

d. implant surface conditions and the use of radiofrequency glow discharge for implant sterilisation (Singh and Schaaf, 1989) and

e. implant design: the use of angulated abutments (Lewis et al., 1989; Kallus et al., 1990) and studies on the frameworks for osseointegrated prostheses (Davis et al., 1988a,b) involving the effect of varying the number of supporting abutments and tooth material.

1.3.6.13.3 Clinical usage

Brånemark implants were originally utilised exclusively in edentulous patients in both the maxilla and the mandible in conjunction with facultatively removable bridges. Modified reconstruction procedures were applied in those edentulous jaws where the remaining bone was insufficient to allow for fixture anchorage. A preformed graft was created in the proximal tibial metaphysis and fixtures are allowed to become integrated in the graft-to-be during the primary remodelling period. An alternative one stage reconstruction program using autologous bone and marrow grafts immediately transferred and anchored to the recipient site via titanium fixtures, later to be used also as bridge support has also been tried (Adell et al., 1981).

Modifications to the original restorative technique for the edentulous patient has evolved in response to the restorative requirements of an increasingly diversified patient

population. These management alternatives include treatment considerations based on cost, denture stability, denture retention or patient compromise, involving age, health, fixture number and/or location (Stålbald, 1985; Parel, 1986; Engquist et al., 1988).

Overdenture therapy for edentulous patients has been utilised involving maxillary and/or mandibular implants. Parallel abutments, bar structures as well as ball attachments, Ceka attachments (Alphadent, Antwerp, Belgium) and magnets have been utilised for denture support and retention (Gillings, 1984; Parel, 1986; Engquist et al., 1988; Haraldson et al., 1988; Naert et al., 1988; Paterson et al., 1990).

It is to be noted that for edentulous mandibles conventional implant supported facultatively removable fixed bridges have been combined with Kennedy Class I removable partial dentures, the connection for example involving extracoronal Dalbo or Ceka attachments.

Additionally, the original Brånemark concept described by Adell et al. (1981) has been extrapolated to the partially dentate patient for the replacement of multiple or single teeth in the maxilla and/or the mandible. In the former circumstance the prosthesis may be connected rigidly or by attachments to natural abutment teeth (Jemt, 1986; Sullivan, 1986; Binon, 1987; Ericsson et al., 1988; Watson et

al., 1988; Henry, 1989; Jemt et al., 1989).

With regard to single tooth replacement, 2 systems have developed to meet the specific requirements of this treatment circumstance for the conventional Brånemark fixture, the 'UCLA' abutment (Lewis et al., 1988a,b) and the 'CeraOne' (Öhrnell et al., 1988; Jörnérus and Edgren, 1991).

1.3.6.13.4 Clinical results

The clinical success of the Brånemark implant system utilising a variety of parameters has been the subject of multiple publications both by the developers and different research teams worldwide. Adell et al. (1981) reported the results of a 15 year period (1965-1980) during which 2768 fixtures were installed in 410 edentulous jaws of 371 consecutive patients. All patients were provided with facultatively removable bridges and were examined at continuous yearly controls. The surgical and prosthetic technique was developed and evaluated over a period of 5 years. The results of standardised procedures applied on a consecutive clinical material with an observation time of 5-9 years were thought to properly reflect the potential of the method. In this group, 130 jaws were provided with 895 fixtures and persisting fixture anchorage of 81% for the maxillary and 91% for the mandibular fixtures was obtained. Anchorage function was considered to be dependent

on both persisting osseointegration and maintained marginal bone height and in 89% of the maxillary and 100% of the mandibular cases the bridges were continuously stable. During healing and the first year after connection of each bridge, the mean value for marginal bone loss was 1.5mm but thereafter only 0.1mm was lost annually.

Other authors directly associated with the University of Gothenburg had previously published clinical results supportive of the work of Adell et al. (1981) for example (Hansson, 1977; Brånemark et al., 1977; Breine and Brånemark, 1980). Adell et al. (1981) considered at the time that the clinical results of the Brånemark system not only fulfilled but exceeded the demands set by the 1978 Harvard Conference on successful implantation procedures. Major criticisms of this literature however were published by James et al. (1986) but were rebutted by Adell and Lekholm (1987). Friedland (1987) has also directed major criticism at the methodology and results of Hansson (1977) but this criticism did not become widespread.

Albrektsson et al. (1986) considered that the Brånemark implant system satisfied their 5 criteria for implant success. Niznick (1987a) criticised this conclusion because Albrektsson et al. (1986) had referred substantially to articles criticised by James (1986). These reports however contributed to provisional American Dental Association acceptance of the device, the first oral implant ever to be

positively evaluated by this body (Albrektsson et al., 1988).

Additional data supporting the reliability of the Brånemark system have subsequently been published. Albrektsson et al. (1988) stated that a valid scientific approach to test whether claims of success or failure of a new type of clinical treatment are true or false is to perform replication studies at centres other than the one originating the report and cited data of a retrospective replication study involving 14 Swedish teams outside the University of Gothenburg, each with at least 3 years' experience and utilising the technique described by Brånemark et al. (1977) a few overdenture cases were included but were not specifically described). The outcome of every implant was reported. Four of the 5 success criteria cited by Albrektsson et al. (1986) were applied, only the criterion relating to the 10 year outcome being excluded. The success rate for the implants inserted into the mandible (excluding grafted and irradiated cases) was 99.1% for 334 implants followed for 5 to 8 years. The success rate for the implants inserted into the maxilla (excluding grafted and irradiated cases) was 84.9% for 106 implants followed for 5 to 7 years.

Albrektsson (1988) reported the outcome of the Brånemark implant system in a multiclinic report that involved 12 teams selected to provide representation from Europe, North

America and Australia. Only teams with a minimum experience of 3 to 4 years and with a minimum of 100 consecutively inserted implants were invited to collaborate on the report. The first 4 of the 5 success criteria cited by Albrektsson et al. (1986) were utilised. The following success statistics exclude grafted and irradiated cases. For mandibular implants 4 teams (excluding Gothenburg) had 5 year data available. The 5 year success rate of a total of 195 implants was calculated to be 92.3% and all 11 participating teams had 3 year follow-up data available. This data subset involved 1029 implants with a success rate of 96.0%. The 1 year follow-up of the subset of 2520 implants indicated a success rate of 97.38%. For maxillary implants, excluding Gothenburg, only Toronto had a follow-up of more than 5 years. Inasmuch as only 12 implants were followed for 5 years or more, the success rate of 100% is based on too few implants to be of great significance. Eight teams had 3 year follow-up of maxillary implants. For a total of 164 inserted implants the success rate was 89.0%. A total of 617 implants were followed for one year for a success rate of 91.0%. Of 580 treated mandibular patients, 578 (99.7%) had continuous prosthesis stability and of 181 treated maxillary patients 174 (96.1%) had continuous prosthesis stability. For grafted and irradiated cases (excluding the University of Gothenburg) Albrektsson (1988) reported the following results: altogether 19 implants were inserted in grafted mandibles with only 1 failure, giving a 1 to 5 year success rate of 94.7%. The 1

to 5 year success rate of implants inserted in the irradiated mandible was 100% based on 21 implants. In the grafted maxillae, 112 implants were inserted, 38 of which failed, giving a 1 to 5 year success rate of 66.08%. The 1 to 5 year success rate of implants inserted in the irradiated maxillae is 100%, but based on only 10 inserted implants.

Independent publications of interim outcomes for the teams participating in the study of Albrektsson (1988) include Zarb and Symington (1983), Henry et al. (1986), Cox and Zarb (1987), Ahlqvist et al. (1990) and Zarb and Schmitt (1990a). Albrektsson (1988) stated that more than 700 teams work with the Brånemark system worldwide and that several of these teams which did not participate in his study have also independently published their results.

It is to be noted that Adell et al. (1990) reported an update of the cases presented by Adell et al. (1981). A life table approach was applied for statistical analysis. Calculated from the time of fixture placement, the estimated survival rates for individual fixtures at 15 years was 78% for the maxillae and 86% for the mandibles. More than 95% of maxillae had continuous prosthesis stability at 15 years. The figure for the mandible was 99%.

The aforementioned studies of clinical success specifically relate to the edentulous patient and in the majority of cases to fixed bridge treatment. Engquist et al. (1988)

reported the clinical experiences of 11 Swedish teams responsible for treating the majority of edentulous patients with overdentures. In all cases the observation time was less than 5 years and there were 339 total fixtures inserted, 32 of which were left dormant. Of the total, 20% of the fixtures were lost, 14% during the osseointegration period and 6% (elsewhere in the article this figure appeared to be 7%) after insertion of the overdentures. In the latter case fixture survival was 87% in the upper jaws and more than 99% in the lower jaws. Stratification of the results according to anatomic prerequisites indicated that degree of bone resorption and/or bone quality are of the utmost importance for the outcome of overdenture therapy. More than half of the patients had extreme resorption and/or poor quality bone according to the criteria used and in that group 78% of the fixture losses occurred and 51% of the lost fixtures were never osseointegrated. Naert et al. (1988) reported the outcome for 44 patients who had mandibles rehabilitated with the installation of 2 or 3 Brånemark fixtures and overdenture placement. A success rate of 97.7% was obtained for the overdentures and for the individually loaded fixtures. The complications encountered were mostly nonspecific to the osseointegration technique but were directly related to the overdenture treatment technique. Haraldson et al. (1988) demonstrated improved post-treatment bite force and chewing efficiency for 9 subjects treated with overdentures and osseointegrated implants in

the mandible.

Consider the success rates for cases of the insertion of Brånemark fixtures into partially dentate circumstances. Jemt et al. (1989) reported on the outcome of a total of 876 fixtures consecutively placed in 268 partially dentate jaws of 244 patients at the University of Gothenburg. Multiple and single tooth treatments were provided. The majority of fixed prostheses were not mechanically connected to adjacent natural abutment teeth but in some situations (20 jaws), prosthesis design provided for a combination of natural tooth and fixture support for the same prosthesis. This approach was used strictly for research purposes and the results of research group I, that group treated with a standardised technique and followed for an average of 2½ years were considered likely to be the most representative. In this group, the fixture survival rate was 94% for the maxilla and 99% for the mandible. Three of the 91 fixed prostheses (3%) in maxillary arches failed completely while none of the 76 prostheses placed in the mandible failed or were replaced. These data together with results from other sections of the study indicated that Brånemark osseointegration procedures can be used to treat partially dentate patients with the same positive results as previously documented for edentulous patients. It was noted that 4 fixtures required removal because of incurable mucosal lesions in the area of exposed integrated implant threads. This is a finding that has not been

observed to the same extent in edentulous patients and may thus reflect a new type of complication for partially dentate circumstances. For the patient group for whom a combination of natural tooth and fixture support was provided, no significant problems were noted but it was recommended on a theoretical basis that such treatment should be approached with caution, especially in the maxilla.

Van Steenberghe (1989) reported on a retrospective multi-centre evaluation of the survival rate of osseointegrated fixtures supporting fixed partial prostheses in the treatment of partial edentulism. Six centres from 3 continents participated in the study which included 133 fixtures in 38 patients. The observation time varied between 6 and 36 months after prosthetic reconstruction. Fifty-eight percent of the prostheses were connected to natural teeth and the success rates for the individual fixtures in the upper and lower jaws was 87% and 92% respectively while the majority of failures occurred before the prosthetic rehabilitation.

Ericsson et al. (1986) also reported on the results of the use of osseointegrated titanium fixtures and teeth as combined abutments for fixed bridge restorations in 10 partially dentate patients. Evaluations at periods of 6 to 30 months postoperatively revealed good clinical results (evaluation criteria included prosthetic parameters, oral

hygiene status, gingival conditions, probing pocket depths and marginal bone level alterations). Some tissue reactions were also observed however, indicating the presence of certain clinically significant differences in the functional behaviour of tooth abutments and titanium fixture abutments. These authors concluded that it was not presently possible because of the short observation time and small number of patients treated to make recommendations regarding the most suitable technical design for this type of bridge restoration.

De Clerq et al. (1988) reported a 5 year success rate of 96% for mandibular and 90% for maxillary cases involving osseointegrated implants and fixed bridges for partially dentate patients. These authors reported that no problems had occurred in the cases where a rigid connection had been used between implant and natural teeth support.

Van Steenberghe et al. (1990) presented 1 year follow up results for a multicentre prospective study of 159 partially dentate patients in whom 558 fixtures were placed, 521 of which remained in the study following placement of the fixed bridge prostheses (199 prostheses in 154 patients). The bridges were designed to be independent of natural teeth. Fixtures were lost or unaccounted for because of nonintegration prior to prosthesis fabrication (3.4%), patient withdrawal (2.0%), prosthodontic reasons (1.08%) and failure during prosthetic procedures (0.2%). It is to

be noted that 10% of the patients in the study suffered from 1 or more fixture losses but because of retrievability of the system only 1.1% of the prostheses failed, requiring a change of therapy. Failure was attributable to unfavourable bone quality, sex (more in males) and smaller fixture size. These studies also support the concept that osseointegrated fixtures can also be applied to the rehabilitation of the partially dentate but further long term study is required.

With regard to the success rate for single tooth replacements, Jemt et al. (1989) included this treatment mode but did not differentiate between single and multiple tooth replacements. Jemt et al. (1991) however reported the results of a multicentre prospective study of 107 implants inserted to support single tooth restorations in 92 patients. Only 3 (2.8%) implants were lost after 1 year of clinical function. The gingival condition was healthy around the single crowns and coincided well with the clinical situation around the permanent teeth, however there was a tendency for more short term inflammation, hyperplasia and fistulae around the restorations and the incidence of fistulae, mostly associated with loose restorations was higher in the present study when compared to implant supported restorations in other studies of edentulous and partially dentate patients. Problems associated with the stability of the screw joints were the most recurrent observations (26% of the screws retaining crowns were retightened during the observation period, but

the frequency of loose screws had a tendency to decrease as the study progressed).

Neither the application of Brånemark fixtures to multiple or single tooth replacement in partially dentate circumstances satisfies the criteria for success described by Albrektsson et al. (1986) but the short term results are encouraging. The issue of whether Brånemark fixtures should be combined with natural tooth abutments is controversial and Jemt et al. (1989) do not recommend it.

1.4 OBJECTIVES OF THIS INVESTIGATION

The objectives of this study were:

- a. to establish the awareness and needs of implant treatment modalities of partially dentate and edentulous prosthodontic patients within New South Wales,
- b. to assess the attitudes towards dental implants of active private general dental practitioners within New South Wales and their involvement with dental implant treatment modalities and
- c. to assemble demographic, functional and psychosocial profiles of patients attending the Centre for Osseo-integrated Dental Implants associated with the University of Sydney, as components of evaluation programmes for the provision of implant treatment ad modum Brånemark.

CHAPTER 2 - MATERIALS AND METHODS

2.1 DESIGN OF THE SURVEY QUESTIONNAIRES

Each phase of the investigation involved the administration of questionnaires.

The methodology for the assessment of awareness and needs of dental patients in relation to implants and the assessment of the attitudes and experiences of dentists with respect to implants involved self-administered questionnaires. This methodology was rationalised in terms of practicality and cost. Additionally, a component of the cohort study to assess the outcomes of implant treatment in relation to conventional treatment also involved self-administered questionnaires as well as a questionnaire to be completed by the examining dentist. This methodological approach to prosthesis evaluation was considered necessary on the basis that some prosthodontic patients are quite satisfied with their dentures in spite of technical imperfections (Carlsson et al., 1967; Bergman and Carlsson, 1972; Berg, 1984; Berg et al., 1985), whilst other prosthodontic patients are dissatisfied with their dentures even though the technical quality of their dentures is excellent (Langer et al., 1961; Yoshizumi, 1964), the implication being that the dentist and the patient may not assess prostheses on the basis of the same criteria.

From the non-dental literature, Quine (1985) completed a pilot study comparing three different modes of questionnaire completion: face to face interview, telephone and self-administered. The questionnaire was designed to obtain data on maternal experiences and exposures to drug and environmental agents during pregnancy. Comparisons were made of the quality of the data and the actual responses obtained. The findings suggested that when using a highly structured questionnaire, and where a favourable rapport had been established between the researcher and the respondents, there were few differences between the modes in those aspects examined in this study.

From the dental literature, consider comparison of dental health data obtained from self-administered questionnaires, interviews and clinical examination (Heloe, 1972). The material consisted of 216 individuals who were participating in a dental treatment programme which had been offered to all pensioners and welfare recipients aged 20-60 years living in a rural community in Norway.

Information concerning time interval since the last dental visit, the number of remaining teeth, and the presence of dentures was obtained by a self-administered postal questionnaire. Each question was furnished with a set of grouped, multiple choice answers. After a period that averaged 4 months, the participants were interviewed and examined at a dental clinic. Consider the following comparisons:

A. between data obtained by the postal questionnaire and by the personal interview on the time since the last dental visit. Accordance was found between 189 out of 216 pairs of data, with the index of agreement being found to be 0.82,

B. between data obtained by the postal questionnaire and by oral examination with regard to:

a. the number of remaining teeth. There was correspondence between 178 out of 214 pairs of data, the index of agreement was 0.79 and of those who over-rated the number of remaining teeth, 21 subjects had one or more roots which had been excluded by the examiner and

b. the occurrence of dentures. Only 5 of the 216 pairs gave conflicting classifications and the index of agreement was calculated to be 0.97.

In summary, the high proportion of agreement between the sets of data is an encouraging finding, indicating some topics which may be successfully studied by postal questionnaires. Interestingly the occurrence of gingival disease was clearly underreported by this method.

A variety of empirical indicators of concepts related to the objectives of the investigation were established. The process of moving from abstract concepts to the point where questionnaire items could be developed to tap the concept

may be termed 'descending the ladder of abstraction'. Each of the variables constructed were clearly defined in the conceptual (akin to a dictionary definition) and the operational sense (defines the characteristic we actually measure), the latter being heavily influenced by considerations of practicability. A definition may be a practical one to use while the information the researcher really wants may be difficult or impossible to obtain. The investigator substitutes what he can measure for what he would like to measure. For comparability with the findings of other studies it can be worthwhile to use the operational definitions used in other studies (Abramson, 1990).

Three broad problems associated with the development of the indicators were considered: content of the questionnaire items, forming the items into a questionnaire and pre-testing of the questionnaires.

2.1.1 Content of the questionnaire items

2.1.1.1 Forms 1 and 1A

Forms 1 and 1A (Appendix I) were designed to assess awareness and needs of implant treatment modalities of patients attending public dental facilities and private practice respectively within New South Wales.

A paucity of publications exists in relation to the

awareness and needs of dental patients with regard to implants. Akagawa et al. (1988) reported on a survey of removable denture patients concerning satisfaction with their dentures, as well as knowledge and assessment of and desire for implant therapy.

The awareness variables selected for this study were:

a. have you ever heard of implant treatment?

If the answer to this question was 'yes' then the following further questions were required to be answered:

b. what is a dental implant?

c. how did you come to know about them?

d. are you aware that dental implant treatment is available in New South Wales?

e. do you believe that dental implants are a valuable addition to dental treatment?

Consider the concept of dental needs and associated definitions as described by Spencer (1980). Requirement for care as determined by expert opinion is termed normative need. Normative need may be expressed in terms of items of dental care, or need equivalents such as time, cost or manpower requirements. Need equivalents are usually specific to various levels of dental technology, use of auxiliaries, practice organisation and administration. Normative need is to be differentiated from perceived need

which is a requirement for care as determined by the patient or public. Demand for dental care arises out of the desire and the attempt by members of the public to seek attention for their perceived needs. The actual attendance by members of the public at health care facilities to receive care is termed utilisation.

Dental need may be estimated by four different approaches, differentiated by the basic sources of data. These are:

- a. surveys of dental status,
- b. surveys of need for dental care,
- c. analyses of service or treatment records and
- d. the best judgement of dental practitioners.

Present limitations in the estimates of need for dental care may be identified in many areas. Ideally, estimates should achieve high levels of:

- a. objectivity, the extent to which the estimate is dependent on actual facts and is uncoloured by feelings or opinions,
- b. directness, the nearness or the relation between the estimate and the actual phenomenon observed,
- c. completeness, the extent to which an estimate assesses the full aspects of the phenomenon within the population,
- d. precision, the level of sophistication of the estimate, the coarseness or fineness of the units of the

estimate and

e. coverage, the extent to which the estimate is derived from the whole population to which the estimate is to be applied.

None of the four approaches to the estimation of need for dental care presented is free of limitations.

The need for dental implant treatment variable selected for this study was: 'do you think that it is likely that you may require a dental implant in the future?' Although the differences between normative need and self-perceived need have been well documented (Nikoukari et al., 1988), it is also apparent that self-perceived need is a significant predictor for dental utilisation (Kiyak, 1986, 1989).

The demand for dental treatment variable selected for this study was: 'what is your treatment request in relation to your missing teeth/dentures?'

