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PROVISION OF DENTAL SERVICES
FOR UNIVERSITY STUDENTS

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THE PROVISION OF DENTAL SERVICES FOR UNIVERSITY STUDENTS

(A survey of dental needs of students
at the Australian National University)

1. Introduction
2. Dentistry today
 - 2.1 extent of dental diseases
 - 2.2 needs for dental care
 - 2.3 demands for dental care
 - 2.4 attitudes to dentistry
3. University health services
4. University dental health services
 - 4.1 America
 - 4.2 Britain
 - 4.3 Finland
 - 4.4 Australia
5. Survey of Dental Needs
 - 5.1 introduction
 - 5.2 methods
 - 5.3 results
 - 5.4 discussion
6. Application of survey results : types of
on-campus dental services and their costs
7. Summary
8. References
9. Appendix
 1. Examination form and questionnaire
 2. Results of survey for part-time students.

1. INTRODUCTION

This study was initiated following a request by the administration of the Australian National University for data concerning the dental condition of undergraduate students at that university, and the possibility of establishing, on-campus, a student dental health service, basically aimed at providing a regular and low cost dental service for students of the university.

This thesis reports on a survey of students at the Australian National University, carried out by the University of Sydney, Department of Preventive Dentistry, to determine the dental health status and treatment needs of those students. The survey is prefaced by a review of the problem of dental disease generally, and a review of the student health services, including dental services, offered in Australia and other selected countries.

Survey results are analysed and possible dental services which could be offered to students on-campus are discussed.

This survey constituted an ideal opportunity to study the prevalence of dental caries and periodontal disease in a young adult population, and help fill in a gap in the literature concerning dental health status of such groups in the Australian community.

2. DENTISTRY TODAY

2.1 Extent of Dental Disease

Dental Caries: The general state of the nation's teeth and, in particular, the state of the teeth of young adults may cause despair to the dental profession as a result of the high prevalence of dental caries.

Dental caries has been an affliction of mankind from the ancient Greeks ⁽²⁾, the peoples of the Bronze and Stone Ages ⁽³⁾ to the modern age, where it now constitutes a major public health problem.

Recent surveys from the United States of America have shown the following incredible facts: a total of 2¼ billion decayed, missing and filled teeth ⁽⁴⁾, an accumulation of 700 million unfilled cavities ⁽⁵⁾. By the age of two, 50 per cent of children have decayed teeth ⁽⁶⁾ and in the age group 18-79, 18 per cent had no natural teeth at all, and a further nine per cent had natural teeth in only one jaw ⁽⁴⁾.

In Australia, the problem is no less grim; 40 million decayed, untreated teeth in the community, of which society only wishes treatment on 10 million of these teeth ⁽⁷⁾. Prevalence studies of dental decay in children 6-15 years of age showed that 98.5 per cent were affected ⁽⁸⁾; fifteen year olds having fourteen decayed, missing or filled teeth ⁽⁹⁾.

Later in this thesis, other studies on the state of the teeth of young adults, more comparable to the survey of Australian National University students will

be presented to enable more direct comparison with the survey results. At this stage it would be sufficient to say that dental caries figures in the age group 17-19 years, vary from 11.3 per person ⁽¹⁰⁾ to 19.1 or more decayed, missing or filled teeth per person ⁽¹¹⁾. The decayed tooth component of the latter being 6.9 decayed teeth per person.

Periodontal Disease: The prevalence of periodontal disease is also high; however, less emphasis is placed on this disease than dental caries by the dental profession.

Unfortunately, comparable figures of periodontal disease are more difficult to obtain than those for decay because of the usage of different indices of measurement. Figures presented below may not be directly comparable, although they will show the extensive nature of the disease.

Periodontal disease is less prevalent in western civilisations than it is, for example, in Asia; however, it may be described as an insidious process, often of long standing, which attacks the supporting tissues of the tooth. It is a relentless disease, seldom causing pain or even severe discomfort, rarely believed to be a serious or direct threat to life but which claims an increasing number of teeth as life progresses ⁽¹²⁾. (Fig. 1) Fig. 2) (4).

