	B	C	D	E
6	7	8	9	10	11	12	13	14	15

E	D	C	B	A	A	B	C	D	E
16	17	18	19	20	21	22	23	24	25

DECIDUOUS TOOTH TREATMENT

	E	D	C	B	A	A	B	C	D	E
tens	26	27	28	29	30	31	32	33	34	35
units	36	37	38	39	40	41	42	43	44	45

	E	D	C	B	A	A	B	C	D	E
tens	46	47	48	49	50	51	52	53	54	55
units	56	57	58	59	60	61	62	63	64	65

00 no treatment
21 – 23 fillings
41 extraction
61 – 63 root treatment and restoration

ID NO

CPITN (Score 0 - 5)

17-14	13-23	24-27
47-44	43-33	34-37

DENTURES

(a) Resorption — Upper ☐ Lower ☐ [Code 0,1,2,3,8]

(b) Posterior extension — Upper ☐ Lower ☐ [Code 0,1,8]

(c) Peripheral extension — Upper ☐ Lower ☐ [Code 0,1,8]

(d) Stability — Upper ☐ Lower ☐ [Code 0,1,8,]

(e) Occlusal loading — Upper ☐ Lower ☐ [Code 0,1,8]

(f) Retention — Upper ☐ Lower ☐ [Code 0,1,8]

(g) Denture stomatitis — Upper ☐ Lower ☐ [Code 0,1,8]

(h) Any other significant pathology — Upper ☐ Lower ☐ [Code 0,1,8]

Describe ....

(i) Subjects opinion of dentures ☐ [Code 0,1,2,8]

APPENDIX IV

NHS treatment fees

TABULATION File of treatment costs and table titles

DOCUMENT SPEEDTITLE

SINGLE SURFACE AF	5.40	SUNNINGDALE RELATES SCALE (1991 PRICES)
MULTIPLE SINGLE AF'S	8.00	
OTHER TYPE AF'S	8.50	
2 OR MORE OTHER TYPE AF'S	10.60	
MO OR DO AF	10.60	
MOD OR MO + DO AF	14.00	
SINGLE AF(S) + MO OR DO	11.60	
SINGLE AF(S)+1 OTHER TYPE	10.00	
SINGLE AF(S)+2 OTHER TYPES	13.00	
MO OR DO + OTHER TYPE(S)	13.00	
SINGLE SYNTH,RESIN OR COMP	10.20	
2 OR MORE SF'S	16.00	
MAXIMUM RESTORATION	22.25	
ILLEGAL CODE - 14	8.00	ORDINARY SCALING (UNDER 16)
ILLEGAL CODE - 15	16.00	EXCEPTIONAL SCALING (UNDER 16)
ILLEGAL CODE - 16	16.00	ORDINARY SCALING (OVER 16)
ILLEGAL CODE - 17	5.00	EXAMINATION FEE
ILLEGAL CODE - 18	0.0	EXTRA GUM TREATMENT
ILLEGAL CODE - 19	0.0	
ILLEGAL CODE - 20	0.0	
SINGLE SURFACE AF OR SF	5.40	
2 OR MORE AF'S OR SF'S	9.00	
MOLAR METAL CROWN	11.30	
ILLEGAL CODE - 24	65.00	DENTURES - FULL UPPER OR LOWER
ILLEGAL CODE - 25	103.00	DENTURES FULL UPPER AND LOWER
ILLEGAL CODE - 26	43.00	PARTIAL DENTURE 1-3 TEETH
ILLEGAL CODE - 27	57.00	PARTIAL DENTURE 4-8 TEETH
ILLEGAL CODE - 28	68.00	PARTIAL DENTURE 9+ TEETH
ILLEGAL CODE - 29	-	ORTHO. APPLIANCE LT.1 YEAR
ILLEGAL CODE - 30	-	ORTHO. APPLIANCE GT.1 YEAR
JACKET CROWN	54.00	
POST CROWN (NON COR E)	65.60	
ILLEGAL CODE - 33	0.0	RADIOGRAPHS BASIC FEE
ILLEGAL CODE - 34	0.0	RADIOGRAPHS MULTIPLE FACTOR
ILLEGAL CODE - 35	0.0	PREVENTION RATE PER MINUTE
ILLEGAL CODE - 36	0.0	PREVENTIVE FEE
ILLEGAL CODE - 37	0.0	
ILLEGAL CODE - 38	0.0	
ILLEGAL CODE - 39	0.0	
ILLEGAL CODE - 40	0.0	
REQUIRES EXTRACTION	5.00	EXTRACTION 1 TOOTH
ILLEGAL CODE - 42	9.00	EXTRACTION 2 TEETH
ILLEGAL CODE - 43	14.00	EXTRACTION 3-5 TEETH
ILLEGAL CODE - 44	18.00	EXTRACTION 6-8 TEETH
ILLEGAL CODE - 45	22.00	EXTRACTION 9-11 TEETH
ILLEGAL CODE - 46	25.00	EXTRACTION 12-14 TEETH
ILLEGAL CODE - 47	30.00	EXTRACTION 15-17 TEETH
ILLEGAL CODE - 48	34.00	EXTRACTION 18-20 TEETH
ILLEGAL CODE - 49	38.00	EXTRACTION 21+ TEETH
ILLEGAL CODE - 50	0.0	
ROOT FILLING + SS SF	35.40	
ROOT FILLING 2+ SS SF	38.00	
ROOT FILLING + POST CROWN	75.60	
ILLEGAL CODE - 54	0.0	
ILLEGAL CODE - 55	16.00	GENERAL ANAESTHESIA 2-3 TEETH