Potential explanatory variables (predictors) for the outcomes of the dependent awareness, needs and demand variables in relation to implant treatment for the questionnaire to be directed to patients were derived from previous research in broader areas of factors influencing dental knowledge (Vogan, 1970), dental status, dental needs and dental utilisation (Scarrott, 1969; Ettinger, 1971; Richards, 1971; Shuval, 1971; Gilmore and Kiyak, 1985;

Helöe, 1973a,b; Rantanen, 1976; Nikias et al., 1977; Rajala et al., 1978; Rise and Helöe, 1978; Davidson, 1979; Holst, 1979; Smith and Sheiham, 1980; Kandelman and Leparge, 1982; Kiyak and Miller, 1982; Marinelli et al., 1982; Rise, 1982; Rise and Holst, 1982; Peterson, 1983; Newman and Anderson, 1972; Gift, 1984; Kiyak, 1984; Antczak and Branch, 1985; Rise, 1985; Kandelman et al., 1986; Kiyak, 1986; Waldman, 1987; Drummond et al., 1988; Tervonen, 1988). These variables were sociodemographic and dental historical in nature as well as containing aspects of the Health Belief Model (Hochbaum, 1958; Kegeles, 1961,1963a,b,1968,1974, 1975; Rosenstock, 1966; Tash et al., 1969; Antonovsky and Kats, 1970; Becker and Maiman, 1975).

The Health Belief Model is a socio-psychological model of health behaviour which can be applied to both preventive and symptomatic dental utilisation. The model identifies several perceptual categories which influence utilisation:

- a. feelings of susceptibility,
- b. awareness of the potential seriousness of the disease,
- c. salience of the problem and
- d. knowledge of the benefits that accrue from appropriate health action.

It is to be noted that negative results for the model have been well documented (Kriesberg and Treiman, 1962; Jaccard, 1975; Wan Yates, 1975; Davis, 1980). Consider these limitations:

- a. it may be that the rationalistic assumptions of the model are at fault. It is quite possible that people do not in fact approach health behaviour in the rationalistic decision making manner portrayed in the Health Belief Model, at least in the absence of major sanctions or cues to action. Enough is known about the behaviour of smokers to recognise that individuals can reconcile and compartmentalise quite inconsistent information (Kirscht, 1974),
- b. there is the question of whether such beliefs precede and motivate health behaviour,
- c. the Health Belief Model framework does not easily accommodate the role of the dentist and the importance of the dentist and the importance of the patient/practitioner relationship (Kasl and Cobb, 1966) and
- d. the framework does not allow for the great range of potential barriers external to the individual which prevent the translation of appropriate or favourable dental attitudes into effective action. They may be, for example problems of access or cost.

It is to be noted that despite these limitations significant research in relation to dental knowledge, attitudes and behaviours still alludes to the Health Belief Model (Durwood and Wright, 1989).

Consider however other approaches to explaining variation in dental utilisation. A theoretical framework developed by

Anderson and Newman (1973) and Newman and Anderson (1972) emphasises the importance of:

- a. characteristics of the health services delivery system (resources and organisation),
- b. societal determinants (changes in medical technology and social norms relating to the definition and treatment of illness) and
- c. individual determinants (predisposing factors, enabling factors and perceived illness level).

2.1.1.2 Form 2

Form 2 (Appendix I) was designed to explore attitudes towards implant treatment modalities and assess the level of involvement with implant treatments of private general dental practitioners within New South Wales. The Australian Dental Practice Survey 1988 contained a question asking dentists to indicate whether they carried out implant procedures (osseointegrated) in their practices (Barnard, 1990), however other published data with respect to these issues were unavailable.

Attitudinal variables explored in this study included:

- a. do you feel that dental implants offer a successful long term treatment outcome?
- b. do you intend to attend a further education course on

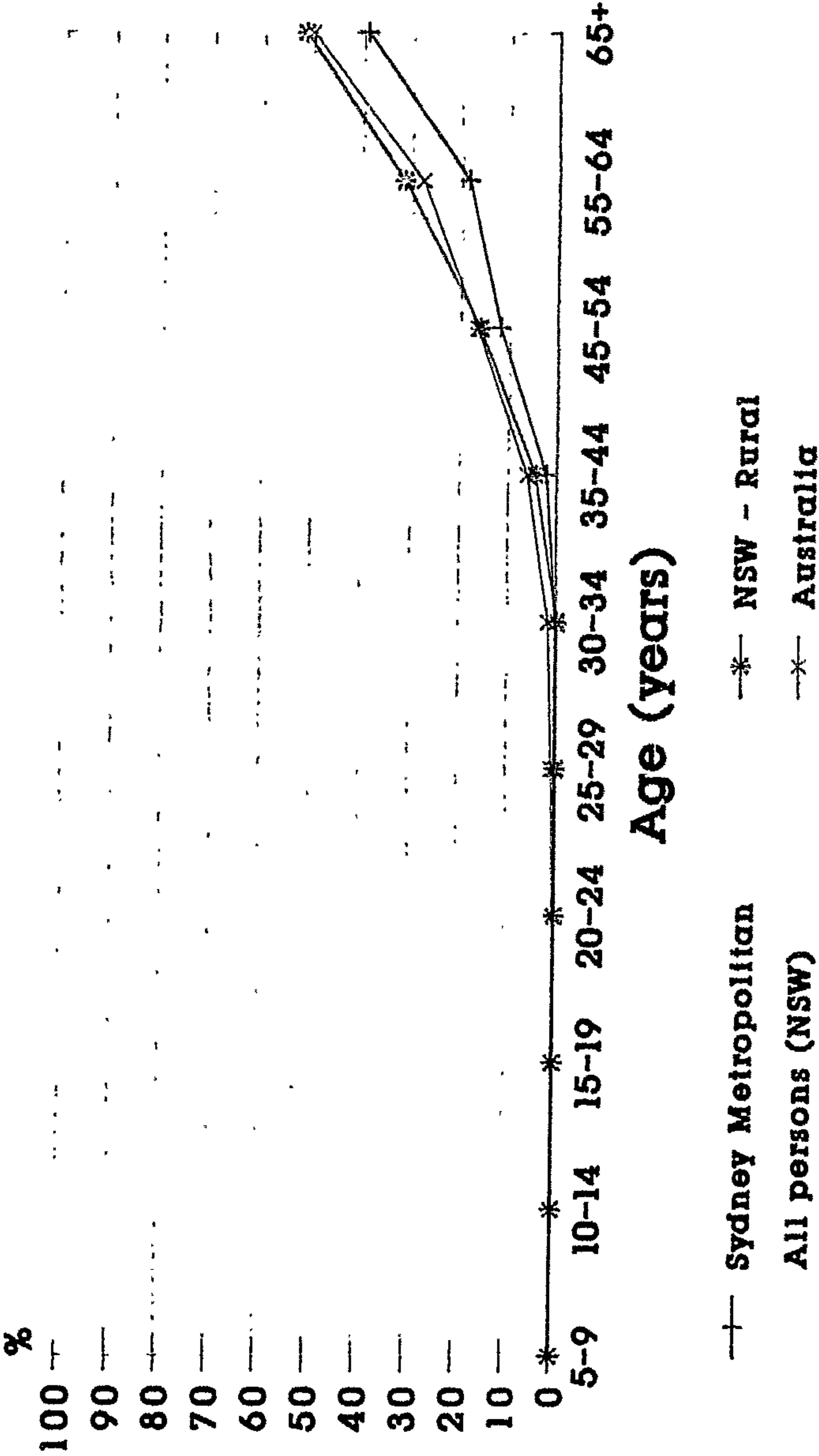
implants within the next 2 years? A question pertaining to previous attendance at further education courses on implants was also included and

c. do you feel that old people (older than 60 years) are poor candidates for oral rehabilitation? This question was included on the basis that it has been reported that 15.1% of the Australian population was aged 60 years or over by 30 June 1988. It is anticipated that by the year 2021 the 60 years-and-over age cohort will have increased to approximately 22% (Barnard, 1988). In a study of 53 elderly patients (aged 65-85 years), treated for edentulousness by tissue-integrated implants ad modum Brånemark, Köndell et al. (1988) found that the chronological age of the patient did not alone, seem to be a determining factor in the prognosis of the treatment.

Estimates for the percentages of edentulous persons for different age groups are presented in Figure 1. Estimates for the total number of missing teeth per person for different age groups are presented in Figure 2. Estimates for denture needs for different age groups in New South Wales are presented in Table 6. It is apparent from this data that the 60 years-and-over age group is of particular relevance to the potential utilisation of implant systems by dentists.

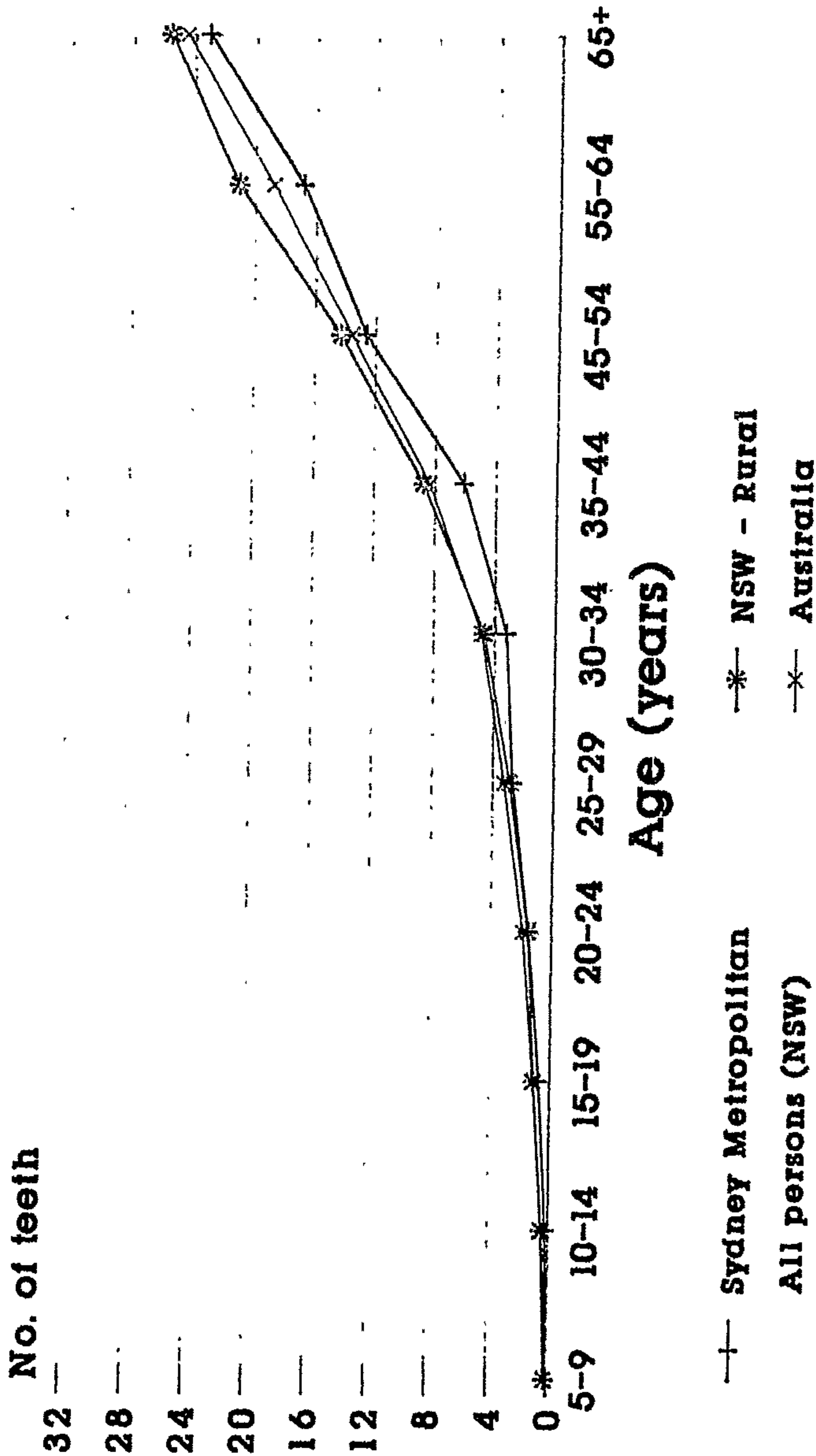
The respondents were asked to discuss their answer so that their attitudes could be characterised.

Figure 1: Estimates for edentulous persons for different age groups.



Source - Survey of Oral Health in Australia 1987/1988, P.D. Barnard

Figure 2: Estimates for total number of teeth missing/different age groups.



Source - Survey of Oral Health in Australia 1987/1988, P.D. Barnard

Table 6: Estimates of 'Denture status - Needing', for different age groups in New South Wales.

TD	Years										
	5-9	10-14	15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+	AA
SYDNEY METROPOLITAN											
SB	124	120	79	76	95	114	193	92	112	128	1333
FF					0.9		1.2	5.2	5.7	17.0	3.6
F-								1.3	1.6	0.8	0.4
FP						0.8	0.4	3.1	3.6	3.9	1.3
-F								2.1	0.9	3.1	0.7
PP					1.8	3.4	6.2	3.3	4.9	6.2	3.1
P-					3.1	5.3	2.4	4.9	2.4	2.3	2.1
-P				1.3	4.0	1.0	8.8	9.5	9.7	8.6	5.0
--	100.0	100.0	100.0	96.0	80.2	83.3	67.2	44.0	48.4	40.2	72.6
BB					1.8	1.0	4.4	3.3	2.9	0.8	1.7
O				2.7	8.1	5.3	9.5	23.3	20.1	17.2	9.5
TO	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
EXTRA METROPOLITAN											
SB	114	97	78	54	106	81	151	87	101	119	988
FF							1.7	5.1	8.9	23.9	4.9
F-							0.9	2.2	5.1	1.7	1.1
FP						1.1	4.5	2.0	4.1	5.8	2.2
-F					1.1			2.9	6.1	2.6	1.4
PP					1.7	1.1	5.1	4.5	5.7	7.7	3.1
P-				2.1	2.2	2.5	3.1	4.5	5.9	1.5	2.3
-P					1.7	3.6	7.3	12.5	7.7	11.0	5.1
--	100.0	100.0	98.8	93.7	89.3	83.6	62.5	49.1	40.8	35.0	71.5
BB			1.2		3.0	1.1	3.7	4.9	2.2		1.7
O				4.2	1.1	6.9	11.2	12.3	13.5	10.8	6.7
TO	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

LEGEND: TD, Type of denture; SB, Sample base, persons; FF, Complete dentures; F-, Full upper denture; FP, Full upper, partial lower; -F, Lower full denture; PP, Partial upper, Partial lower; P-, Partial upper; -P, Partial lower; --, No dentures; BB, Upper bridge, Lower bridge; O, Other; T, Total.

SOURCE: Survey of Oral Health in Australia, 1987/1988. P.D. Barnard (1991)

It is well documented that dentists like other health care professionals are reluctant to work with older patients (Sheiham et al., 1986). It has also been reported that dentists consider the elderly the least satisfying group to treat (Strayer et al., 1986). In the study by Kiyak et al. (1982), 332 dentists in private practice completed a questionnaire that included a revised version of Palmore's 'Facts on Aging' quiz, and questions regarding experiences with older patients. Over 50% of the dentists held inaccurate but positive perceptions of the elderly, the average correct response was 60%. This is similar to the proportion correct found among dentists by Holtzman and Beck (1979). Dentists have also been reported to stereotype the older person as inactive, unproductive, egocentric, inflexible, probably senile, uninterested and uninteresting (Evans, 1984) and exhibiting several negative pathoses (Baum, 1981a,b). They may patronise and infantilise the elderly (Fishman, 1989; Dolinsky and Dolinsky, 1984). Lebel (1989) reported that dentists believe that older persons are poor candidates for dental rehabilitation and preventive care.

The level of involvement with implant treatment modalities of the dentists was explored by a series of variables pertaining to the number and the character of implant treatments provided.

Potential explanatory variables (predictors) for the outcomes of the dependent variables within Form 2 were

developed from parameters included in the Australian Dental Practice Survey 1988. It was planned to assign postcodes of the main practice location to Area Health Service Regions as defined by the New South Wales Health Department. Additionally predictors were gleaned from the study of Martens et al. (1987) who reported on practice profiles of younger and older dentists.

2.1.1.3 Form 3

This form was designed for use in acquiring pretreatment sociodemographic and dental history data (Appendix I). Many of the variables were derived from Forms 1 and 1A and literature related to longitudinal studies of patients receiving prosthetic treatment, for example, pretreatment denture problems were considered by Watson and Reeve (1985). Lundqvist and Carlsson (1983) considered a variable involving the reasons why the implant patients had lost their natural teeth. From a theoretical point of view it is possible that patients who present with loss of natural teeth from periodontal disease may suffer from an analogous form of the disease around implant fixtures.

2.1.1.4 Forms IA1, IB1 and IC1

The self-administered treatment evaluation forms were termed IA1, IB1 and IC1 for ready identification with the time at which they were to be administered (Appendix I).

They contained sections for functional assessment of the prostheses (Bergman and Carlsson, 1972,1985; Haraldson and Carlsson, 1977; Heyink et al., 1986; Naert et al., 1988; Vervoorn et al., 1988; Grogono et al., 1989) and psychosocial evaluation in relation to treatment outcomes. For reasons of comparability, the psychosocial variables were similar to those utilised by Blomberg and Lindquist (1983) in a controlled study of 26 implant patients who were examined pre- and post-operatively, 3 months and two years after the insertion of a jawbone-anchored bridge. Hoogstraten and Lamers (1987) and Albrektsson et al., (1987) also reported the use of psychosocial variables for the evaluation of implant therapy, similar to those of these authors.

In addition, Form IA1 contained a section termed 'Procedural assessment' to evaluate characteristics of the treatment procedures culminating in the insertion of the prostheses.

2.1.1.5 Forms CA1, CB1 and CC1

Forms CA1, CB1 and CC1 were similar to Forms IA1, IB1 and IC1 but they were directed to the control group of patients.

2.1.1.6 Forms CA2, CB2 and CC2

These forms were to be completed by the examiner(dentist) for the control patients and each involved two sections, a functional assessment and tissue assessment (Appendix I).

The content of these questionnaires was influenced by:

- a. the assessment criteria utilised in related studies (Nyquist, 1952; Kapur, 1967; Rayson et al., 1971; Rise, 1979; Hunt et al., 1985),
- b. theoretical considerations in relation to vertical dimension (Lechner, 1989) and the enunciation of sounds by complete denture wearers (Zarb et al., 1990) and
- c. practical considerations.

Pinsent and Laird (1989), after a review of the literature of many of the criteria utilised in the assessment of complete dentures, concluded that adequate and consistent reliability has not been demonstrated and a number of factors were discussed which accounted for the contradictory nature of this evidence.

For Forms CA2, CB2 and CC2 it was decided to utilise criteria for prosthesis and tissue characteristics (and a single examiner) based largely on the work of Nyquist (1952), Bergman, et al. (1964), Hobdell et al. (1966), Budtz-Jorgensen and Bertram (1970), Gray et al. (1970),

Norheim and Valderhaug (1979), Carlsson et al. (1980) and Lundqvist and Carlsson (1983).

2.1.1.7 Forms IA2, IB2 and IC2

These forms were to be completed by the examiner(dentist) for the implant patients and each involved three sections, a functional assessment, a tissue assessment and a fixture assessment (Appendix I). The functional and tissue assessment components were based on Forms CA2, CB2 and CC2. Conventional periodontal indices and pocket depths were not utilised for the assessment of perifixtural tissues for although they have been utilised for the assessment of treatment outcomes following implant therapy in previous studies (Zarb and Symington, 1983; Adell et al., 1986; Henry et al., 1986; Lekholm et al., 1986; Cox and Zarb, 1987) the significance of these methods of evaluation as applied to this circumstance is controversial.

Hansson (1977) reported that there was no immediately apparent correlation between the clinical state of the mucous membrane surrounding an implant and the bone resorption rate and that pocket depths are not of primary relevance because of differences in the morphological relations between the marginal periodontium surrounding natural teeth and marginal tissues surrounding implants.

Adell et al. (1981) reported that until the possible

relevance of these methods has been proved for a situation which is very different from that of the natural tooth, these methods cannot be reliably used for revealing the status of the tissues surrounding osseointegrated implants.

Adell et al. (1986) concluded that marginal soft tissue reactions were not significantly correlated to progressive periodontitis, these authors conceded that other investigative methods (mobility tests of separate fixtures combined with quantitative and qualitative standardised radiological examinations of the surrounding bone) appear to provide a truer comprehension of longitudinal events at osseointegrated implants than conventional clinical soft tissue observations.

Also, Lekholm et al. (1986) did not find that the presence of gingivitis and deep pockets was accompanied by accelerated marginal bone loss.