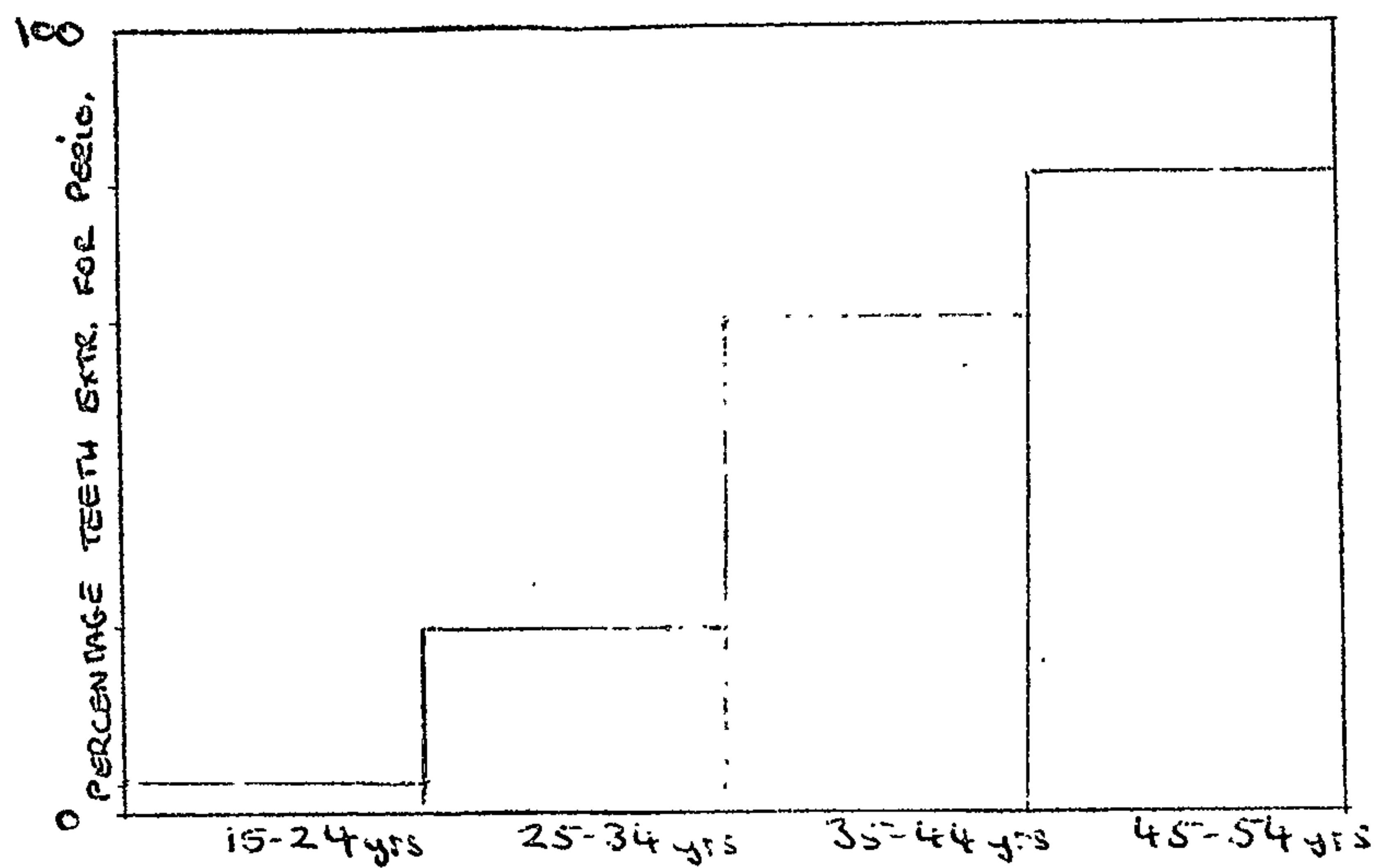


FIG 1 PERCENTAGE TEETH EXTRACTED
FOR PERIODONTAL REASONS BY AGE (12)