APPENDIX V

Backchecking questionnaire

ADVERTISING RESEARCH UNIT
DEPARTMENT OF MARKETING, UNIVERSITY OF STRATHCLYDE
173 CATHEDRAL STREET, GLASGOW G4 0RQ
Tel: 041 552 4400 Extn 3060/3192

HEALTH STUDY (PHASE 2) 1990
BACKCHECK

Date ....

Backchecking Interviewer ....

Name of Respondent ....

Address ....

....

Post Code ....

Telephone No ....

Office Use Only (1-4)			

Backchecker Code (6) (7)

Sex	(8)
Male	1
Female	2

Age of Respondent

Date of Birth ....

Age Group	(9)
16-24	1
25-34	2
35-44	3
45-54	4
55-65	5
Refused	6

Occupation of Head of Household

....

....

Social Class	(10)
A	1
B	2
C1	3
C2	4
D	5
E	6

Smoking Status (cigarettes, cigars and pipes)	(11)
Tobacco smoker	1
Non-tobacco smoker	2

Working Status of Respondent	(12)
Unemployed	1
Non-working (eg. housewife)	2
Part-time work (8-29 hours per week)	3
Full-time work (30+ hours per week)	4
Retired	5
Full-time education	6

Childhood Status

Can you tell me whether you were brought up in the Glasgow area or not? (13)

Glasgow area	1
Outwith Glasgow	2

16 and 17 Year-olds Interviews

Parental permission obtained (tick box) ☐

PROBE FOR BEST ESTIMATE OF DATE

....

Q2 Where were you interviewed?
PROBE FOR OWN HOME OR ELSEWHERE

....

Q3 How long did it last?
PROBE FOR NUMBER OF MINUTES

....

Q4 What was the interview about?

....

....

Q5 Can you tell me whether or not you were shown blue cards like these?