Smith and Zarb (1989) in a review of the literature for criteria for success of osseointegrated implants concluded:

- a. that although an increasing degree of gingival inflammation is not a desirable response and deserves the attention of the clinician as a treatment complication requiring corrective measures it has not been shown to be critical to implant success and
- b. that there is little evidence that pocket depth is

related to implant success. They reported that the tissue attachment to implants is not strong, is easily penetrated on probing, that nearly all implants can be probed to within 1 to 2mm of the level of the bone, that it is possible to maintain a stable bone level with a sulcus depth considered to be greater than normal for natural teeth and concluded that peri-implant sulcus depth is neither a good predictor of problems with stability of bone level nor a useful parameter for evaluating implant success.

An oral hygiene index was nevertheless utilised to assess the success of patients' attempts to maintain fixture cleanliness.

Soft tissue complications of fixture placement such as mucosal perforations, gingival hyperplasia, fistulae (Adell et al., 1981; Albrektsson et al., 1986; Worthington et al., 1987) and mechanical complications related to fixture/superstructure placement (Worthington et al., 1987) were to be reported in the open ended component of the questionnaire section pertaining to prosthesis assessment.

To minimise the intrusiveness and inconvenience of the study for participants, several of whom were employed and/or fee paying, superstructures were not removed in order to assess mobility of the abutments.

Routine radiographic assessment of fixtures was also not carried out because of the short term nature of the study.

The presence of successful osseointegration for each fixture was established at second stage surgery by mobility and percussion tests.

2.1.1.8 Personality measurement

Several studies in other dental treatment areas have utilised personality measures for pretreatment evaluation and to assess treatment outcomes, for example Cattell's 16PF (Gross and Vacchiano, 1973) and in particular the Minnesota Multiphasic Personality Inventory (Solberg et al., 1972; Lupton and Johnson, 1973; Smith, 1976; Gillis et al., 1979; Millstein-Prentky and Olson, 1979; Eversole et al., 1985; Alpern et al., 1988).

With regard to studies of patients receiving implant treatment, Hoogstraten and Lamers (1987) required subjects to complete personality questionnaires on internal and external control and a Dutch version of Eysenck's MPI and Blomberg and Lindquist (1983) utilised Eysenck's personality inventory together with other modes of psychiatric evaluation.

Based on this literature it was planned to have the patients receiving implant treatment in this study together

with their controls, complete Minnesota Multiphasic Personality Inventories pre- and post-treatment.

2.1.2 Forming the items into a questionnaire

2.1.2.1 Structure of the questions

The following guidelines were followed in forming the questions (Dillman, 1978; Abramson, 1990; de Vaus, 1990):

- a. the language was kept simple and did not contain abbreviations or unconventional phrases, the questions were not vague or too precise,
- b. words were utilised that were intended to be uniformly understood,
- c. attempts were made to avoid bias in the sense that it influences people to respond in a manner that does not accurately reflect their position,
- d. they were kept short without being too cryptic,
- e. they were technically accurate,
- f. the questions were not intended to be objectionable and
- g. they did not contain double negatives.

Another aspect of question construction considered was that of question structure. A basis for distinguishing among question structure is the nature of response behaviour asked of the respondent (Moser and Kalton, 1971; Warwick

and Lininger, 1975; Dillman, 1978; de Vaus, 1990). Using this as a criterion three basic types of structures can be identified:

A. open-ended;

these questions have no answer choices. Instead, the respondents must 'create' their own answers and state them in their own words,

B. closed (forced choice);

for these questions answer choices are provided. Some of the most widely used approaches to providing responses for closed choice questions are:

- a. Likert-style formats, this general approach involves providing people with statements and asking them to indicate how strongly they agree or disagree. The format in which this is presented may be verbal or diagrammatic,
- b. other ranking formats,
- c. semantic differential formats, this format consists of choosing adjectives to represent the two extremes of a continuum and asking respondents to put a mark between the two extremes and
- d. unordered response choices,

C. partially close-ended: such questions provide a compromise. Although answer choices are provided respondents have the option of creating their own responses.

The choice of question structure or combination of structures varies with:

- a. the aims of the questionnaire,
- b. type of respondent,
- c. the purpose of the specific question and
- d. coding and time available.

Open-ended questions are likely to be used in two distinctly different situations:

- a. those in which respondents can express themselves freely and
- b. to elicit a precise piece of information that respondents can recall without difficulty and when there are a very large number of possible answers and listing all of them would increase the difficulty of answering.

Closed questions with ordered answer choices are appropriate when a researcher has a well defined issue and knows precisely what dimension of thought he or she wants the respondent to use in providing the answer. The fear that certain options will be overlooked by researchers has led to the widespread use of the partially close-ended question.

Consider advantages and disadvantages of open-ended and close-ended questions:

A. open-ended questions;

a. Advantages,

- respondents formulate their own answers without prompting,
- the opportunity for self expression may provide the incentive for continued interest in the survey,
- can be used in circumstances where the range of responses is not clear,
- can be used to provide informative, colourful case illustrations to brighten final reports.

b. Disadvantages,

- can be demanding, respondents are asked to recall past experiences, reorganise them and find the terms with which to express them,
- difficulty of constructing meaningful variables for statistical analysis because of incomplete, uninterpretable or irrelevant information,
- coding can be time consuming.

B. close-ended questions;

a. Advantages,

- are quick and less demanding to answer which is of particular importance where the questionnaire is long or people's motivation to answer is not high,
- people are often more willing to reveal their virtues and vices by checking those that apply on a standard list,

- are easier to code,
- are well suited to sophisticated analyses.

b. Disadvantages,

- prompts are present, the use of structured items may produce answers where none really exist or impose an artificial view,
- the researcher is required to allow meaningful answer choices,
- requires an exhaustive range of alternative responses,
- there is no opportunity for the elaboration of the response.

Consider now scales of measurement. As part of the process of clarifying each of the variables to be studied, its scale of measurement requires to be specified (Moser and Kalton, 1971; Warwick and Lininger, 1975; Abramson, 1990; de Vaus, 1990). Scales of measurement may be classified as follows:

- a. nominal,
- b. ordinal,
- c. interval and
- d. ratio.

A satisfactory scale of measurement is one which meets the following requirements:

- a. appropriate,
- b. practical,
- c. sufficiently powerful,
- d. clearly defined categories,
- e. sufficient categories,
- f. comprehensive and
- g. mutually exclusive.

There are several reasons why it is desirable to measure a concept by using multiple indicators rather than one; it:

- a. helps to explore the complexity of the concept,
- b. assists in developing more valid measures,
- c. helps increase reliability,
- d. enables more precision and
- e. summarises the information conveyed by a number of questions into one variable; the analysis is thus simplified.

The scales used for measuring composite variables may be termed 'composite scales'. Composite scales may be based on:

- A. formulae,
- B. composite scores, arrived at by adding together separate scores allotted to the component items, of which there are two types:

- a. raw, for example 'Likert-type' scales and
- b. weighted scores which are based upon the allocation of different weights to component items, may be determined arbitrarily on the basis of the apparent respective importance of the items or allotted as a result of careful analysis of data collected in a previous investigation and
- c. graded sets of items, for example Thurstone-type or cumulative scale.

Composite scales may require collection and analysis of the component data before their method of combination is decided upon, for example the Guttman scale.

The aforementioned guidelines were utilised to define scales of measurement for each questionnaire within this study. A composite variable termed 'class' was formed for Forms 1 and 1A using a hierarchical model based on the responses to the variables involving occupation (Daniel, 1984, 1990; Erikson, 1984; Quine, 1986; Najman, 1988; Quine and Lancaster, 1989).

For the post-treatment questionnaires the number of examiners to be involved, single or multiple and possible protocols for multiple examiners, simultaneous evaluation, averaging of independent assessments and independent assessments retained (Korduner and Markén, 1967; Ramstad et

al., 1980) was also considered.

2.1.2.2 Questionnaire layout

2.1.2.2.1 Question sequence

a. The opening questions for each survey questionnaire were kept simple and readily answerable. Warwick and Lininger (1975) consider that if respondents are able to answer early questions easily and quickly then fears that the questionnaire contains difficult and time consuming questions are overcome. This principle of building respondents' confidence with early questions has led to the use of demographic items for commencement questions although this practice is controversial (Dillman, 1978).

b. The sequences were kept as interesting as possible.

c. The question sequences were clearly related to the survey topic.

d. Attempts were made to convey a sense of neutrality.

e. Questions that were similar in content were grouped together and placed within specific content areas. This served two purposes: it eased the mental effort required in relation to switching from one kind of question to another, and encouraged well thought out answers,

something that is more likely to occur if respondents are asked questions in an order that seems logical to them.

f. Advantage was taken of cognitive ties that respondents were likely to make among groups of questions. In this way a sense of flow and continuity was built throughout the questionnaire.

g. Potentially sensitive questions were introduced at points where the respondent was likely to have developed trust and confidence in the study, and were located in sections of the questionnaire where they were most meaningful in the context of other questions, in some instances camouflage questions were included.

h. Questions that were likely to have positive responses were mixed with those that were likely to have negative responses to help avoid an acquiescent response set.

i. Open-ended questions were appropriately distributed.

2.1.2.2.2 Physical layout of the questionnaire

A. Answering procedures:

For open-ended questions sufficient space was left to avoid cramming of responses but not so much as to discourage completing the questionnaire because of the time it would apparently take. For closed questions

patients were asked to tick relevant boxes.

B. Contingency questions:

Contingency or filter questions were used to avoid respondents wasting time reading questions which were not relevant to them.

C. Length of the questionnaire:

In a review of the response rates for surveys involving mail questionnaires of different lengths utilising the Total Design Method entirely, or at least partly, Dillman (1978) did not find significant differences in the response rates for questionnaires of less than 12 pages or those which contain less than 125 items for either the general public or specialised populations. This result was viewed cautiously and tempered with the view that after response rate, the factor that has contributed most negatively to the image of self-administered questionnaires is the view that they must be kept short, too short for the study of significant issues. The survey questionnaires in this study were kept as short as possible, compatible with the elucidation of data compatible with the objectives of the project.

D. Instructions:

General instructions were provided for each questionnaire as necessary, for example the general instructions: 1. please tick the relevant boxes to indicate your response, 2. please answer other questions by writing in the space

provided and 3. please answer every question, were placed at the commencement of Forms 1 and 1A and were repeated in the top left side corner for subsequent pages as necessary.

E. Size:

Guidelines that were utilised in determining the size of the questionnaires were:

- a. a questionnaire should be large enough to allow sufficient space between the items but not so large that it is unwieldy. Smaller forms are more susceptible to loss,
- b. for open-ended questions, sufficient space but not much more is to be allowed for the average length of the responses (gauged in advance). If too much space is allowed it may suggest a longer response than necessary is required and
- c. individual questions should not be broken between pages.

F. Coding:

To facilitate the transfer of information to the Statistical Analysis System, SAS^R (Saffer, 1985), data sets, small numbers were placed on the right side of each response box.

G. Font:

The predominant font chosen for the questionnaire was such that it enabled the questionnaire to be clearly read

and the style was appropriate to the circumstances. Bold capitalisation of this font was used for sectional headings. The different type faces were used consistently throughout the questionnaire.

H. Other:

Form 2 and Appendix II were each coloured so that they could be readily distinguished from each other and for aesthetic reasons.

2.1.3 Pretesting of the questionnaires

2.1.3.1 Form 1

Patients who presented to the University of Sydney Prosthetic Dentistry clinic were considered a suitable pool for the administration of pilot questionnaires. Three pilot surveys (PS1, PS2 and PS3) were completed involving samples of 15, 18 and 19 patients respectively. The percentage number of correctly recorded responses per person and the respective standard deviations are presented in Table 7. PS3 not only demonstrated a significantly greater percentage of correctly recorded responses per person, Kruskal-Wallis H Test (Phillips, 1978), $H = 15.74$, $p < 0.001$, but also a more consistent response when compared to PS1 and PS2, F Test (Phillips, 1978), $F = 3.42$, $p < 0.01$ and $F = 2.15$, $p < 0.10$ respectively. These statistics corresponded to:

Table 7: Representation of the number of correctly answered questions per person for the 3 pilot surveys (involving the 55 equivalent questions).

Pilot Survey	Average Number Correct/ Person	Standard Deviation	Percentage Correct/ Person
PS1	27.80	13.87	50.55
PS2	35.83	11.00	65.15
PS3	44.37	7.50	80.67

- a. a change to the request that for closed questions, patients place a numerical digit in a box, to a request to tick the relevant box and
- b. format changes, involving a decrease in the number of pages of the questionnaire by printing on both sides of each leaflet and decreasing the size of the font, improved spacing and clear instructions and contingency questions.

One sided normal tests of proportions were completed for each survey question to determine if it was answered correctly at least 80% of the time and this criterion was required to be satisfied for inclusion in the final questionnaire. It was decided to delete a question requesting details of income from PS3 because the correctly recorded response rate was only 42.1% indicating the likelihood of response bias in the non-respondents to be significantly high. Chi-square tests were utilised to determine if the frequency of a correct response for any particular question changed between surveys.

In Table 8 the characterisation of the responses for each questionnaire section for each pilot survey is presented. The percentages of correct responses for the personal details, dental history and needs and awareness components of PS3 are similar. The percentage number of correct responses for the needs and awareness section of PS1 was poor probably because it was located at the end of a

Table 8: Representation of the categorisation of the response (percentages), for each questionnaire section for each pilot survey.

	Pilot Survey 1			Pilot Survey 2			Pilot Survey 3					
Questionnaire Section	Correct	Total Incorrect		Correct	Total Incorrect		Correct	Total Incorrect				
Personal Details	64.91	M 21.05	D 11.93	X 2.11	74.27	M 19.00	D 4.39	X 2.34	83.38	M 15.79	D 0.83	X 0.00
	47.87	31.82	18.79	1.52	57.83	34.34	6.06	1.77	77.03	22.49	0.00	0.48
	35.24	30.47	32.38	1.91	64.28	22.22	13.10	0.40	82.71	15.41	0.75	1.13
Average	49.34	27.78	21.03	1.85	65.46	25.19	7.85	1.50	81.04	17.90	0.52	0.54

LEGEND:
M: missing response
D: deducible response
X: incorrect response

relatively long questionnaire (in terms of physical layout) and necessitated some relatively complex answers in tabular form.

2.1.3.2 Form 1A

Form 1A contained one additional question in comparison to Form 1 but was otherwise developed directly from this form. The results of the pretesting of Form 1 were considered to be of relevance to the administration of Form 1A to private dental patients. In addition however, 11 private general practitioners were personally requested to present Form 1A to patients requesting prosthodontic treatment within their practices. Twenty three completed forms were returned by 7 of these dentists within a 6 week period. The entire questionnaire was completed correctly by most patients and the dentists themselves had positive attitudes in relation to the nature of the questionnaires. The 4 dentists who did not return the questionnaires reported that suitable patients did not present for treatment within the defined time limit.

2.1.3.3 Form 2

The pretesting of Form 2 involved a direct personal invitation to 15 dentists involved with private general dental practice to complete this form and each dentist agreed to participate and each later returned completed

questionnaires. Each questionnaire was returned personally allowing for discussion in relation to the nature of the questionnaire. The entire questionnaire was completed correctly by most dentists. Two closed questions were able to be created for the definitive questionnaire from the open question in the trial questionnaire relating to the nature of the implant treatment undertaken. Minor physical layout changes were completed and the questionnaire was printed onto pale yellow stationery.

2.1.3.4 Forms CA1, CB1 and CC1: IA1, IB1 and IC1

The functional aspects of these questionnaires were considered to have been pretested as for the development of Forms 1 and 1A.

The psychosocial variables within these forms were tested by administering them to 19 patients who presented to the University of Sydney Prosthetic Dentistry Clinic. All 19 patients completed the questionnaires and the entire questionnaire was completed correctly by almost all of the respondents.

2.1.3.5 Forms CA2, CB2 and CC2: IA2, IB2 and IC2

To develop and test the functional and tissue assessment scales and test for intra-examiner reliability, 2 pilot surveys involving 17 and 13 patients respectively were

carried out. The patients had had new complete dentures inserted approximately 6 months previously, the characteristics of these prostheses were comparable to those expected within the definitive surveys. For each survey the examiner was blinded and the patients recalled 1 week after the completion of the first examination. The second survey was completed 1 month after the first, partly to evaluate any changes in examiner reliability with time. The percentage agreement values for series 1 and series 2 are presented in Table 9. It was not deemed appropriate to calculate the Kappa statistic (interpretable as a measure of agreement for dichotomous or qualitative judgements, beyond that solely due to chance) as discussed by Hunt (1986), because of the small sample sizes involved and the distribution of the data resulting in occurrences of zeros for some of the marginal totals.

Variability in agreement for the parameter of retention for the lower denture for each survey could arguably have arisen because of anatomical factors (and theoretical concerns) specific to the mandibular denture bearing area. Variations in examiner agreement for cleanliness for each survey could have arisen because the patient was subconsciously motivated to clean the dentures between visits and the resulting healing process could possibly have influenced the evaluations for mucosal erosions/ ulcerations. Attempts were made to control other factors with the potential to lead to examiner variation such as discussion with the patient, the examiners' health and emotional state

Table 9: Percentage agreement values for the two trial surveys undertaken to define functional and tissue assessment scales and determine intra-examiner reliability for complete denture patients.

PARAMETERS	PERCENTAGE AGREEMENT	
	SERIES 1	SERIES 2
Retention - Upper	94.1	100.0
Retention - Lower	76.6	76.9
Stability - Upper	94.1	92.3
Stability - Lower	82.4	100.0
Occlusion	88.2	100.0
Vertical Dimension	88.2	100.0
Aesthetics	82.4	92.3
Denture defects - Upper	88.2	92.3
Denture defects - Lower	82.4	92.3
Denture cleanliness - Upper	76.5	84.6
Denture cleanliness - Lower	76.5	100.0
Denture Stomatitis - Upper	100.0	84.6
Denture Stomatitis - Lower	100.0	100.0
Mucosal erosion/ulceration - Upper	76.5	84.6
Mucosal erosion/ulceration - Lower	76.5	84.6
Other oral pathology	88.2	100.0

and biases arising from previous training and physical circumstances such as quality of the lighting. The percentage agreement levels for the scales utilised for Series 2 were considered suitable for application to the clinical study.

2.2 SAMPLE DESIGN AND CONDUCT OF THE SURVEYS

2.2.1 Forms 1, 1A and 2

A population is any collection of individuals of interest. Reasons to use sampling instead of making measurements on an entire population are to conserve resources, human and financial and if efforts are concentrated, then the quality of information obtained may be improved (reduction of non-sampling error). Similar principles apply to the selection of sampling methodology. Samples may be classified as non-probability or probability in nature. The recommended method is probability sampling, the distinctive feature of which is that each individual unit in the total population around which a sampling procedure is planned (each sampling unit) has a known, non-zero but not necessarily equal probability of being selected. Generalisations can be made to the 'parent' population with a measurable precision and confidence. Methods of probability sampling include simple random sampling, systematic sampling, stratified sampling, ratio estimation and cluster sampling. Probability sampling may be performed in more than one stage (Kelsey, 1986; Abramson, 1990).

For Forms 1A and 2 in this study the primary sampling frame was the Australian Dental Association, New South Wales Branch membership record of active private general dental practitioners. It was not possible to obtain a complete list of contact addresses for these dentists from records of the Dental Board of New South Wales.

A computer generated random sample of 400 fulltime active private general dental practitioners was provided by the Australian Dental Association. It was planned to invite 300 of these dentists by a telephone request to participate in the survey. If it was found that any dentists were no longer at the address provided, that is the sampling frame was inaccurate then a replacement was chosen utilising a table of random numbers from the remaining 100 dentists on the computer list.

The sample size of 300 dentists was decided upon after a consideration of:

- a. resources as previously referred to,
- b. adequate precision for summary statistics obtained for descriptive aspects of the study and
- c. adequate statistical power to detect real differences between comparison groups for analytical aspects of the study (Dobson, 1984).

The following formulae were utilised:

a. the formula for sample size when sampling for proportions (Cochran, 1977):

$$n = \frac{\frac{t^2 PQ}{d^2}}{1 + \frac{1}{N} \left(\frac{t^2 PQ}{d^2} - 1 \right)}$$

d = margin of error

t = 't' statistic

N = size of population

n = sample size

P = proportion for the event occurring

Q = 1-P, proportion for the event not occurring

If N is large a first approximation of the above formula is:

$$n_0 = \frac{t^2 pq}{d^2} = \frac{pq}{V} \quad V = \frac{pq}{n_0}$$

where n_0 is an estimate of n and V = desired variance of the sample proportion and n_0 may be considered to equal n. However the number of dentists in the population was 1891 and so the correction factor was utilised to obtain n;

$$n = \frac{n_0}{1 + (n_0 - 1)/N}$$

b. a formula for sample size involving a consideration of power (Machin and Campbell, 1987):

$$m = \frac{(z_{1-\alpha} + z_{1-\beta})^2 \cdot \{ \pi_1(1-\pi_1) + \pi_2(1-\pi_2) \}}{\sigma^2}$$

m = required sample size

z = 'z' statistic

α = type 1 error, significance level

β = type 2 error

π_1 = proportion of event not occurring

π_2 = proportion of event not occurring

With regard to conduct of the survey to the private practices Dillman (1978) reported that a very large number of methodological publications deal in some way with how to improve the quality and quantity of response for postal surveys and that among the topics studied are the following:

- a. advance notification by letter or telephone that a questionnaire is being sent,
- b. white or off-white stationery,
- c. more expensive methods of delivering mail, for example certified delivery,
- d. inclusion of stamped return envelopes,
- e. official sponsorship of survey,
- f. personalisation of correspondence,
- g. anonymity and confidentiality,
- h. cover letter's composition: permissive (versus firm), long and reasoned (versus short and punchy), a plea for help (versus offer of reward), a request for favour, stress on social usefulness of study and importance of

respondent to study success,

i. offer and/or enclosure of incentive,

j. use of repeated follow-up by mail and/or telephone and

k. timing of follow-ups.