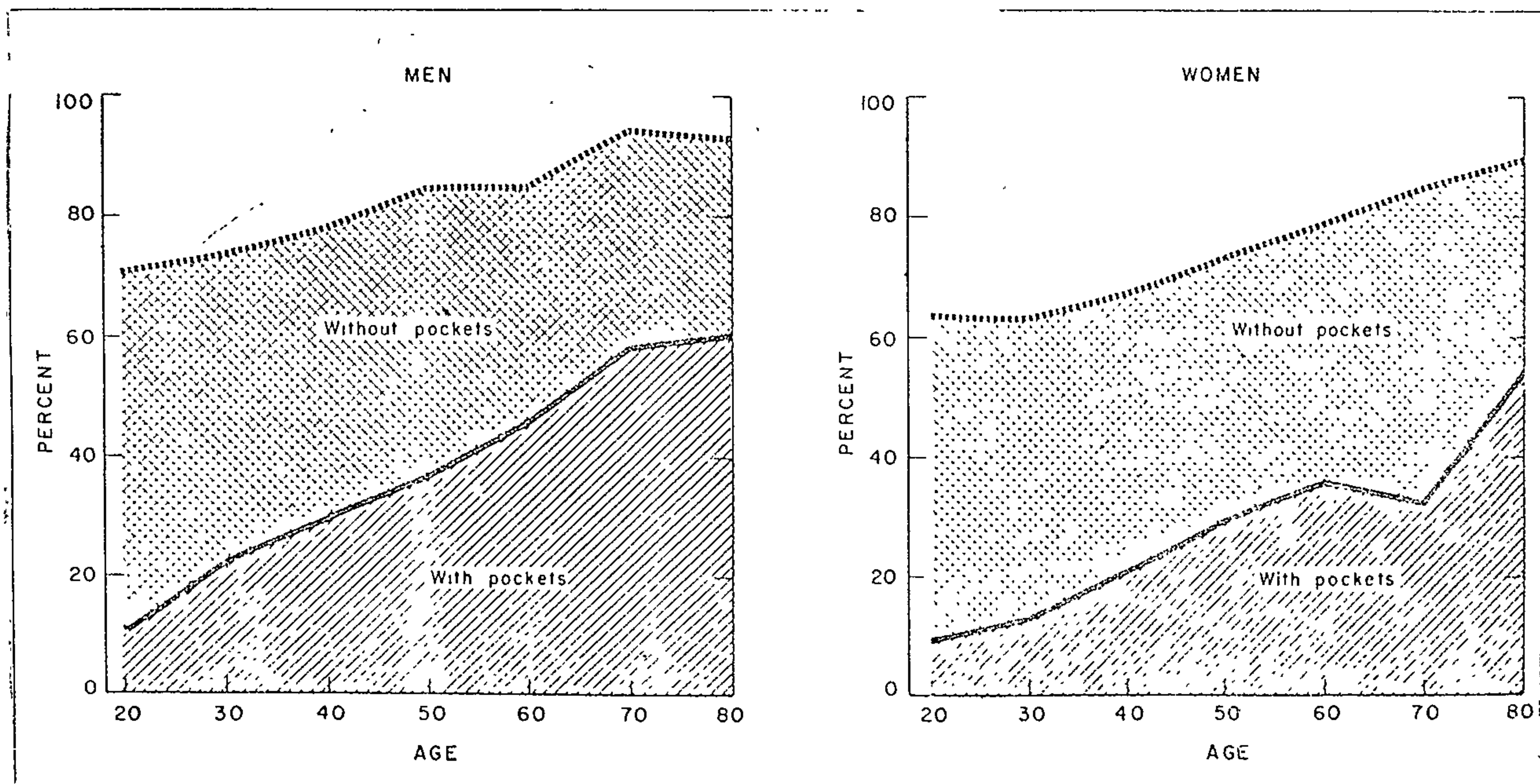


FIG. 2.

Percent of men and women with periodontal disease, with and without pockets, by age: United States, 1960-62. (4) ;

As mentioned previously, an increase in the prevalence of destructive periodontal disease with age has been noted in many studies. Barnard ⁽⁹⁾ observed that 75% of a sample of schoolchildren aged from 6-16 had gingivitis (a condition which most frequently precedes destructive periodontitis). Jamison ⁽¹³⁾ observed 95% of a sample of children had some degree of gingival inflammation; however, pronounced, measured differences in prevalence are very likely to result even in the same population when definitions or methods of measuring gingival and periodontal disease are dissimilar.