Yes	1
No	2
DK	3

Q6 I'm going to read out a list of health services. Can you tell me how often you've visited each over the last twelve months by choosing your answer from this card?
SHOW CARD 2

		Not at all	Once	Twice	Three times or more	DK	
a)	Hospitals	1	2	3	4	5	(23)
b)	GPs	1	2	3	4	5	(24)
c)	Dentists	1	2	3	4	5	(25)
d)	Opticians	1	2	3	4	5	(26)
e)	Chiropodists	1	2	3	4	5	(27)
f)	Family Planning	1	2	3	4	5	(28)

Q7 Do you know of a dentist you can attend if you want or need to? (44)

Yes	1
No	2
DK	3

Q8 When was the last time you visited a dentist, either for treatment or a check-up? Could you choose your answer from this card.
SHOW CARD 3
SINGLE CODE

		(46)
(A)	Less than 2 years ago	1
(B)	Between 2 and 5 years ago	2
(C)	Between 5 and 10 years ago	3
(D)	Between 10 and 15 years ago	4
(E)	More than 15 years ago	5
	DK	6

Q9 Now can you tell me how often you go for regular check-ups by choosing your answer from this card. By check-ups, I mean a visit to the dentist not because you are in pain or have a specific problem with your mouth, but because you simply wish to see what condition your mouth is in.
SHOW CARD 4
SINGLE CODE

		(50)
(A)	Never been	1
(B)	Have not been for many years	2
(C)	Go about every 2 years	3
(D)	Go about once a year	4
(E)	Go about every 6 months	5
	DK	6

Q10 Here is a list of things people have said made it difficult for them to see the dentist. Can you tell me if they have ever affected your ability to get dental treatment by choosing your answer from this card.
SHOW CARD 7

	Never Come Across	Affected Me A Little	Affected Me A Lot	Prevented Me Going	DK	
a) Dentist was too far away	1	2	3	4	5	(58)
b) Couldn't get a suitable appointment time	1	2	3	4	5	(59)
c) Lost pay because appointment was during working hours	1	2	3	4	5	(60)
d) Didn't have transport to get there	1	2	3	4	5	(61)
e) Couldn't find somewhere to park the car	1	2	3	4	5	(62)
f) Wasn't able to take the time from work	1	2	3	4	5	(63)
g) When I tried to make an appointment, the receptionist was unhelpful	1	2	3	4	5	(64)
h) Dentist difficult to get to using public transport	1	2	3	4	5	(65)

Q11 Do you have any children of your own at home under the age of 16?

	(21)
Yes	1
No	2
DK	3

Q12 Now I'd like to ask you some questions about looking after teeth and dentures. Some of the questions are about dentures and some are about teeth. To make sure I ask you the correct ones, can you tell me first of all, do you have any of your own teeth? By your own teeth I mean natural teeth.

	(48)
Yes	1
No	2
DK	3

Q13 And, could you tell me whether you have any dentures or dental plates? By 'a denture or dental plate,' I mean false teeth that you can remove.

	(49)
Yes	1
No	2
DK	3

IF RESPONDENT HAS A DENTURE OR DENTAL PLATE, CONTINUE
OTHERWISE GO TO Q15

Q14 Thinking about brushing dentures and dental plates, how often do you think people should brush them, by choosing a letter from this card?
SHOW CARD 10

		(50)
(A)	Never	1
(B)	Less than once a week	2
(C)	Once a week	3
(D)	Three or four times a week	4
(E)	Once a day	5
(F)	Twice a day	6
(G)	Three or more times a day	7
	DK	8

Q15 IF RESPONDENT HAS NO NATURAL TEETH, GO TO Q17
OTHERWISE CONTINUE

Thinking about brushing teeth - by 'teeth' I mean natural teeth, how often do you think people should brush them, by choosing a letter from this card?
SHOW CARD 10

		(52)
(A)	Never	1
(B)	Less than once a week	2
(C)	Once a week	3
(D)	Three or four times a week	4
(E)	Once a day	5
(F)	Twice a day	6
(G)	Three or more times a day	7
	DK	8

Q16 Now I'm going to read you a list of situations in which people have said they might brush their teeth. By 'teeth,' I mean their natural teeth. Can you tell me how likely you are to brush your teeth in each situation, by choosing a number from this card.
SHOW CARD 12

		(1) Very Likely	(2) Quite Likely	(3) Not very Likely	(4) Not at all Likely	DK	
a)	First thing in the morning	1	2	3	4	5	(55)
b)	Last thing at night	1	2	3	4	5	(56)
c)	After meals	1	2	3	4	5	(57)
d)	Before meals	1	2	3	4	5	(58)
e)	When getting ready to go out for the evening	1	2	3	4	5	(59)

Q17 IF RESPONDENT HAS A DENTURE OR DENTAL PLATE, CONTINUE
OTHERWISE GO TO Q20

Now thinking about your denture or dental plate, using this card, can you tell me how often you soak them overnight?
SHOW CARD 16

		(80)
(A)	Never	1
(B)	Sometimes	2
(C)	Always	3
	DK	4

Q18 Do you ever brush your denture or dental plate?