He concluded however that it was difficult to arrive at definitive conclusions regarding particular techniques designed to improve responses primarily because of the way the research had been conducted, most studies focussing on only one or two techniques at a time and researchers assumed that respondent behaviour is primarily a reaction to particular aspects of mail questionnaire studies, rather than a reaction to the whole. He also concluded that there was a lack of focus on the prospective respondent. Dillman (1978) therefore proposed the Total Design Method for survey methodology. The Total Design Method consists of two parts:

A. the identification of each aspect of the survey process that may affect either the quality or quantity of response and to shape each of them in such a way that the best possible responses are obtained. This step is guided by a theoretical view about why people respond to questionnaires involving the concept of social exchange. This concept suggests several things a researcher might do to encourage response:

a. reward the respondent by,

- showing positive regard,

- giving verbal appreciation,
- using a consultative approach,
- supporting his or her values and
- making the questionnaire interesting,

b. reduce costs to the respondent by,

- making the task appear brief,
- reducing the physical and mental effort that is required,
- eliminating chances for embarrassment,
- eliminating any chances for subordination and
- eliminating any direct monetary cost,

c. establish trust by,

- identifying with a known organisation that has legitimacy and
- building on other exchange relationships.

B. the implementation of the survey in accordance with design intentions.

Dillman (1978) reported on the highly favourable outcomes of 50 mail surveys utilising the Total Design Method involving a large number of different investigators and a wide range of different topics. The theory of this method was therefore utilised to guide the mail survey aspects of this project as well as other aspects of the project in a broader sense.

Each participating dentist was forwarded by post 2 Form 1A's to be completed by patients presenting to the practice requesting removable denture and/or fixed bridge treatment (the patients were sampled by the two stage cluster method), and a Form 2 to be completed by themselves. Two additional leaflets (Appendix I) were provided, one a further explanation of the survey protocol addressed to the dentists and the other, an explanation of the research procedures to be presented to participating patients. A numerically coded self-addressed 'Freepost' envelope was provided for return of the questionnaires. The coded envelopes allowed for follow-up of non-respondents. A maximum time period of 3 months was allowed for the completion of patient questionnaires. Three follow-ups were carried out by telephone at 1 monthly intervals. These follow-up contacts allowed the opportunity to further answer respondent questions and to forward further questionnaires in circumstances where the original ones had been misplaced, as well as request return of the questionnaires. It is to be noted that it was requested that both complete and incomplete questionnaires be returned in an attempt to attach value to each form.

Consider the sample design for the patients attending public dental facilities. The previously mentioned concepts and formulae of Dobson (1984), Cochran (1977) and Machin and Campbell (1987) were used. Form 1 was directed to patients requesting removable denture and/or fixed bridge

treatment presenting to the admissions areas of three public hospitals, two Sydney based, United Dental Hospital and Westmead Hospital Dental Clinical School and Royal Newcastle, a regional hospital. In order to reduce bias, attempts were made to encourage each respondent approached to complete the questionnaire even when there were language difficulties. Interpreters were sought when necessary, often a person(s) accompanying the respondent was able to assist.

2.2.2 The longitudinal study of patients receiving implant treatment

The sample of patients receiving implant treatment (as described by Adell et al., 1988; Zarb and Jansson, 1988; Engquist et al., 1988 and Naert et al., 1988) to be studied were urban edentulous patients attending the Centre for Osseointegrated Dental Implants established by the University of Sydney and the United Dental Hospital. It was decided not to include similar patients attending the Centre who lived in rural areas for practical reasons.

Each of the patients receiving implant treatment was matched to an edentulous control patient receiving conventional complete dentures. By definition, matching refers to the selection of a series of subjects identical, or nearly so, to the index series (those subjects receiving the intervention which in this study was implant treatment)

with respect to one or more potentially confounding factors. Matching enhances validity. The mechanics of matching may be performed subject by subject, which is described as individual matching, or for groups of subjects, which is described as frequency matching. The general principles that apply to matched data are identical for individually matched or frequency matched data (Rothman, 1986).

In this study individual matching was used. The patients within the index series were as closely matched as possible with control patients for gender, age and class. Patients were assigned to a social class based on the method of Cunningham (1984) who assigned class according to the suburb in which the study participants lived. The patients receiving implant treatment were classified as public patients if they were entitled to a Health Care Card, otherwise they were classified as private patients. The records of the prosthetic treatment waiting list of the United Dental Hospital were used to select control patients from the public sector. Private general dental practitioners from relevant suburbs were invited to forward details of patients receiving complete denture treatment to the author so that arrangements could be made to include these patients in the study as appropriate.

It was decided that it would be practical only to review patients after treatment (the post-test only control group

design described by Campbell and Stanley {1963} was referred to). Post-treatment follow-up periods were 1, 3 and 6 months.

It is to be noted that the administration of Minnesota Multiphasic Personality Inventories was discontinued because the length of the questionnaires made it difficult for aged patients to answer and also because it was difficult to integrate the time taken for completion of the questionnaires with the routines of private general dental practice. It was not deemed appropriate to substitute an alternative personality measurement because once again the burden for some study participants was likely to have been excessive.

2.3 DATA MANAGEMENT PLAN

Data management was committed to a NEC Powermate 1 Plus Personal Computer, utilising mainly the SAS^R system (Saffer 1985) and Wordperfect^R word processing package (WordPerfect Corporation, 1989). It was planned to use other statistical packages, for example SPIDA^R (Hamey et al., 1985), as necessary. The Harvard Graphics package and a Hewlett Packard Plotter (7550A) were used to create graphical output of the data.

Preliminary data files were created in the FS EDIT section of SAS^R with a text input file from Wordperfect^R delineat-

ing the cell names, the type of data (character or numeric) and the cell length. This procedure was developed during the pretest stage of questionnaire construction and the subsequent data files were modified as necessary.

Data editing was carried out to ensure accuracy, consistency and completeness of the final data sets (Rothman, 1986). Frequency programmes were run to detect non-allowable values, maldistributions and missing values. Cross tabulation checks were done where possible. Missing and incorrect data were provided with specific codes where necessary.

Data were reduced for open-ended questions after assessment of fine categorisations of answers revealed that more useable categories could be created.

CHAPTER 3 - RESULTS

3.1 RESPONSE TO THE QUESTIONNAIRES

3.1.1 Response to the administration of Form 1 within the hospitals

One hundred questionnaires were completed at both the United Dental Hospital and Westmead Hospital Dental Clinical School and 89 questionnaires at the Royal Newcastle Hospital.

3.1.2 Response to the postal questionnaires

Following the telephone invitation, 93.7% of the sample of 300 active general dental practitioners agreed to participate in the study. Expressed as a percentage of the original sample, 69.7% of envelopes were returned. At least one Form 1A was returned by 68.7% of dentists, 54.3% of dentists returned at least one completed Form 1A so that 276 of these questionnaires could be subjected to statistical analysis.

With regard to Form 2, 69.0% of the dentists returned a questionnaire, 65.3% of the dentists returned completed questionnaires.

This response rate compares favourably with the National

Dental Practice survey conducted in 1988 and reported in the Australian Dental Association News Bulletin in 1989. It was not possible to determine the representativeness of the response for the dentists by comparison to data stratified according to gender, age or geographic location of each dentist's main practice from the records of the Australian Dental Association. Similarly, relevant stratified data for full-time active private general dental practitioners was not available from the New South Wales Health Department. However this Department was able to provide stratified frequency tables for gender, age and geographic location of each dentist's main practice for the total number of registered dentists in New South Wales. On theoretical grounds it was considered unreasonable to perform Chi Square analyses for the variable 'age' for this group of dentists and the survey respondents. In the former group, 16% of dentists were aged 65 years or over and were possibly not active or only practicing part-time. Although subject to biases, Maximum Likelihood Chi Square (G^2) analyses were completed for these two groups of dentists for the variables gender and geographical location of each dentist's main practice, significant differences were not detected at the $p \leq 0.05$ level ($G^2=1.157$; $df\{\text{degrees of freedom}\}=1$; $p\{\text{probability value}\}=0.282$ and $G^2=12.542$; $df=15$; $p=0.638$ respectively).

3.1.3 Response to the clinical study

A total of 14 urban edentulous patients receiving implant treatment ad modum Brånemark were able to participate in the study and were matched to suitable control patients receiving conventional complete denture treatment (Table 10).

Complete post-treatment data sets were not obtained for all patients because of, for example, patient illness, leave restrictions from employment and holiday commitments. The response pattern for completion of the questionnaires is presented in Table 11.

3.2 DESCRIPTION AND ANALYSES OF FORMS 1 AND 1A

3.2.1 Description and analyses of sociodemographic, dental history and health beliefs data

Unless otherwise stated, the level of significance for the ensuing analyses is considered to be at the $p \leq 0.05$ level. Also, abbreviations once defined, remain consistent.

Frequency tables for selected potential explanatory variables for the dependent awareness and needs variables for the patients attending public hospitals and private practice are presented in Appendix II. Tables 12-14 contain Maximum Likelihood Chi Square analyses of these data. It

Table 10: Characteristics of the patients receiving implant treatment and their matched control patients.

Code	IMPLANT PATIENTS			CONTROL PATIENTS		
	Sex	Dob	Scls	Sex	Dob	Scls
1	F	1929	4	F	1926	4
2	F	1915	7	F	1914	6
3	F	1919	5	F	1918	4
4	F	1918	6	F	1919	4
5	M	1920	4	M	1922	4
6	M	1919	4	M	1924	3
7	F	1951	6	F	1950	6
8	F	1934	5	F	1935	4
9	F	1946	6	F	1946	5
10	M	1947	5	M	1943	6
11	F	1925	4	F	1946	7
12	F	1950	5	F	1935	5
13	F	1923	2	F	1921	3
14	F	1942	4	F	1935	4

LEGEND:

Sex:

F: female

M: male

Dob: date of birth

Scls: Social class (Cunningham, 1984)

1-7: median rankings for class (1-highest rank)

Table 11: Response pattern for the completion of post-treatment questionnaires by the implant patients and the control group.

Code	IMPLANT PATIENTS			CONTROL PATIENTS		
	1 mth PI	3 mth PI	6 mth PI	1 mth PI	3 mth PI	6 mth PI
1			*	*	*	*
2	*	*	*	*	*	*
3	*			*		
4	*	*	*	*	*	*
5	*	*	*	*	*	*
6		*			*	
7	*	*	*	*	*	*
8	*	*	*	*	*	*
9			*	*	*	*
10	*	*	*	*	*	*
11	*		*	*	*	*
12	*	*	*	*	*	*
13	*	*		*	*	
14	*	*		*	*	*

LEGEND:

1 mth PI: 1 month after insertion of the prosthesis(es)

3 mth PI: 3 months after insertion of the prosthesis(es)

6 mth PI: 6 months after insertion of the prosthesis(es)

*: patient and dentist questionnaires completed

Table 12: Maximum Likelihood Chi Square analyses of 'Sociodemographic' variables for the patients attending public hospitals and private general dental practice.

VARIABLE	df	G ²	p
SEX	1	1.211	0.271
AGE	7	92.111	0.000
MS	4	42.736	0.000
EQ	9	199.609	0.000
CLASS	2	182.315	0.000
POB	16	27.662	0.035
LR	6	32.136	0.000
LANG	10	36.792	0.000
CR	1	1.498	0.221

LEGEND:

- df: Degrees of freedom
- G²: Maximum Likelihood Chi Square
- p: Probability value
- SEX: 'Sex of the patient'
- AGE: 'Age of the patient'
- MS: 'Marital status'
- EQ: 'Education'
- CLASS: 'Social class'
- POB: 'Place of birth'
- LR: 'Length of residence in Australia'
- LANG: 'Main language spoken at home'
- CR: 'Change of residence in the last 5 years'

Table 13: Maximum Likelihood Chi Square analyses of 'Dental History' variables for the patients attending public hospitals and private general dental practice.

VARIABLE	df	G ²	p
FEAR	1	1.342	0.247
DISL	1	0.038	0.845
FAMF	1	7.268	0.007
FAMD	1	1.725	0.189
OFTA	4	68.376	0.000
EV	1	116.740	0.000
OFTAS	5	59.734	0.000
OFTAC	5	52.872	0.000
KAC	1	24.327	0.000
NTM	1	7.249	0.007
HDB	1	6.317	0.012
LDB	4	9.997	0.040
FC	4	16.656	0.002
TT	4	142.452	0.000
DI	1	335.428	0.000
DW	21	153.783	0.000

LEGEND:

- FEAR: 'Do you have any specific fears in relation to dentists?'
- DISL: 'Do you have any specific dislike (excluding fear) in relation to dentists?'
- FAMF: 'Do any of your family members have any specific fears in relation to dentists?'
- FAMD: 'Do any of your family members have any specific dislikes (excluding fear) in relation to dentists?'
- OFTA: 'How often do you attend the dentist?'
- EV: 'Is today's dental visit for an emergency reason(s)?'
- OFTAS: 'How often does your spouse/defacto attend the dentist?'
- OFTAC: 'How often do/does your children attend the dentist?'
- KAC: 'Do you know anyone who has a complete denture(s)?'
- NTM: 'Do you have a natural tooth/teeth missing (excluding wisdom teeth)?'
- HDB: 'Do you have a denture(s)/bridges(s)?'
- LDB: 'How long is it since you first began to wear a denture(s)/bridge(s)?'
- FC: 'How frequently do you clean your denture(s)/teeth?'
- TT: 'How much time does it take for you to travel to the dentist?'
- DI: 'Do you have dental insurance?'
- DW: 'Type of denture(s)/bridge(s) worn'

Table 14: Maximum Likelihood Chi Square analyses of 'Health Beliefs' variables for the patients attending public hospitals and private general dental practice.

VARIABLE	df	G ²	p
VR	1	19.600	0.000
GPR	1	20.384	0.000
DPS	1	0.408	0.523
PSDP	1	2.457	0.117
LNTI	1	23.017	0.000
FILEX	1	37.168	0.000
DCFT	2	16.531	0.000

LEGEND:

- VR: 'Do you believe it is of value to see a dentist regularly?'
- GPR: 'Did you know that it is good practice to see a dentist every six months?'
- DPS: 'Do you feel that dental problems are serious?'
- PSDP: 'Do you feel that you are particularly susceptible to dental problems?'
- LNTI: 'Do you feel that the loss of natural teeth is inevitable?'
- FILEX: 'Preference for a filling or an extraction'
- DCFT: 'How do/would full dentures (upper and lowers) compare with natural teeth?'

is apparent that the two groups of patients differ to a significant extent for most of the variables.

3.2.2 Description and analyses of awareness variables

With regard to the awareness variables, 63.8% (95% CI {confidence interval} $\pm$ 5.67%) of the patients attending private practice had 'heard' of dental implants as compared to 27.3% (95% CI $\pm$ 5.14%) of patients attending public institutions (Figure 3). This difference is highly statistically significant (Table 15). There was no significant difference between United Dental Hospital (UDH), Westmead Hospital Dental Clinical School (WHDCS) and Royal Newcastle Hospital (RNH) with respect to this issue (Table 16).

An Informal Stepwise Logistic Regression Analysis (Hamey et al., 1985) was also carried out for the variable 'have you ever heard of dental implants?' Independent variables were included in this analysis if they were of theoretical relevance and/or were demonstrated to be significantly associated with this awareness variable utilising the Maximum Likelihood Chi Square statistic (Tables 17-19). The imputation method for management of the missing/incorrect data involved Worst Case Analysis where occurrences of missing/incorrect data for the independent variables were considered to have responded in the negative for the dependent variable. By convention affirmative responses for

Figure 3: Have you ever heard of dental implant treatment?

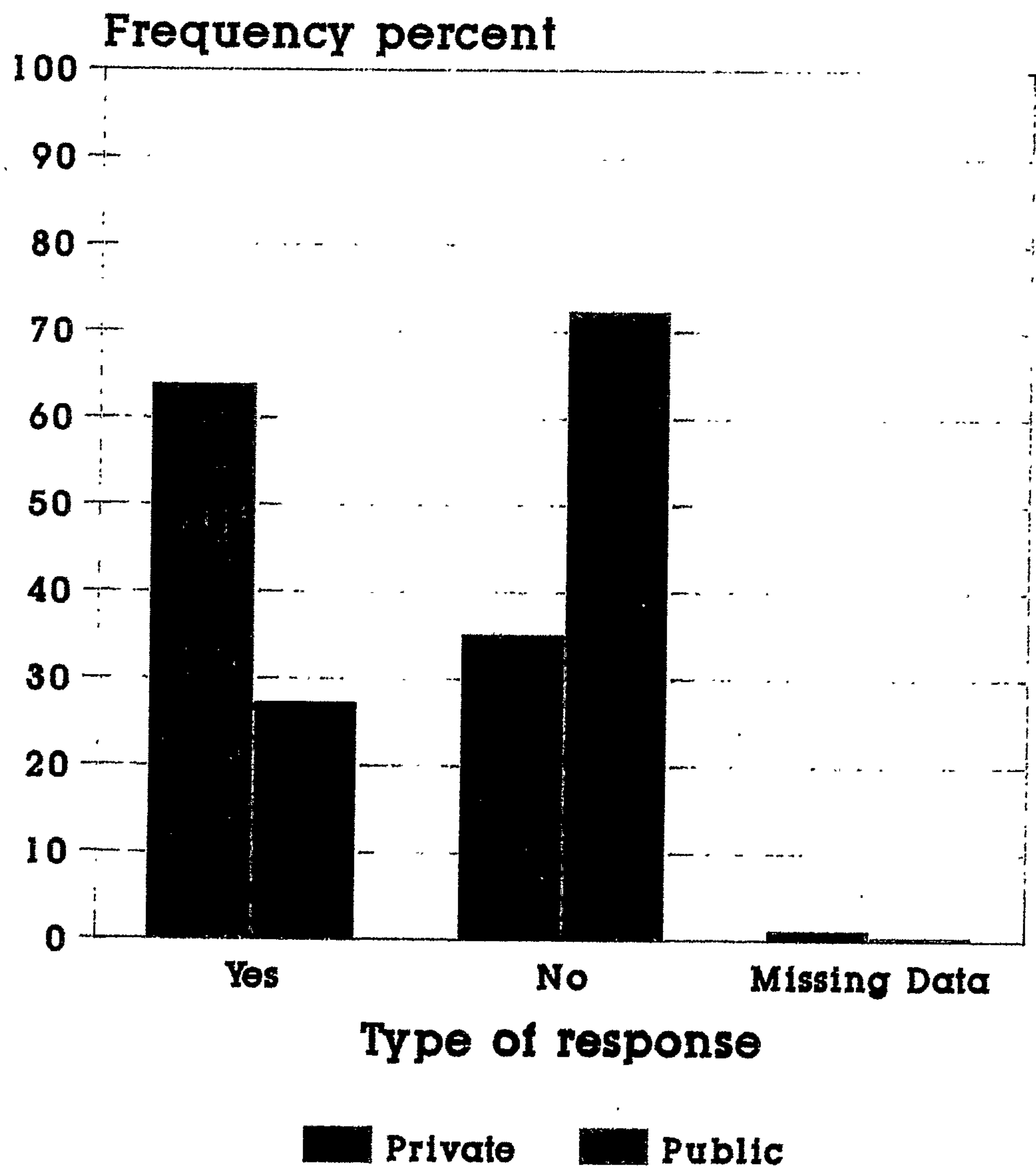


Table 15: Contingency table for the variables 'Have you ever heard of dental implants?' (HI) and whether the patient attends public hospitals or private general dental practice (PTYPE).

PTYPE	HI		
Frequency			
Percent			
Row Pct			
Col Pct	1	2	Total
-----+-----+-----+			
private	176	97	273
	31.37	17.29	48.66
	64.47	35.53	
	69.02	31.70	
-----+-----+-----+			
publich	79	209	288
	14.08	37.25	51.34
	27.43	72.57	
	30.98	68.30	
-----+-----+-----+			
Total	255	306	561
	45.45	54.55	100.00

LEGEND:

Row Pct: row percent
Col Pct: column percent
HI:
1: yes
2: no
PTYPE:
private: patient attends private general dental practice
publich: patient attends public hospital

STATISTICS FOR TABLE OF HI BY PTYPE

Statistic	df	Value	Probability

Likelihood Ratio Chi-Square	1	79.404	0.000

Sample Size = 561

Table 16: Contingency table for the variables 'HI' and location of the hospital attended by the patient (LHOSP).