In the young adult group, pathological loss of bone can be demonstrated in the 20 to 29 years age group, and loss of teeth from the disease becomes a factor of importance in this decade of life; ⁽¹⁴⁾ Males appearing to be more affected than females.

From the survey in the United States of America ⁽⁴⁾ it may be seen that in the 18-24 year age group, approximately 10% had destructive periodontitis rising to 22% in the 25-34 years group.

In Australia a sample of seventeen year olds revealed that 10% had severe and extensive pockets (destructive periodontal disease) ⁽¹⁵⁾. These figures demonstrate the extent of the disease but do not all show the extent of the treatment required, although pocket formation and periodontitis may need corrective surgical treatment involving much time and, of course, expense.

Thus, the two main dental diseases, caries and periodontal disease, present a serious and complex problem. Both have a high, almost universal, rate of attack. Caries commencing very early in life but abating somewhat by the early twenties, whereupon periodontal disease takes over, becoming progressively more severe with age.

Dental diseases are mostly irreversible and cumulative, they do not heal spontaneously, neither can they be cured by advice or prescription. Once there is a break in the surface enamel of the tooth, the carious lesion can only be cured by operative treatment. Once bone has been lost through periodontal disease, surgical treatment is generally necessary. Failure to seek treatment results in a tremendous 'backlog' of disease to be treated.

2.2 Needs and Demands for Dental Treatment

Needs: The need for dental treatment as measured by surveys will give the detectable need for treatment but no examination procedure could hope to discover all pathological conditions present. Therefore, there exists a difference between the detectable and the absolute need. This will become especially apparent in the survey of Australian National University students, where not all diagnostic procedures were used (notably the use of radiography).

One of the most dramatic influences on the need for dental treatment will be that of past dental experience. Many studies show that patients who have had periodic and especially preventive care will have markedly less need for treatment (See Fig. 3) (16)

FIG. 3.