	(12)
Yes	1
No	2
DK	3

IF 'YES' CONTINUE
IF 'NO' OR 'DK,' GO TO Q20

Q19 Can you tell me if you ever brush them with any of these?
SHOW CARD 18
ASK: 'Do you ever brush them with anything else?'

MULTICODE POSSIBLE
WRITE IN

....
....
....

		(13)(14)
(A)	Water	1
(B)	Soap and water	2
(C)	Toothpaste	3
(D)	Scouring powder	4
(E)	Diluted bleach	5
(F)	Dental cleaner dissolved in water	6
	Other	7

ASK ALL

Q20 This time I'm going to read out a list of things people have used to help relieve pain and clean their teeth, by 'teeth,' I mean natural teeth. Could you tell me by choosing a number from this card, whether or not you have used any of them?
SHOW CARD 14

		(1) Use Regular-ly	(2) Use Occas-ionally	(3) Tried Once or Twice	(4) Used in past but not now	(5) Never Used	DK	
a)	Using salt to clean teeth	1	2	3	4	5	6	(26)
b)	Using soot to clean teeth	1	2	3	4	5	6	(27)
c)	Using baking soda to clean teeth	1	2	3	4	5	6	(28)
d)	Using diluted bleach to clean teeth	1	2	3	4	5	6	(29)
e)	Using milk to clean teeth	1	2	3	4	5	6	(30)
f)	Using cloves to relieve toothache	1	2	3	4	5	6	(31)
g)	Using tobacco to relieve toothache	1	2	3	4	5	6	(32)
h)	Using baking soda to treat mouth ulcers	1	2	3	4	5	6	(33)
i)	Using alcohol such as whisky to relieve pain	1	2	3	4	5	6	(34)
j)	Putting an asprin on the gum or tooth to relieve pain	1	2	3	4	5	6	(35)

Q21 Were you asked if you wished to have a dental inspection or check-up?

Yes	1
No	2
DK	3

END OF BACKCHECK

APPENDIX VI

Phase 4 data collection card

SERVICES AVAILABILITY DATA COLLECTION CARD

Area: Area code: Practice no:

	Mon	Tue	Wed	Thu	Fri	Sat
WH :	---------:	---------:	---------:	---------:	---------:	---------:
D1 :	---------:	---------:	---------:	---------:	---------:	---------:
D2 :	---------:	---------:	---------:	---------:	---------:	---------:
D3 :	---------:	---------:	---------:	---------:	---------:	---------:
D4 :	---------:	---------:	---------:	---------:	---------:	---------:
D5 :	---------:	---------:	---------:	---------:	---------:	---------:
D6 :	---------:	---------:	---------:	---------:	---------:	---------:
D7 :	---------:	---------:	---------:	---------:	---------:	---------:
D8 :	---------:	---------:	---------:	---------:	---------:	---------:

Number of dentists:
Full-time:
Part-time:

Practice's working hours/week:

Manhour availability/week:

Leaflets:

Average no of Appts/dentist/day:
Average no of Broken Appts/dentist/day:

Average no of Appts/day for the whole of the practice:
Average no of Broken Appts/day for the whole of practice:

Average no of Emergencies/dentist/day:
Average no of Emergencies/day for the whole of practice:

If smb calls for a NON-emergency appt within how many days will he/she be seen:

Do you send recall letters for routine check-ups? YES NO
Every 6 months (ad) :
Every 4 months (ch) :
Every year :
What is the response?