LHOSP		HI		
Frequency				
Percent				
Row Pct				
Col Pct	1	2		Total
-----+-----+-----+-----+-----				
RNH	21	68		89
	7.29	23.61		30.90
	23.60	76.40		
	26.58	32.54		
-----+-----+-----+-----+-----				
UDH	26	73		99
	9.03	25.35		34.38
	26.26	73.74		
	32.91	34.93		
-----+-----+-----+-----+-----				
WHDCS	32	68		100
	11.11	23.61		34.72
	32.00	68.00		
	40.51	32.54		
-----+-----+-----+-----+-----				
Total	79	209		288
	27.43	72.57		100.00

STATISTICS FOR TABLE OF HI BY LHOSP

Statistic	df	Value	Probability
-----+-----+-----+-----			
Likelihood Ratio Chi-Square	2	1.763	0.414

Sample Size = 288

Table 17: Maximum Likelihood Chi Square statistics for the association of 'Sociodemographic' factors (SDF) and the variable 'HI' for patients attending both public hospitals and private general dental practice.

	PUBLIC PATIENTS			PRIVATE PATIENTS		
SDF	df	G^2	p	df	G^2	p
SEX	1	4.990	0.025	1	4.622	0.032
AGE	7	14.066	0.050	7	5.398	0.611
AGE	1	0.300	0.584	1	0.669	0.414
AGE	2	0.785	0.675	2	2.003	0.367
MS	3	4.676	0.197	4	4.133	0.388
EQ	9	10.782	0.291	9	10.445	0.316
EQ	2	7.838	0.020	2	4.988	0.083
POB	16	18.180	0.313	15	20.448	0.155
POB	1	4.849	0.028	1	0.574	0.449
CLASS	2	2.352	0.308	2	2.960	0.228
LR	6	3.586	0.733	6	10.087	0.121
LANG	9	14.753	0.098	8	14.419	0.071
LANG	1	3.425	0.064	1	0.952	0.329
CR	1	0.542	0.462	1	0.109	0.742

Table 18: Maximum Likelihood Chi Square Statistics for the association of 'Dental History' factors (DHF) and the variable 'HI' for patients attending both public hospitals and private general dental practice.

	PUBLIC PATIENTS			PRIVATE PATIENTS		
DHF	df	G ²	p	df	G ²	p
FEAR	1	1.178	0.278	1	0.942	0.332
DISL	1	0.048	0.826	1	0.714	0.398
FAMF	1	1.676	0.195	1	0.207	0.649
FAMD	1	0.098	0.754	1	6.606	0.010
OFTA	4	4.871	0.301	4	4.246	0.374
EV	1	0.286	0.593	1	5.031	0.025
OFTAS	5	6.125	0.294	5	2.059	0.841
OFTAC	5	2.581	0.764	5	12.949	0.024
KAC	1	9.581	0.002	1	3.898	0.048
HDB	1	0.157	0.692	1	0.038	0.845
LDB	4	3.736	0.443	4	1.092	0.896
FC	4	3.502	0.478	4	14.078	0.007
TT	4	9.536	0.049	4	3.541	0.472
DI	1	1.912	0.167	1	0.666	0.414
DW	12	15.887	0.196	18	14.292	0.710

Table 19: Maximum Likelihood Chi Square Statistics for the association of 'Health Belief' factors (HBF) and the variable 'HI' for patients attending both public hospitals and private general dental practice.

	PUBLIC PATIENTS			PRIVATE PATIENTS		
HBF	df	G ²	p	df	G ²	p
VR	1	5.017	0.025	1	2.335	0.127
GPR	1	17.124	0.000	1	1.009	0.000
DPS	1	7.161	0.007	1	0.122	0.727
PSDP	1	1.215	0.270	1	0.309	0.578
LNTI	1	2.732	0.098	1	15.561	0.000
FILEX	1	2.566	0.109	2	11.526	0.003
DCFT	2	1.869	0.393	2	10.206	0.006

relevant variables were assigned the value of 1 when setting up the dummy variables for the logistic regression model. Table 20 presents the results of the logistic regression analysis.

With regard to awareness of the availability of dental implant treatment in New South Wales 84.1% of those patients attending private practice who had 'heard' of dental implant treatment were also aware that dental implant treatment is available in New South Wales as compared to 48.1% for the public group (Figure 4). This difference is highly statistically significant (Table 21). There was no difference between UDH, WHDCS and RNH with respect to this issue (Table 22). If the frequency of the 'yes' response is expressed as a percentage of the total number of respondents in the survey then it is apparent that 53.6% of the patients attending private practice are aware that dental implant treatment is available in New South Wales as compared to 13.2% of the patients attending public hospitals (Figure 4).

Responses for the definition of the term 'dental implant' are presented in Table 23. A significant difference existed between the patients attending private practice and public hospitals with respect to these responses ($G^2=40.871$; $df=12$; $p=0.000$). There was no significant difference between the patients attending UDH, WHDCS and

Table 20: Logistic Regression analysis for the variable 'HI'.

COLNM	COEFF	SE	p	ODDS	0.95 CI
0	-1.634	0.531	0.002		
1	1.095	0.245	0.000	2.990	1.851-4.833
2	0.397	0.207	0.056	1.487	0.990-2.233
3	0.528	0.274	0.054	1.696	0.992-2.899
4	-0.342	0.346	0.322	0.710	0.361-1.398
5	-0.370	0.401	0.356	0.691	0.315-1.515
6	0.057	0.334	0.864	1.059	0.551-2.035
7	-0.276	0.379	0.467	0.759	0.361-1.596
8	-0.819	0.416	0.049	0.441	0.195-0.997
9	0.286	0.366	0.436	1.330	0.649-2.727
10	-0.743	0.434	0.087	0.476	0.203-1.113
11	-0.382	0.414	0.356	0.682	0.303-1.535
12	-0.415	0.453	0.360	0.661	0.272-1.604
13	-0.005	0.257	0.985	0.995	0.602-1.646
14	0.580	0.291	0.046	1.787	1.011-3.159
15	-0.133	0.374	0.721	0.875	0.421-1.820
16	-0.514	0.343	0.134	0.598	0.306-1.172
17	0.866	0.293	0.003	2.378	1.338-4.226
18	0.597	0.304	0.049	1.817	1.002-3.294
19	-0.632	0.202	0.002	0.531	0.358-0.789
20	0.824	0.263	0.002	2.280	1.363-3.814

df:540; Dev:624.774; %(0):54.545; #iter:11; RSq:0.192

LEGEND:

- COLNM: Column Name

COEFF: Coefficient

SE: Standard Error

Dev: Deviance

#iter: Number of iterations

RSq: Coefficient of Determination

0: Constant

1: Source of data

2: Sex of the patient

3: Family fears/dentist

4: Wearing complete(C) dentures

5: Wearing (C) upper(U) denture(D) only

6: Wearing partial(P) UD

7: Wearing PUD and P lower(L) D
- 8: Wearing FUD/PLD

9: Wearing any other D

10: Frequency of cleaning(FQC), ≤once/2days

11: FQC, once/day

12: FQC, twice/day

13: Time/travel to dentist(TT), 15-29 minutes

14: TT, 30-59 minutes

15: TT, ≥1 hour

16: Belief/value/regular visits

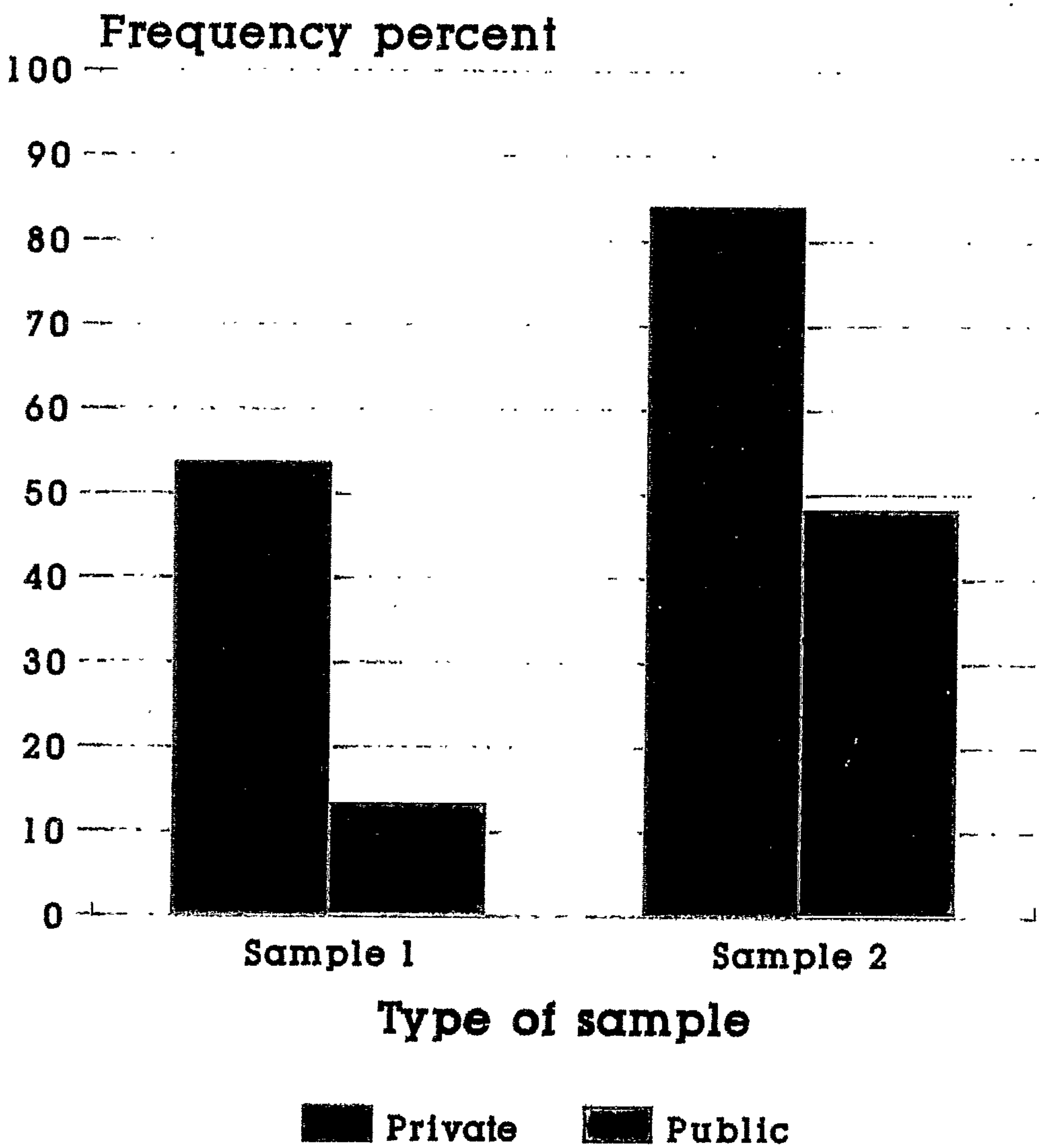
17: Knowledge/good practice/regular visits

18: Belief/dental problems/serious

19: Belief/loss natural teeth inevitable

20: Belief/preference for filling/extraction

Figure 4: Awareness of the availability of DimpTx* in NSW



*DimpTx - Dental implant treatment

Table 21: Contingency table for the variables 'Are you aware that dental implant treatment is available in NSW?' (ANSW) and 'PTYPE'.

PTYPE		ANSW		
Frequency				
Percent				
Row Pct				
Col Pct	1	2		Total
-----+-----+-----+				
private	148	28		176
	58.27	11.02		69.29
	84.09	15.91		
	79.57	41.18		
-----+-----+-----+				
publich	38	40		78
	14.96	15.75		30.71
	48.72	51.28		
	20.43	58.82		
-----+-----+-----+				
Total	186	68		254
	73.23	26.77		100.00

LEGEND:
ANSW:
1: yes
2: no

STATISTICS FOR TABLE OF ANSW BY PTYPE

Statistic	df	Value	Probabilty

Likelihood Ratio Chi-Square	1	32.823	0.000

Sample Size = 254

Table 22: Contingency table for the variables 'ANSW' and 'LHOSP'.

LHOSP	ANSW		
Frequency			
Percent			
Row Pct			
Col Pct	1	2	Total
-----+			
RNH	10	11	21
	12.82	14.10	26.92
	47.62	52.38	
	26.32	27.50	
-----+			
UDH	13	12	25
	16.67	15.38	32.05
	52.00	48.00	
	34.21	30.00	
-----+			
WHDCS	15	17	32
	19.23	21.79	41.03
	46.88	53.13	
	39.47	42.50	
-----+			
Total	38	40	78
	48.72	51.28	100.00

STATISTICS FOR TABLE OF ANSW BY LHOSP

Statistic	df	Value	Probabilty

Likelihood Ratio Chi-Square	2	0.161	0.922

Sample Size = 78

Table 23: Definition of the term 'Dental Implant' for patients attending public hospitals and private general dental practice (expressed as percentages of the total number of reports).

RESPONSE	PUBLIC PATIENTS	PRIVATE PATIENTS
1	43.6	55.9
2	2.56	13.5
3	23.1	16.5
4	5.13	6.47
5	5.13	0.00
6	10.3	1.18
7	3.85	1.18
8	1.28	1.77
9	2.56	3.53

LEGEND:

- 1: Artificial tooth and foundation in gum/jaw bone
- 2: Foundation in gum/jaw bone
- 3: Tooth (nature undefined) implanted/inserted into gum
- 4: Artificial replacement
- 5: Artificial tooth put onto root (post crown)
- 6: Artificial tooth placed in gum immediately after extraction
- 7: Natural tooth put into gum (including transplant)
- 8: Miscellaneous item/incorrect
- 9: Doesn't know

RNH with respect to this issue.

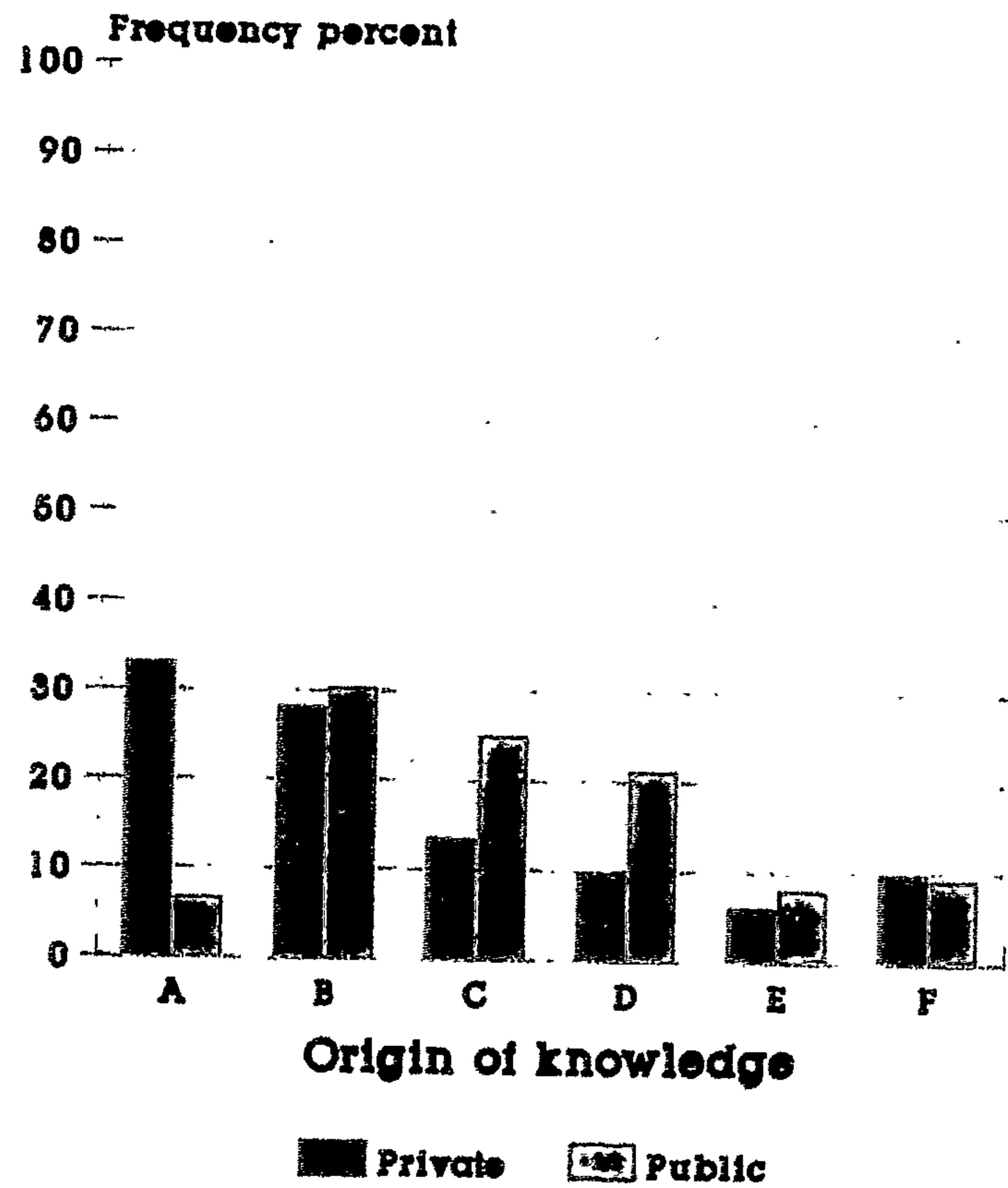
Responses for the origin of the respondents' knowledge regarding dental implants are presented in Figure 5. A significant difference existed for the private and public groups ($G^2=40.637$; $df=20$; $p=0.004$). There was no significant difference between the patients attending UDH, WHDCS and RNH with respect to this issue.

With regard to the issue of whether dental implants may be considered a valuable addition to dental treatment, of those patients who had 'heard' of dental implants, 84.1% of the patients attending private practice and 76.0% of the patients attending the dental hospitals considered that this was the case. This difference was not significantly different. There was no significant difference between the patients attending UDH, WHDCS and RNH with respect to this issue.

3.2.3 Description and analyses of 'needs' variables

With regard to self perceived need for dental implants, of those patients who had 'heard' of dental implants, 30.1% of the private group and 24.1% of the public group responded 'yes' to the question 'do you think that it is likely that you may require a dental implant in the future?' If the frequency of the 'yes' response is expressed as a percentage of the total number of respondents in the survey then it is apparent that 19.2% of the patients attending

Figure 5: Origin of knowledge*



*(expressed as a percentage of the total number of reports)

Legend:
Response categories

- A. Dentist
- B. Reading
- C. Television
- D. Friends/Acquaintances
- E. Family
- F. Other;
 - Media
 - Radio
 - General knowledge
 - Dental nurse
 - Conferences
 - Medical practitioner
 - Doesn't know

private practice have a self-perceived need for dental implant treatment as compared to 6.6% of the patients attending public hospitals. This data is represented in Figure 6.

Percentage figures for the prosthodontic treatment requests involving dental implants are presented in Table 24. A significant difference existed between the patients attending private practice and those going to public hospitals ($G^2=56.267$; $df=3$; $p=0.000$).

For the patients attending the dental hospitals it was not possible to assess the association between the nature of problems associated with denture(s)\bridge(s) and\or missing teeth and treatment requests involving implants because of the low number of such requests. For the patients attending private practices a significant association was found between the upper denture\bridge problem of comfort and upper implant treatment requests ($G^2=5.103$; $df=1$; $p=0.024$) however this result is possibly biased because the percentage of missing data for the question relating to denture\bridge problems exceeded 15%. A decision was made not to impute the data. No significant associations were found between problems with missing teeth for which the patients did not have denture(s)\bridge(s) and treatment requests involving implants.