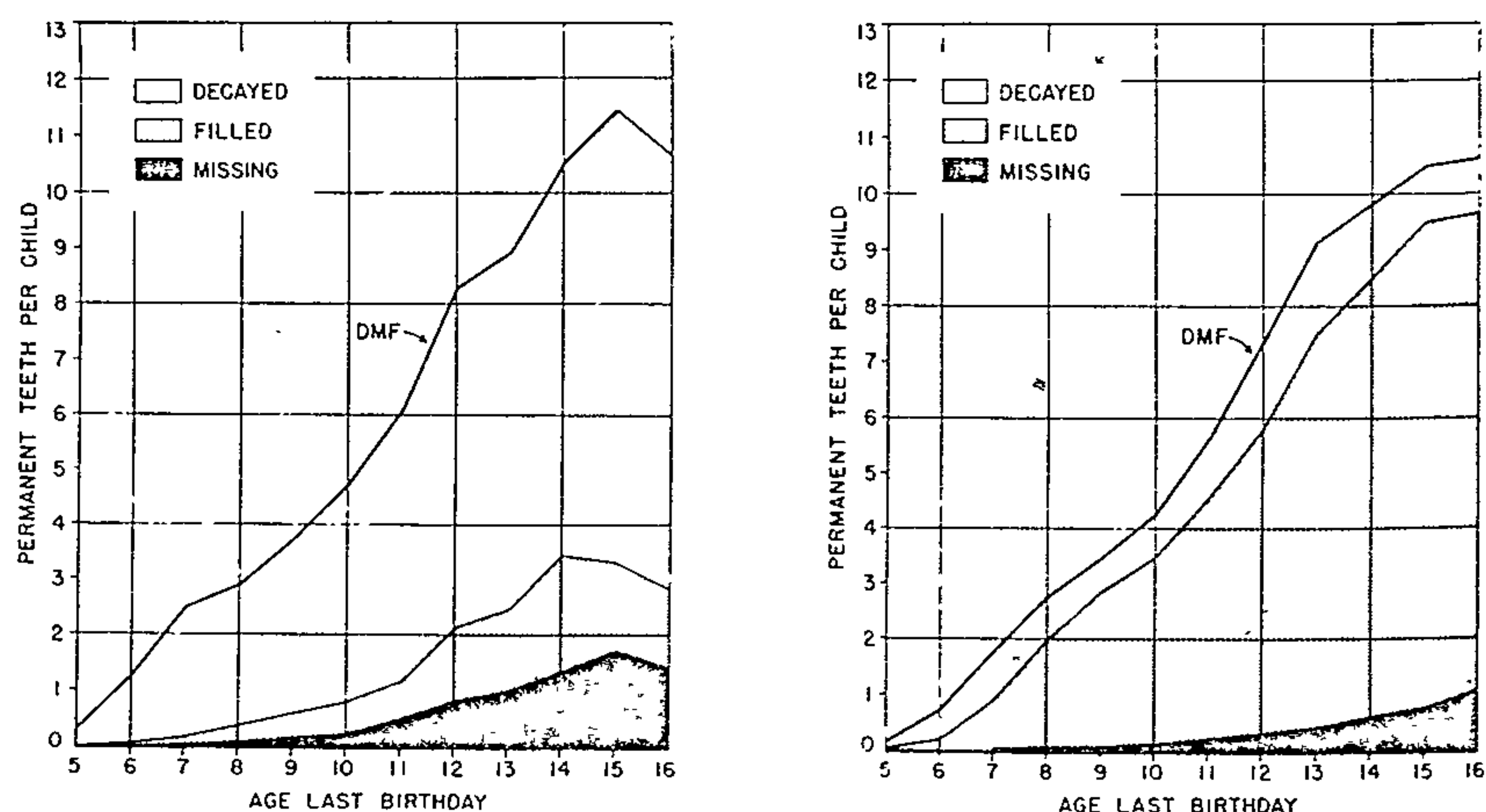


FIGURE 11. Prevalence of dental caries at the start of a community dental care study (left) and following the fourth treatment series (right). (Waterman, G. E., and Knutson, J. W. Studies on dental care services for school children, third and fourth treatment series, Richmond, Indiana. Pub. Health Rep., 69:247-54, Mar. 1954.)

In the Student Dental Health programme of the University of Alabama ⁽¹⁷⁾ a marked decrease in the need for dental treatment was noted for those students who received regular care. This may be demonstrated by the number of decayed teeth needing restoration or the ratio of decayed to filled teeth.

Freshman entering student health facility

DECAYED TEETH: D: 2.73 D+F 3.32 TOTAL 6.05

Seniors in student health facility

DECAYED TEETH: D: 0.07 D+F 0.09 TOTAL 0.16

This serves to emphasise the point that the needs and demand on a student health service will be large initially, but reducing as those students who have had their 'backlog' treatment needs satisfied, move on to 'maintenance' treatment. The length of time since the last visit may give a reasonable estimate of the amount of 'backlog' treatment required (Fig. 4) ⁽¹⁸⁾.