The reasons for the patients having missing teeth are

Figure 6: Self perceived need for dental implant treatment

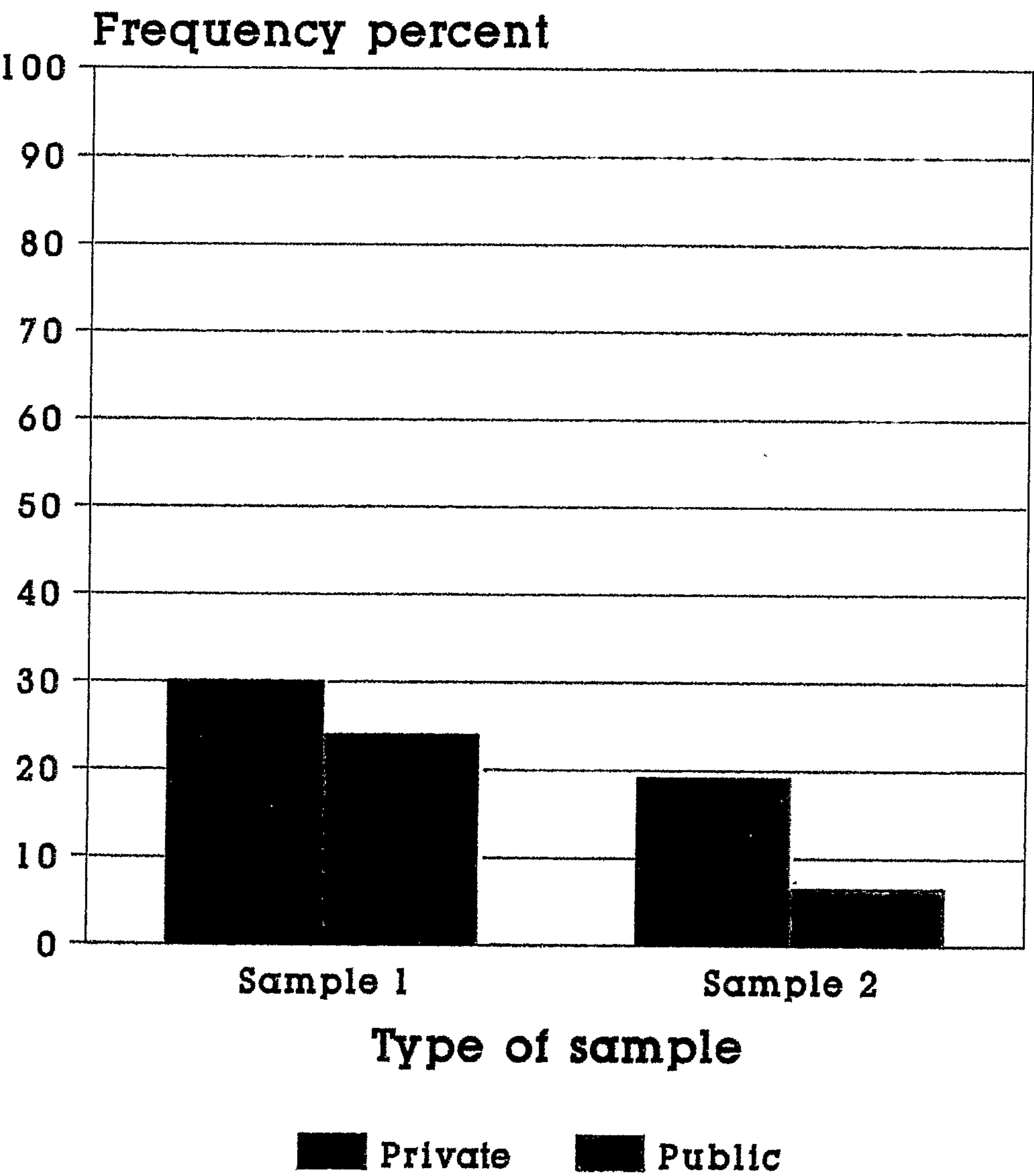


Table 24: Percentage of treatment requests involving dental implants (TREQ) for patients attending public hospitals and private general dental practice.

TREQ	PUBLIC PATIENTS	PRIVATE PATIENTS
UIT	0.346	5.44
LIT	0.000	3.62
ULIT	0.000	5.07
TOTAL	0.346	14.13

LEGEND:

TREQ: Treatment request
UIT: Upper implant treatment
LIT: Lower implant treatment
ULIT: Both upper and lower implant treatment

presented in Table 25.

3.3 DESCRIPTION AND ANALYSES OF FORM 2

Dental implants were considered to offer a successful long term treatment outcome by 67.9% (95%CI $\pm$ 6.5%) of the respondents and 14.3% (95% $\pm$ 4.9%) reported that they had completed a stage(s) of work involving dental implants. These outcomes were not significantly associated with age, year of graduation (these factors are probably collinear), gender, location of the institution from which the undergraduate dental qualification was gained or main practice location. The raw frequency tables for these data are presented in Appendix III. However the latter outcome was significantly associated with place of birth. Dentists born outside Australia were more likely to have completed a stage(s) of dental implant work (Table 26).

The percentage of dentists who reported that they had referred a patient for dental implant treatment was 44.4% (Table 27). The number of patients referred per dentist is presented in Table 28.

Now within the stratum of respondents who had completed a stage(s) of dental work involving implants, in addition to examination and treatment planning, consider the number of further treatment phases (FTP's) with which these dentists had been involved; one FTP had been completed by 35.7% of

Table 25: Reasons for having missing teeth for patients attending private practice and public hospitals (REASONS MT) (expressed as percentages of the total number of reports).

REASONS MT	PERCENTAGES	
	PUBLIC	PRIVATE
Decay	24.32	22.31
Bad, poor condition	22.98	17.48
Chalky, calcium deficient	3.04	0.372
Associated with pregnancy	1.01	0.745
Worn	1.35	1.12
Gum disease	10.47	10.78
Pain	16.89	11.52
Infection, abcesses	2.37	6.69
Appearance	1.01	1.49
Crowding, impaction	0.338	2.60
Accident, fight	6.08	5.58
Professional advice	4.39	10.78
Financial	0.678	1.12
To avoid drilling	0.678	0.744
Appointment problems	1.35	1.86
Other	3.04	4.84
Total	100.0	100.0

Table 26: Contingency table for the variables 'Have you ever completed any stage of work for a dental implant?' (COMDIW) and place of birth (POB).

POB		COMDIW		
Frequency				
Percent				
Row Pct				
Col Pct	1	2		Total
-----+-----+-----+				
1	15	128		143
	7.77	66.32		74.09
	10.49	89.51		
	53.57	77.58		
-----+-----+-----+				
2	13	37		50
	6.74	19.17		25.91
	26.00	74.00		
	46.43	22.42		
-----+-----+-----+				
Total	28	165		193
	14.51	85.49		100.00

LEGEND:

COMDIW:

- 1: yes
- 2: no

POB:

- 1: Australia
- 2: outside Australia

STATISTICS FOR TABLE OF COMDIW BY POB

Statistic	df	Value	Probabilty

Likelihood Ratio Chi-Square	1	6.515	0.011

Sample Size = 193

Table 27: Frequency table for the variable 'Have you ever referred a patient for dental implant treatment (REFP) ?'

REFP	FQ	%	CFQ	C%
1	87	44.4	87	44.4
2	105	53.6	192	98.0
I	1	0.5	193	98.5
M	3	1.5	196	100.0

LEGEND:

FQ: frequency
%: percentage
CFQ: cumulative frequency
C%: cumulative percentage
I: incorrect
M: missing
REFP:
1: yes
2: no

Table 28: Frequency table for the variable 'Number of patients referred for dental implant treatment (NPREF)?' (expressed as percentage of the total number of reports).

NPREF	FQ	%
1	58	63.7
2	16	17.6
3	6	6.59
4	2	2.20
I	2	2.20
M	7	7.69

LEGEND:

NPREF:

- 1: 1-3
- 2: 4-6
- 3: 7-10
- 4: 11-15

these dentists, 28.6% had completed two FTP's, 17.9% three FTP's and 10.7% four FTP's where a further treatment phase was defined specifically as prosthodontic, oral surgical, periodontic or endodontic in nature. The FTP which was reported to have been completed most frequently was the prosthodontic phase (34.0%), closely followed by the oral surgical phase (30.2%) as indicated in Figure 7.

Now if the 12 different combinations of FTP's that were reported are considered, then it is apparent that the most frequently reported combination was a single further treatment phase involving prosthetic treatment (19.2%). The frequency of each of the other combinations was 11.5% or less.

With regard to the dental implant system(s) with which the dentists had been involved, 64.3% were solely involved with an endosseous system(s), 17.9% reported that they were involved with an endosseous system(s) in combination with one or more other types of implant systems, 3.57% of dentists reported that they had not been involved with an endosseous system, but another type of system.

Within the prosthetic phase the ratio of single tooth implants to removable overdentures to fixed bridge treatment was 1:1.5:1 respectively (Figure 8).

If utilisation of each type of system is expressed as a

Figure 7: Further Treatment Phases provided by the dentists

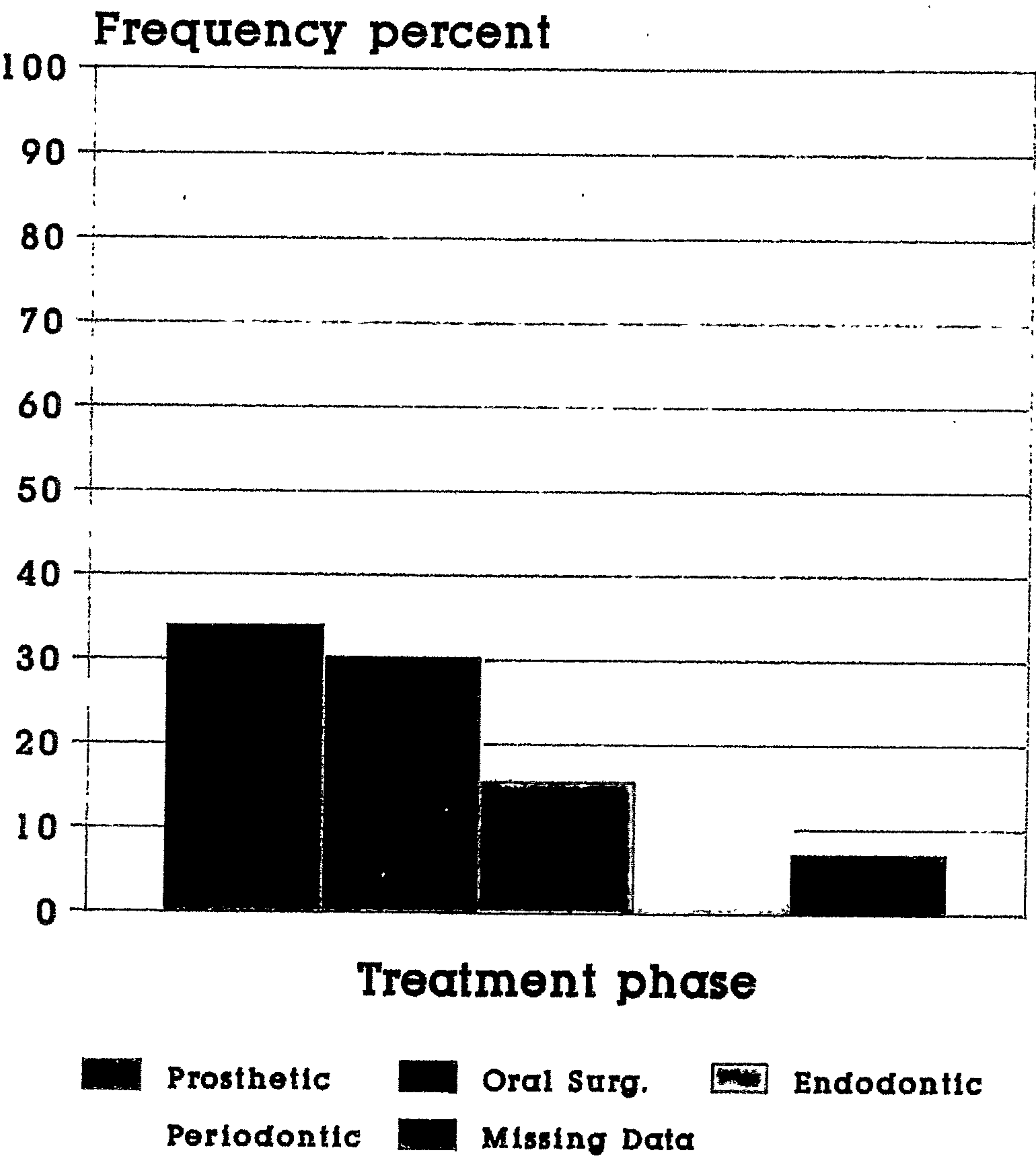
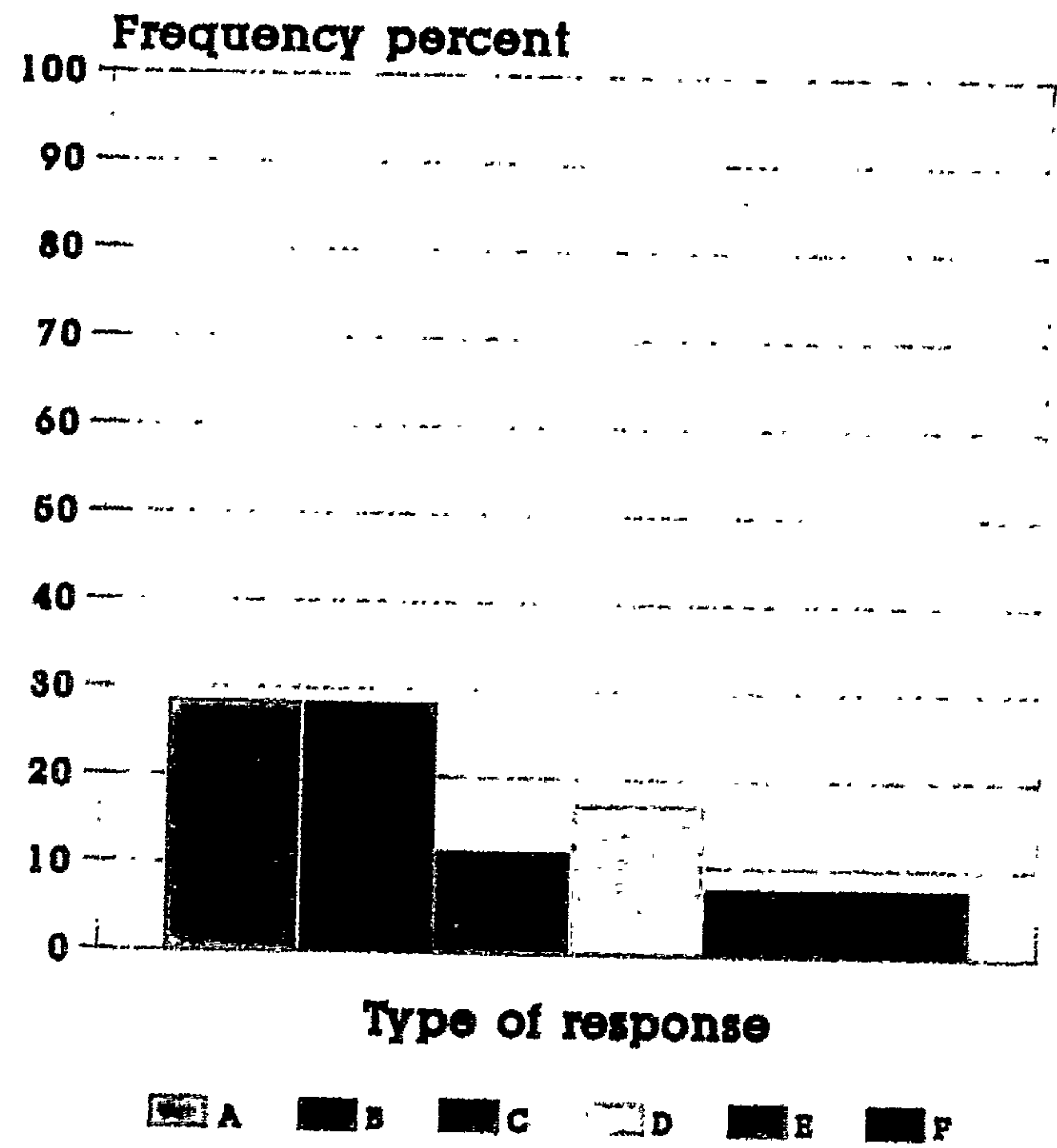


Figure 8: Prosthodontic nature of implant treatment*



*(expressed as a percentage of the total number of reports)

Legend:
Response categories

- A. Fixed bridgework
- B. Single tooth implant
- C. Maxillary removable complete overdenture
- D. Mandibular removable complete overdenture
- E. Maxillary removable partial overdenture
- F. Mandibular removable partial overdenture

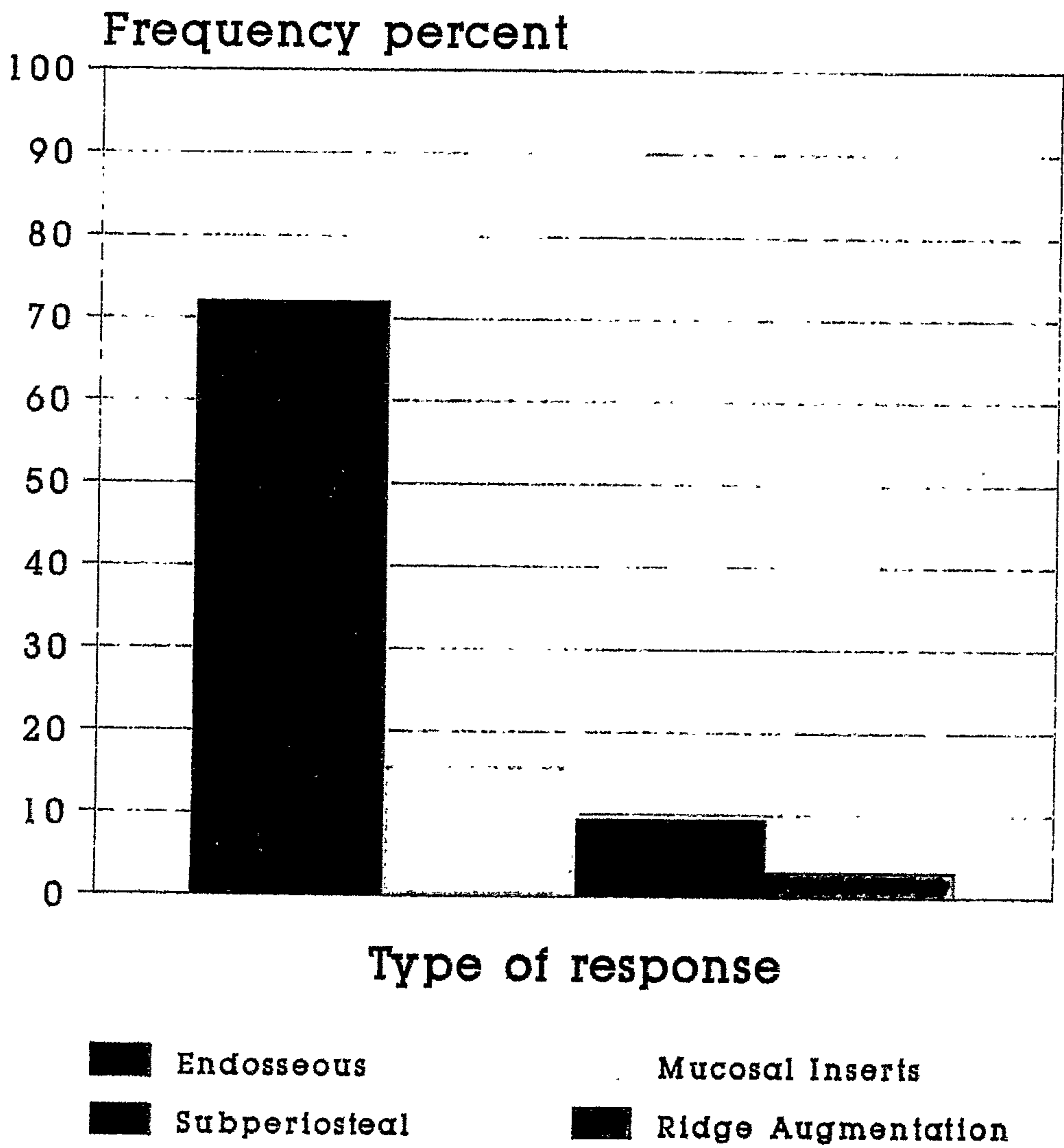
percentage of the total number of reports of different systems (the question was an open one), then it is apparent that endosseous implants (including screws, blades and endodontic implants) had or were being used more frequently (71.9%), followed by mucosal inserts, subperiosteal implants and ridge augmentation materials (15.6%, 9.38% and 3.13% respectively) (Figure 9).

Within the endosseous implant system stratum the ratio of current utilisation by dentists of a blade system(s), the Core-VentTM system or the Brånemark SystemTM, alone or in combination with another system(s) is 1.4:1:1.4 respectively.

With regard to the reasons for selecting specific implant systems, the most frequently reported reason was 'success rate and/or recommendation', 31.3% of the total number of responses. 'Oral factors and/or individual patient requirements' was the next most frequently reported category (21.9%) followed by 'ease of use' (15.6%) and 'cost' (12.5%). The figure for 'cost' may be considered quite low (Figure 10).