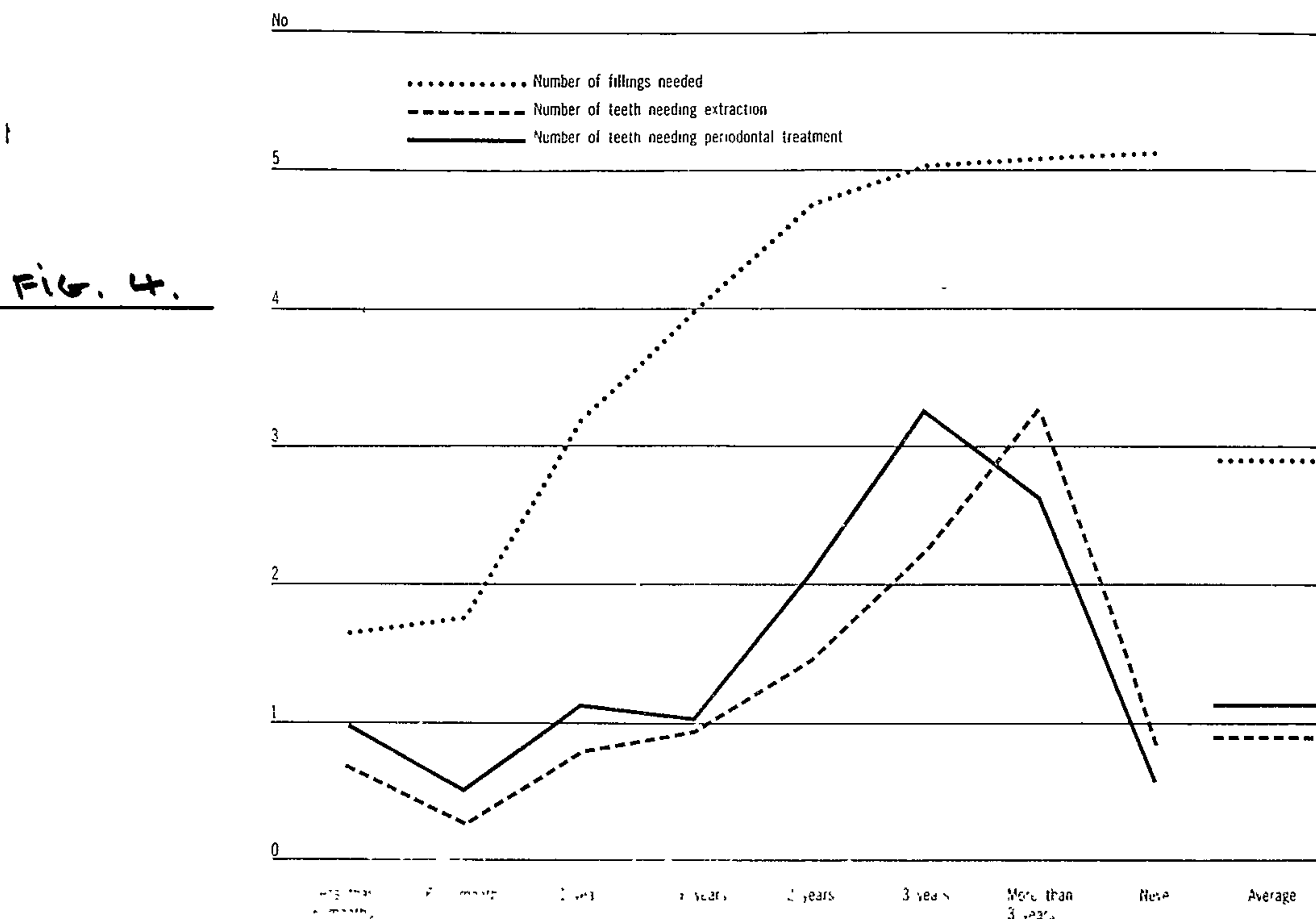
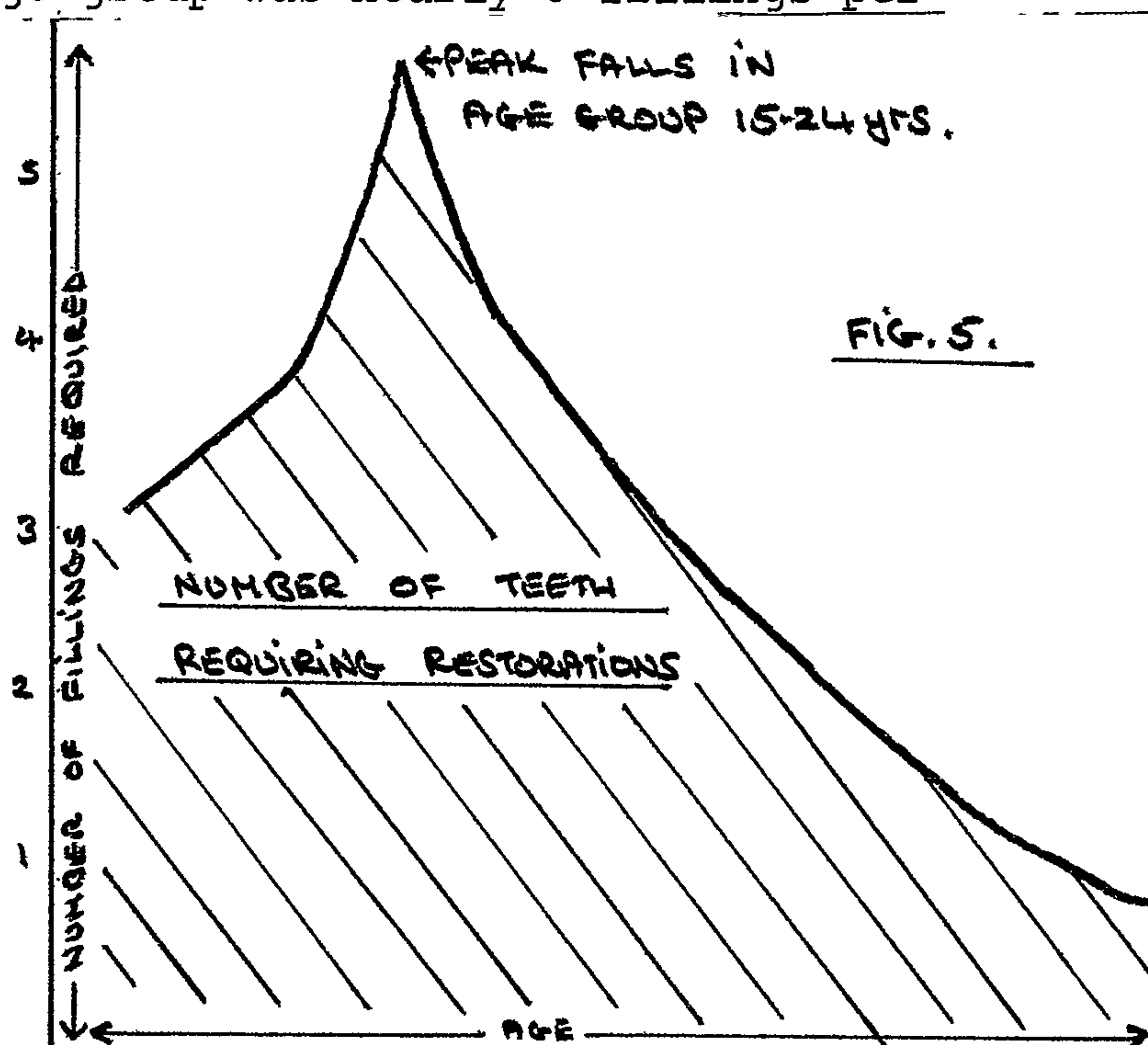