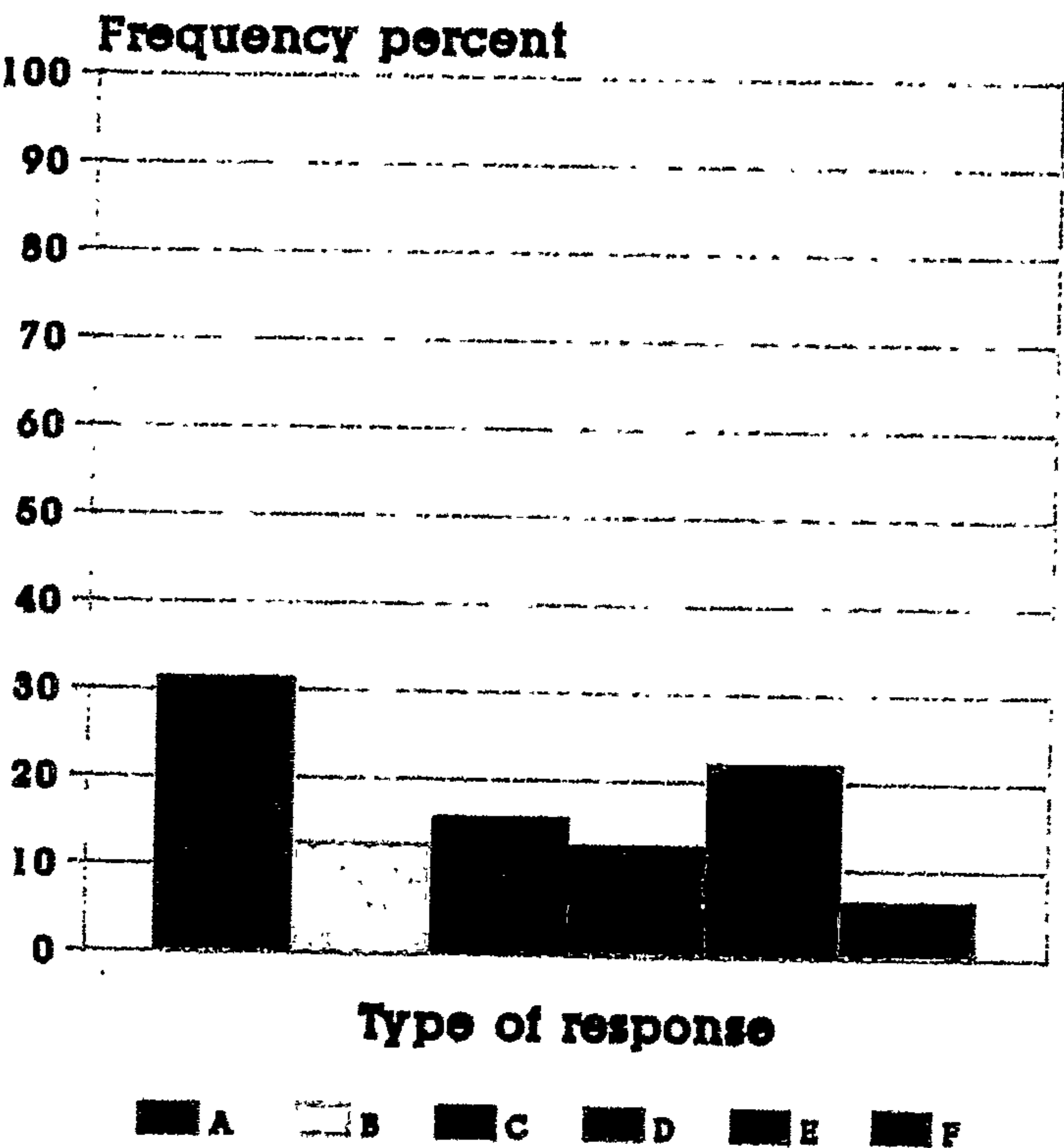
Consider the number of patients receiving implant treatment by this group of dentists in the last 5 years as presented in Figure 11. The most frequently reported category was the '1-3 patients' group, 39.3% of dentists had provided treatment for 7 or more patients over this time, 17.9% of

Figure 9: Utilisation of
implant systems*



*(expressed as a percentage of the
total number of reports)

Figure 10: Reasons for choice of implant system*

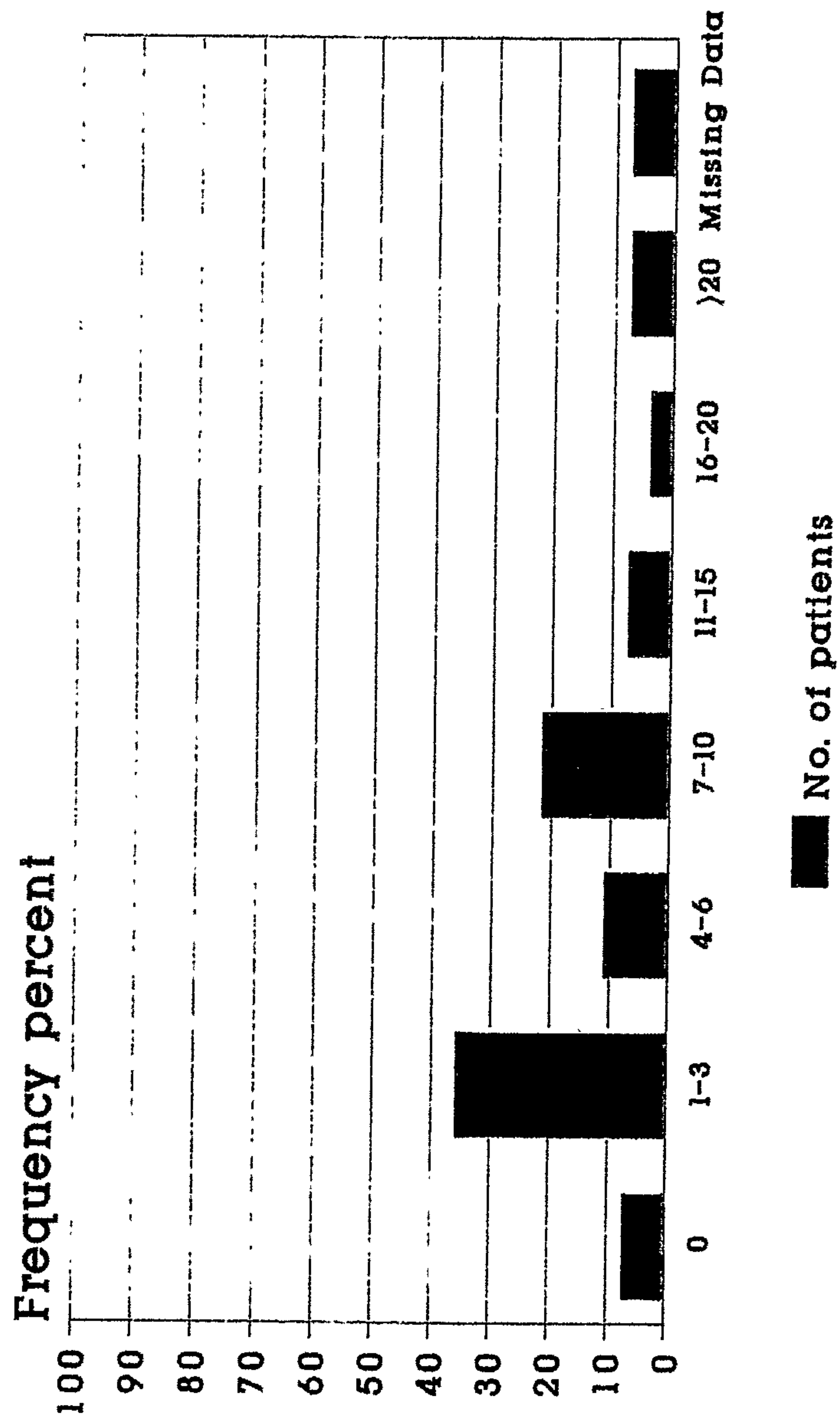


*(expressed as a percentage of the total number of reports)

Legend:
Response categories

- A. Success rate/recommendation
- B. Ready availability/backup/
team usage
- C. Ease of use
- D. Cost
- E. Oral factors/patient requirements
- F. Other

Figure 11: No. of patients receiving
DimpTx in the last 5 years



the dentists had provided treatment for 11 or more patients.

The number of patients with which they had been involved in providing implant treatment had increased over the last 2 years in relation to the previous 2 years for 46.4% of the dentists. It is worthwhile to emphasise at this stage that the total number of respondents who had completed a stage(s) of work in relation to dental implants was only 14.2% of the total number of respondents.

Now 42.9% of the total number of respondents in the survey reported that they had attended one or more further education courses on implants. This variable was significantly related to the location of the institution from which the undergraduate dental qualification was gained (Table 29). Those respondents who had gained this qualification outside of New South Wales were more likely to have attended a further education course.

With regard to intent to attend a postgraduate education course on dental implants, 54.1% of the total number of dentists responded 'yes'. This outcome was significantly related to age, year of graduation for the undergraduate dental qualification (these factors are probably collinear) and place of birth (Tables 30-32). Larger percentages of younger dentists and more recent graduates and dentists born outside Australia (particularly those born in Asia)

Table 29: Contingency table for the variables 'Have you ever attended one or more further education courses on implants?' (ATTEC) and location of the institution from which the undergraduate qualification was obtained (INSL).

INSL		ATTEC		
Frequency				
Percent				
Row Pct				
Col Pct	1	2		Total
1	66	90		156
	35.68	48.65		84.32
	42.31	57.69		
	78.57	89.11		
2	18	11		29
	9.73	5.95		15.68
	62.07	37.93		
	21.43	10.89		
Total	84	101		185
	45.41	54.59		100.00

LEGEND:

ATTEC:

- 1: yes
- 2: no

INSL:

- 1: New South Wales
- 2: outside New South Wales

STATISTICS FOR TABLE OF ATTEC BY INSL

Statistic	df	Value	Probability
Likelihood Ratio Chi-Square	1	3.849	0.050
Sample Size = 185			

Table 30: Contingency table for the variables 'Do you intend to attend a further education course on implants within the next two years?' (INTEC) and Age.

AGE		INTEC		
Frequency				
Percent				
Row Pct				
Col Pct	1	2	Total	
1	22	11	33	
	11.96	5.98	17.93	
	66.67	33.33		
	20.75	14.10		
2	43	17	60	
	23.37	9.24	32.61	
	71.67	28.33		
	40.57	21.79		
3	28	15	43	
	15.22	8.15	23.37	
	65.12	34.88		
	26.42	19.23		
4	6	17	23	
	3.26	9.24	12.50	
	26.09	73.91		
	5.66	21.79		
5	7	17	24	
	3.80	9.24	13.04	
	29.17	70.83		
	6.60	21.79		
6	0	1	1	
	0.00	0.54	0.54	
	0.00	100.00		
	0.00	1.28		
Total	106	78	184	
	57.61	42.39	100.00	

LEGEND:
INTEC: 2: 30-39
1: yes 3: 40-49
2: no 4: 50-59
AGE: (in years) 5: 60-69
1: 20-29 6: 70(+)

STATISTICS FOR TABLE OF INTEC BY AGE			
Statistic	df	Value	Probability
Likelihood Ratio Chi-Square	5	26.267	0.000
Sample Size = 184			

Table 31: Contingency table for the variables 'INTEC' and year of graduation for the undergraduate dental qualification (YGRAD).

YGRAD		INTEC		
Frequency				
Percent				
Row Pct				
Col Pct	1	2		Total
1	0	1		1
	0.00	0.54		0.54
	0.00	100.00		
	0.00	1.28		
2	0	1		1
	0.00	0.54		0.54
	0.00	100.00		
	0.00	1.28		
3	3	2		5
	1.63	1.09		2.72
	60.00	40.00		
	2.83	2.56		
4	9	25		34
	4.89	13.59		18.48
	26.47	73.53		
	8.49	32.05		
5	17	14		31
	9.24	7.61		16.85
	54.84	45.16		
	16.04	17.95		
6	42	15		57
	22.83	8.15		30.98
	73.68	26.32		
	39.62	19.23		
7	35	20		55
	19.02	10.87		29.89
	63.64	36.36		
	33.02	25.64		
Total	106	78		184
	57.61	42.39		100.00

LEGEND:

YGRAD:	4: 1950-59
1: Pre 1930	5: 1960-69
2: 1930-39	6: 1970-79
3: 1940-49	7: 1980-

STATISTICS FOR TABLE OF INTEC BY YGRAD			
Statistic	df	Value	Probabilty
Likelihood Ratio Chi-Square	6	24.282	0.000
Sample Size = 184			

Table 32: Contingency table for the variables 'INTEC'and 'POB'.

POB		INTEC		
Frequency				
Percent				
Row Pct				
Col Pct	1	2	Total	
1	67	68	135	
	36.61	37.16	73.77	
	49.63	50.37		
	63.21	88.31		
2	6	3	9	
	3.28	1.64	4.92	
	66.67	33.33		
	5.66	3.90		
4	3	0	3	
	1.64	0.00	1.64	
	100.00	0.00		
	2.83	0.00		
5	12	1	13	
	6.56	0.55	7.10	
	92.31	7.69		
	11.32	1.30		
6	1	0	1	
	0.55	0.00	0.55	
	100.00	0.00		
	0.94	0.00		
7	1	1	2	
	0.55	0.55	1.09	
	50.00	50.00		
	0.94	1.30		
8	16	4	20	
	8.74	2.19	10.93	
	80.00	20.00		
	15.09	5.19		
Total	106	77	183	
	57.92	42.08	100.00	

LEGEND:

POB:

1: Australia

2: United Kingdom/Ireland

3: Italy

4: Greece

5: Asia

6: South Africa

7: New Zealand

8: Other

STATISTICS FOR TABLE OF INTEC BY POB			
Statistic	df	Value	Probabilty
Likelihood Ratio Chi-Square	6	20.638	0.002
Sample Size = 183			

were more likely to report that they intended to attend a postgraduate education course on dental implants. There was no significant relationship between past attendance at a further education course and intent to attend such a course.

With regard to the variable 'do you feel that old people (older than 60 years) are poor candidates for oral rehabilitation?', 28.6% of the dentists responded 'yes' (Table 33). This outcome was significantly related to place of birth of the dentist, those dentists who were born in Australia and the United Kingdom/Ireland being more likely to respond 'no' (Table 34).

The factors influencing the dentists' decisions are presented in Table 35. These data are expressed as frequencies and percentages of the total number of factors reported. It is to be noted that 21.9% and 2.6% of dentists respectively did not respond to this question or provided incorrect information.

3.4 DESCRIPTION OF FORM 3

Form 3 provided sociodemographic data and dental history data for each patient. The reasons for the patients' missing teeth are presented in Table 36. Control patients appeared to have had their teeth extracted because of 'pain' and 'gum disease' to a greater extent than the

Table 33: Frequency table for the variable 'Do you feel that old people (older than 60 years) are poor candidates for oral rehabilitation (AGEC) ?'

AGEC	FQ	%	CFQ	C%
1	56	28.6	56	28.6
2	125	63.8	181	92.3
I	4	2.0	185	94.4
M	11	5.6	196	100.0

LEGEND:

AGEC:

1: yes

2: no

Table 34: Contingency table for the variables 'AGEC' and 'POB'.

POB	AGEC		
	Frequency		
	Percent		
Row Pct			
Col Pct	1	2	Total
1	35	97	132
	19.44	53.89	73.33
	26.52	73.48	
	62.50	78.23	
2	1	8	9
	0.56	4.44	5.00
	11.11	88.89	
	1.79	6.45	
4	2	1	3
	1.11	0.56	1.67
	66.67	33.33	
	3.57	0.81	
5	7	6	13
	3.89	3.33	7.22
	53.85	46.15	
	12.50	4.84	
6	0	1	1
	0.00	0.56	0.56
	0.00	100.00	
	0.00	0.81	
7	1	0	1
	0.56	0.00	0.56
	100.00	0.00	
	1.79	0.00	
8	10	11	21
	5.56	6.11	11.67
	47.62	52.38	
	17.86	8.87	
Total	56	124	180
	31.11	68.89	100.00

STATISTICS FOR TABLE OF AGECE BY POB

Statistic	df	Value	Probabilty
Likelihood Ratio Chi-Square	6	13.396	0.037
Sample Size = 180			

Table 35: Factors influencing the dentists' attitude to oral rehabilitation of old people (older than 60 years) (FACTORS AGECE).

FACTORS AGECE	FQ	%	CFQ	C%
Tissue quality	50	16.8	50	16.8
Physiological response	7	2.4	57	19.2
Medical status	42	14.1	99	33.3
Life expectancy	17	5.7	116	39.0
Learning	13	4.4	129	43.4
Motivation/ cooperation	52	17.5	181	60.9
Expectation	21	7.1	202	67.9
Financial	20	6.7	222	74.6
Complexity, trauma (cost)/benefit ratio	25	8.4	247	83.0
Maintenance	20	6.7	267	89.7
Prognosis	3	1.0	270	90.8
Individual patient factors	28	9.4	298	100.0

Table 36: Reasons for having missing teeth (REASONS MT) for patients receiving implant treatment (IMPPAT) and the control patients (CTRLPAT) (expressed as percentages of the total number of reports).

REASONS MT	PERCENTAGES	
	CTRLPAT	IMPAT
Decay	5.9	16.0
Bad, poor condition	17.7	16.0
Chalky, calcium deficient		16.0
Associated with pregnancy		8.0
Gum disease	23.5	8.0
Pain	29.4	8.0
Infection, abcesses		8.0
Accident, fight	11.8	8.0
Professional advice	11.8	8.0
Patient request		4.0
Total	100.0	100.0

implant patients and both groups used highly emotive terms to describe how they felt about the loss of their natural teeth (Table 37).

The pre-treatment problems reported by the patients are presented in Table 38. Both groups presented with problems predominantly associated with the mandibular prostheses but this was more the case for the implant patient group. Both groups reported that they had experienced their current problems for considerable periods of time (Table 39).

3.5 DESCRIPTION OF THE POST-TREATMENT QUESTIONNAIRES

3.5.1 Description of procedural assessment variables

At 1 month post-treatment 45.5% of the implant patients reported that they found an aspect of the treatment unpleasant. Most of these responses related to surgical aspects of the treatment, 'being awake during the operation', the 'drilling' and 'pain after the anaesthetic had worn off.' However 72.7% of the total number of respondents considered that the treatment procedure was as they expected it to be, the main reason for differences being the length of time of the treatment procedure.

3.5.2 Description and analyses of psychosocial variables

Both the implant patients and the control patients

Table 37: Frequency table for the variable 'How did you feel about the loss of your teeth in the relevant jaw(s)?' (HFLOSST) for patients receiving implant treatment and the control patients.

HFLOSST	PERCENTAGES	
	CTRLPAT	IMPAT
Good/happy/ grateful/relieved	16.7	25.0
Relieved at the time/now regretful	8.3	8.3
Accepted it/not worried	16.7	25.0
Initially disappointed/then acceptance		8.3
Concerned/hated it/ devastated	58.3	33.3
Total	100.0	100.0

Table 38: Frequency table for the nature of the pretreatment problems (PRPT) reported by the patients for the maxillary and mandibular prostheses, MXPROS and MDPROS respectively.

PRPT	MXPROS				MDPROS			
	CTRLPAT		IMPPAT		CTRLPAT		IMPPAT	
	FQ	%	FQ	%	FQ	%	FQ	%
1	5	27.8	1	20.0	5	13.9	2	5.88
2	1	5.56	1	20.0	1	2.78	2	5.88
3	2	11.1	2	40.0	9	25.0	10	29.4
4	2	11.1			5	13.9	6	17.7
5	1	5.56			7	19.4	10	29.4
6	2	11.1			2	5.56		
7	1	5.56			2	5.56		
8		5.56			1	2.78	1	2.94
9	2	11.1			2	5.56		
10	1	5.56			1	2.78		
11	1				1	2.78		
12			1	20.0			2	5.88
13							1	2.94
TOTAL	18	100.0	5		36		34	100.0

LEGEND:

PRPT:

- 1: appearance
- 2: speech
- 3: tightness of fit
- 4: chewing
- 5: comfort
- 6: broken/keep breaking
- 7: age of the dentures
- 8: can't wear them
- 9: bite problems
- 10: stains, cleanliness
- 11: noise from the dentures during function
- 12: psychological attitude
- 13: attitude to ridge resorption

Table 39: Percentages for the length of time for which the patients had experienced dental problems with their upper jaw (LGUP) and lower jaw (LGLP) respectively.

		CTP	IMP
VAR	RESP	%	%
LGUP	1	8.33	
	2	8.33	
	3	16.7	
	4	50.0	16.7
	M	8.33	16.7
	P	8.33	66.7
TOTAL		100.0	100.0
LGLP	1	8.33	8.33
	2	8.33	
	3	16.7	8.33
	4	66.7	83.3
TOTAL		100.0	100.0

LEGEND:

CTP: control patients

IMP: implant patients

LGUP/LGLP:

- 1: >4 weeks but <3 months
- 2: >3 months but <6 months
- 3: >6 months but <2 years
- 4: >2 years

considered themselves adaptable people, did not tend to hide their dentures or teeth, neither group declined social invitations or avoided speaking to people because of denture or teeth problems and both groups did not have occupational or nervous conditions caused by dentures or teeth. The upper dentures/teeth were not considered to be the cause of any general problems and neither group reported that their current dentures were felt to be 'foreign bodies' (frequency tables for this data are presented in Appendix IV).

For several other variables it appeared that there might be formal statistical differences between the implant patients and their control group (Figures 12-15; Tables 40-43). To test the hypotheses that there were no differences between the implant patients and the control group for these variables at each post-insertion assessment period the Binomial Theorem (Phillips, 1978; Beyer, 1981) was utilised.

The implant patients considered that their current dentures had improved their psychological status, at 1 month and 6 months post-insertion, $p=0.063$ and $p=0.109$ respectively. They also considered that their appearance was significantly better at 1 month post-insertion compared with the control patients ($p=0.031$), that their contact with other people had improved at 3 months post-insertion ($p=0.063$) and that they were not noticing other peoples'

Figure 12: Do you notice other peoples teeth?

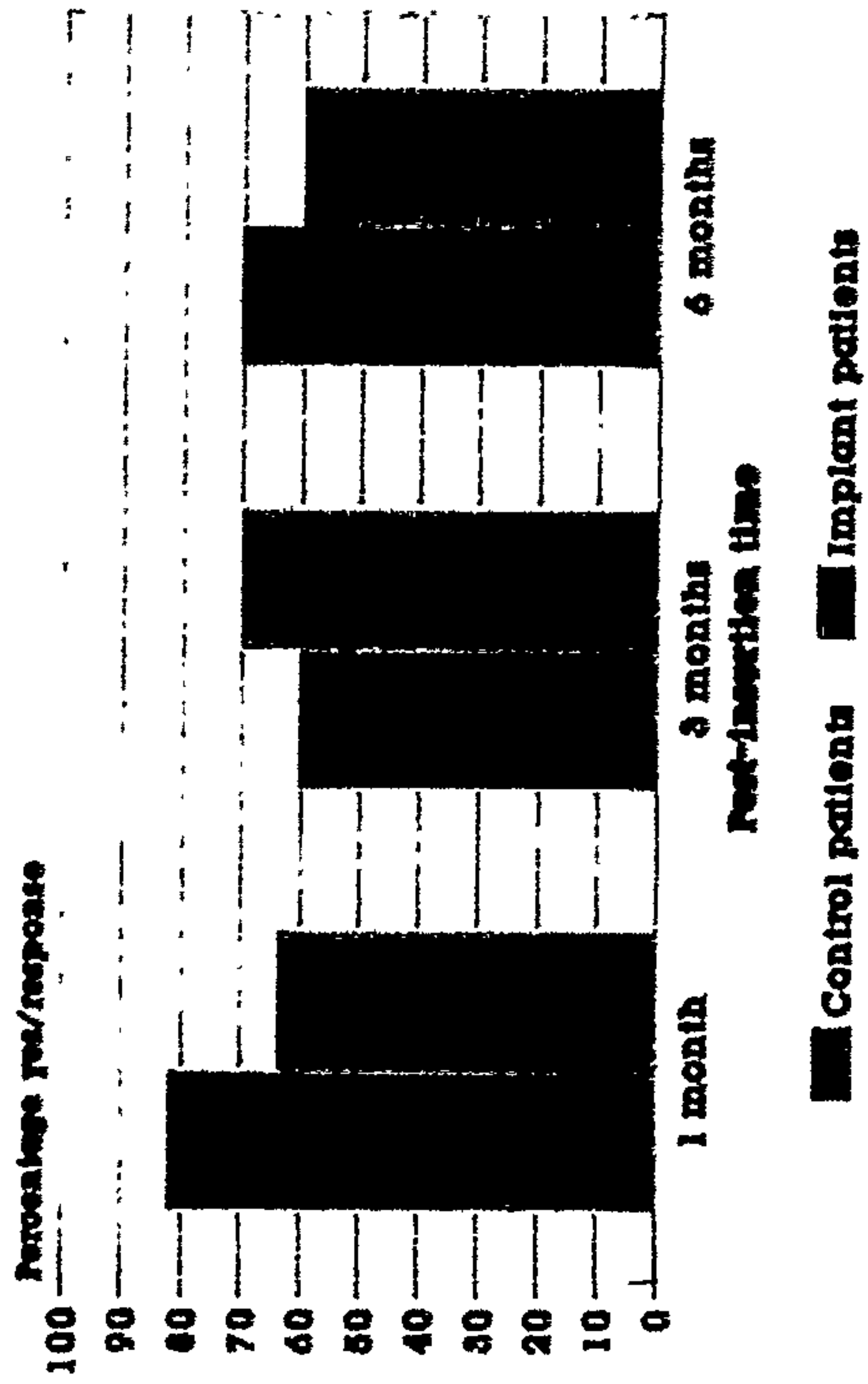


Figure 13: Do you think that other people notice your dentures/teeth?

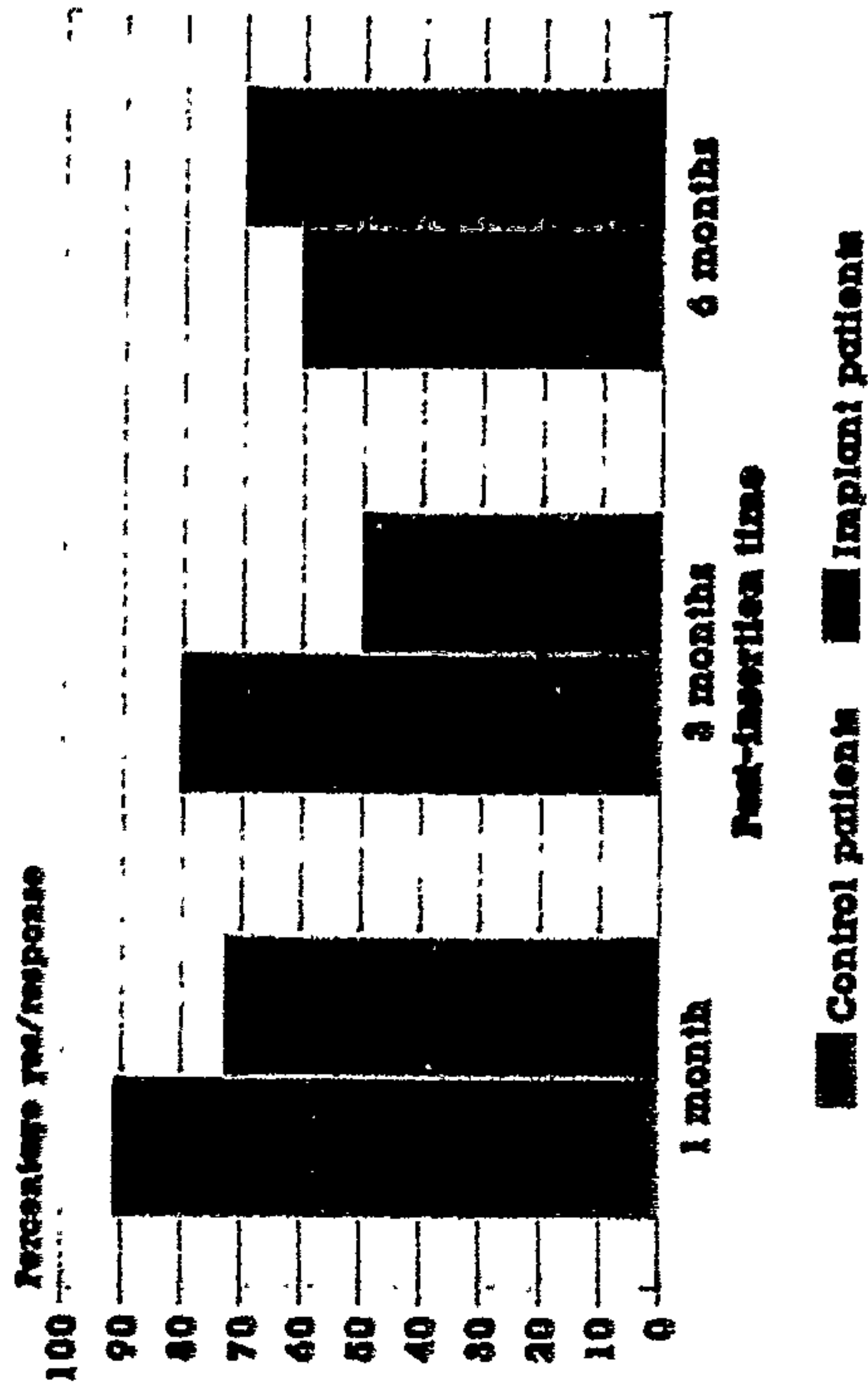


Table 40: Frequency table for the variables 'Have your current dentures affected you psychologically?' (PSY) and 'Have you a changed appearance due to your current dentures?' (APP).

		CONTROL PATIENTS						IMPLANT PATIENTS					
		1 mth PI		3 mth PI		6 mth PI		1 mth PI		3 mth PI		6 mth PI	
VAR	RESP	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%
PSY	1	9	81.8	9	90.0	9	90.0	6	54.5	7	70.0	5	50.0
	2	1	9.1	1	10.0			1	9.1	3	30.0	3	30.0
	3	1	9.1			1	10.0	4	36.4			2	20.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0
APP	1	2	18.2							1	10.0		
	2	6	54.5	8	80.0	7	70.0	4	36.4	4	40.0	6	60.0
	3	3	27.3	2	20.0	2	20.0	5	45.5	5	50.0	3	30.0
	4					1	10.0	2	18.2			1	10.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0

LEGEND:
 PSY:
 1: no difference
 2: somewhat better
 3: much better
 APP:
 1: somewhat worse
 2: unchanged
 3: somewhat better
 4: much better

Table 41: Frequency table for the variables 'Have your dentures affected your contact with other people?' (CNT) 'Do you think that your current dentures have affected your ability to speak clearly?' (SP).

		CONTROL PATIENTS						IMPLANT PATIENTS					
		1 mth PI		3 mth PI		6 mth PI		1 mth PI		3 mth PI		6 mth PI	
VAR	RESP	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%
CNT	1	8	72.7	10	100.0	9	90.0	9	81.8	6	60.0	6	60.0
	2	2	18.2							3	30.0	2	20.0
	3	1	9.1			1	10.0	2	18.2	1	10.0	2	20.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0
SP	1	1	9.1	2	20.0	1	10.0			2	20.0		
	2	7	63.6	7	70.0	7	70.0	9	81.8	6	60.0	7	70.0
	3	2	18.2	1	10.0	1	10.0	1	9.1	2	20.0	1	10.0
	4	1	9.1			1	10.0					2	20.0
	5							1	9.1				
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0

LEGEND:

CNT:

- 1: unchanged
- 2: somewhat better
- 3: much better

SPP:

- 1: somewhat worse
- 2: unchanged
- 3: somewhat better
- 4: much better
- 5: incorrect

Table 42: Frequency table for the variables 'Do you think that your confidence and self-esteem are affected by your current dentures?' (CSE) and 'Have your current dentures caused any change in your way of life?' (CWL).

		CONTROL PATIENTS						IMPLANT PATIENTS					
		1 mth PI		3 mth PI		6 mth PI		1 mth PI		3 mth PI		6 mth PI	
VAR	RESP	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%
CSE	1	1	9.1										
	2	7	63.6	7	70.0	8	80.0	6	54.5	6	60.0	5	50.0
	3			3	30.0			2	18.2	2	20.0	2	20.0
	4	3	27.3			2	20.0	3	27.3	2	20.0	3	30.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0
CWL	2	8	72.7	8	80.0	7	70.0	7	63.6	6	60.0	4	40.0
	3	2	18.2	1	10.0	1	10.0	2	18.2	1	10.0	3	30.0
	4	1	9.1	1	10.0	2	20.0	2	18.2	3	30.0	3	30.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0

LEGEND:
CSE/CWL:

1: somewhat worse
2: unchanged
3: somewhat better
4: much better

Figure 14a: Do you feel discomfort/
taking your dentures out to clean them?
Control patients

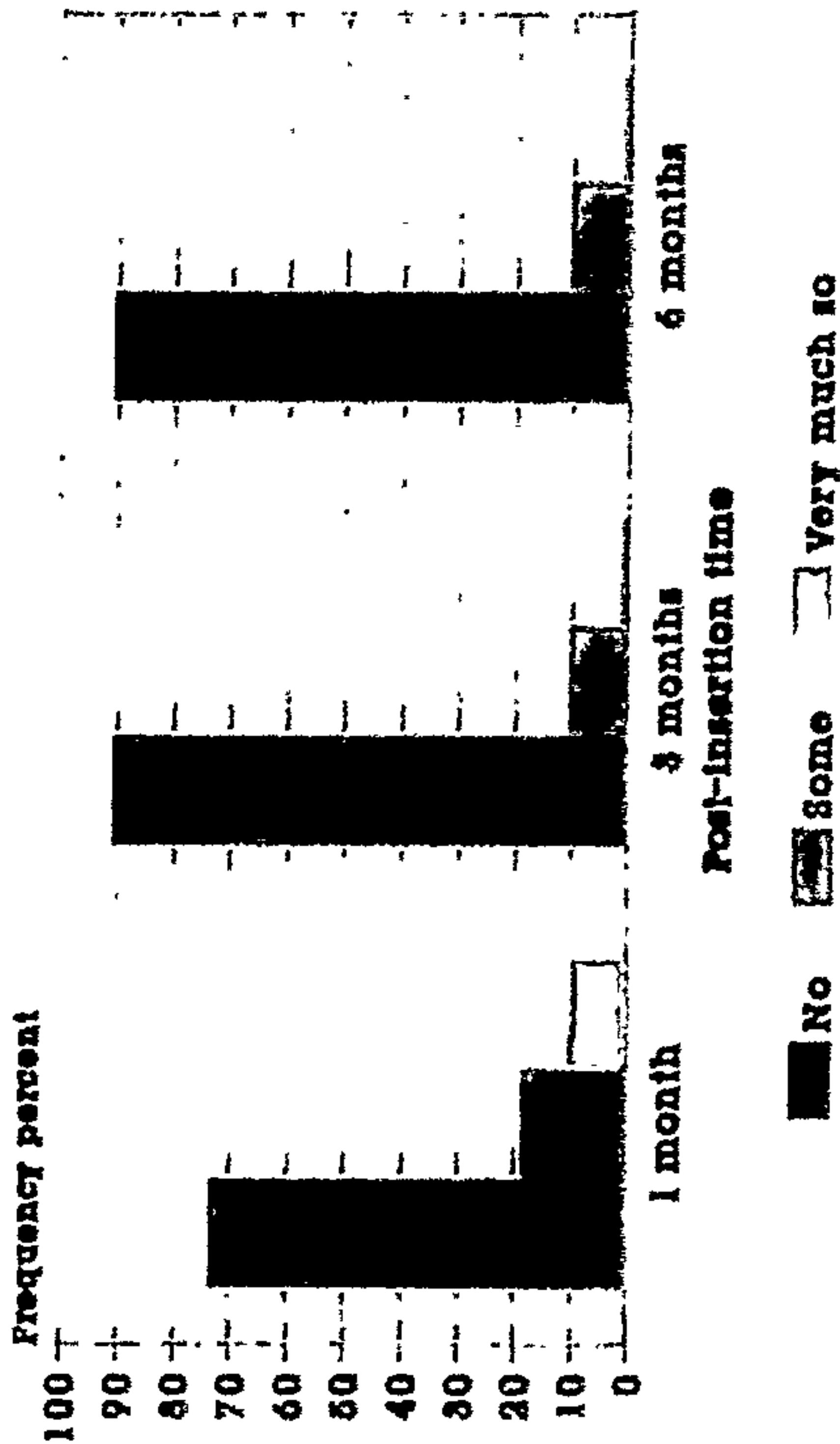


Figure 14b: Do you feel discomfort/
taking your dentures out to clean them?
Implant patients

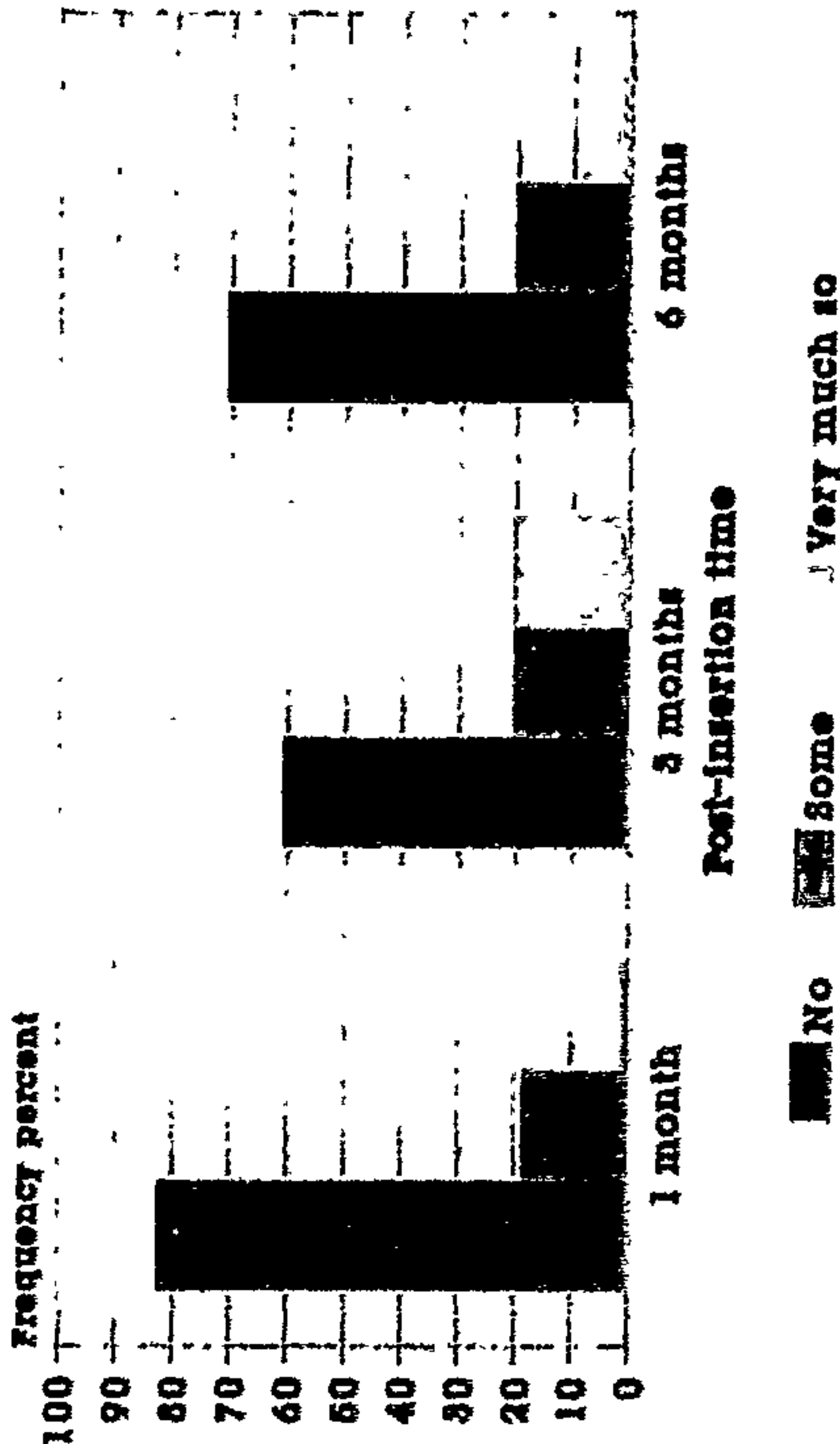


Table 43: Frequency table for the variables 'Are you afraid an accident might happen with your dentures/teeth?' and 'Do you feel hurt by "funny stories" about dentures and toothlessness?' (HRTS).

		CONTROL PATIENTS						IMPLANT PATIENTS					
		1 mth PI		3 mth PI		6 mth PI		1 mth PI		3 mth PI		6 mth PI	
VAR	RESP	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%	FQ	%
ACDT	1	4	36.4	6	60.0	5	50.0	4	36.1	6	60.0	1	10.0
	2	3	27.3	3	30.0	4	40.0	7	63.6	4	40.0	8	80.0
	3	4	36.4	1	10.0	1	10.0					1	10.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0
HRTS	1	2	18.2	1	10.0			4	36.4	2	20.0	3	30.0
	2	9	81.8	9	90.0	10	100.0	7	63.6	8	80.0	7	70.0
	TOTAL	11	100.0	10	100.0	10	100.0	11	100.0	10	100.0	10	100.0

LEGEND:
 ACDT: 1: no
 2: sometimes
 3: often
 HRTS: 1: somewhat
 2: no