FIGURE 17. Average needs for fillings, extractions, and periodontal treatment, by length of time since last visit to a dentist. (From American Dental Association.)

In the patient who had seen a dentist within the previous twelve months, the average number of fillings needed was found to be 1.75 for one study (18). This may be compared to a similar study by the same group (19) in which the same number of backlog fillings in the 15-24 year age group was nearly 6 fillings per patient (Fig. 5)



Regional Variations in need for dental treatment;

the addition of fluoride to community water supplies at one part per million has had the most impact on regional variations in DMF figures, especially the decayed component. All the studies from the original by H. Trendly Dean (20) to the present study in Australia (Tamworth) (21) confirm that the fact that those people who drink water containing fluoride at approximately one part per million obtain up to a 60 per cent reduction in dental decay. These benefits remaining throughout adult life. Other regional variations may cause minor changes in the decay prevalence (22) and hence treatment needs.

2.3 Demand for Care: Although the factors which may affect the potential demand are listed below, the demand from a group such as university students is expected to be high, because students tend to come from families with a higher than average income, higher standard of education, greater awareness of dental health, from urban areas, and have had some experience with routine operative dentistry.

The difference between potential demand and effective demand should be realised because of its effect on the expected utilisation of future dental services. Potential demand is the unqualified desire for dental care whereas effective demand is potential demand plus the ability to obtain dental services (23). Barriers preventing people obtaining dental care will be described later.

Factors influencing demand:

Females are more attentive to the health of their teeth and are more anxious to prevent cosmetic disfigurement than are men. This may be observed in various studies showing increased orthodontic treatment in females (24), increased filled component in DMF counts (4,11) and the pattern of dental visits (25) See Fig. 6.

Income:

the frequency with which dental service was sought in the U.S.A., bears a striking correlation to family income. (Fig. 7) Although the families of students tend to come from 'middle or higher class' families, many students need financial assistance if dental treatment is to be obtained. There appears to be some reluctance, more marked in males to ask parents for money for dental treatment ⁽⁵⁾. Fanning found that 27% males and 32% of females actually avoided treatment because of cost, in a sample survey of over 1,000 South Australian students ⁽²⁴⁾.

Education:

similar patterns of demand for dental care exist as for income, and it was found in the United States study ⁽²³⁾ that education and income were related independently to the frequency with which dental care was sought.

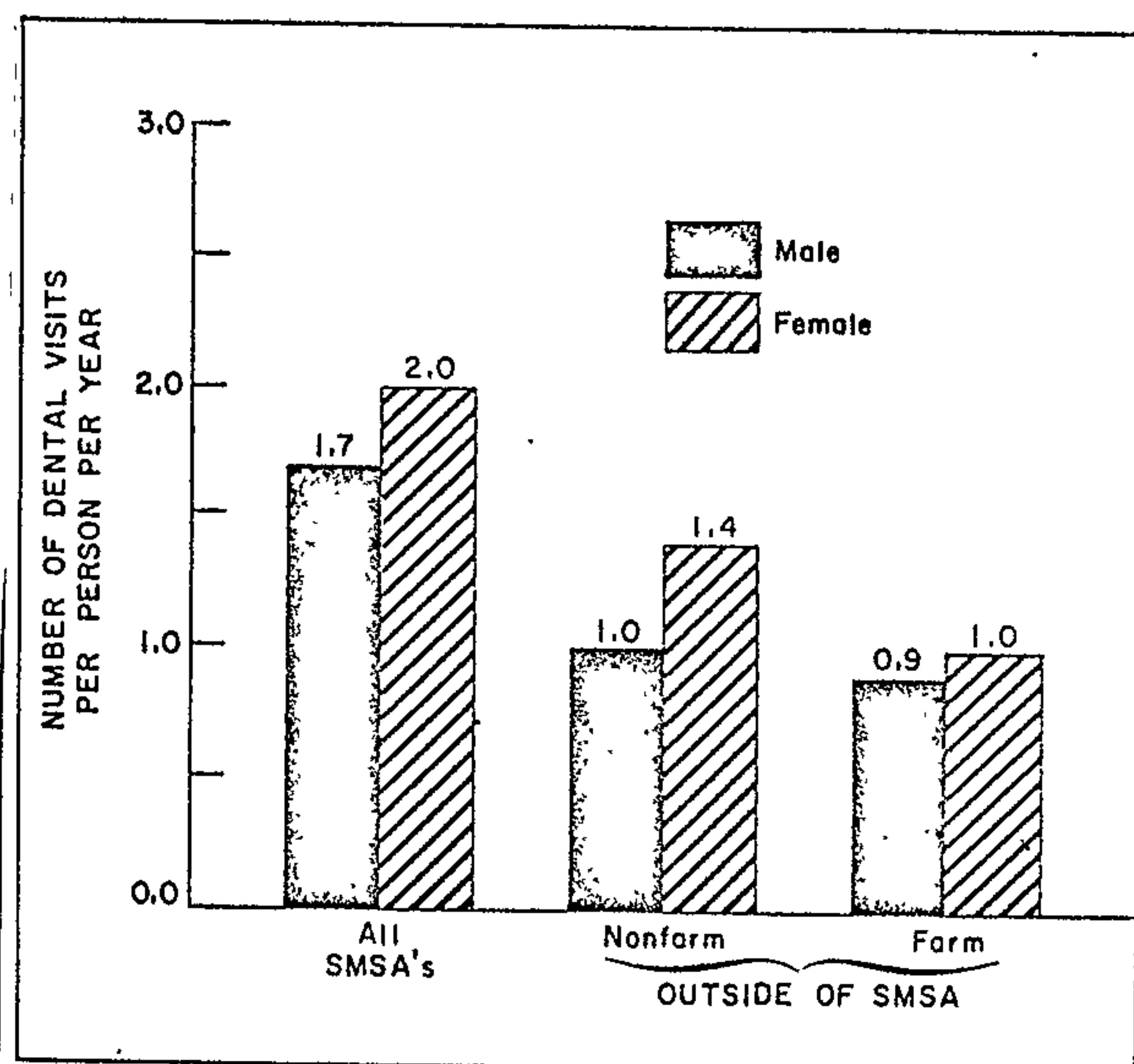


Figure 6 Number of dental visits per person per year, by residence and sex.

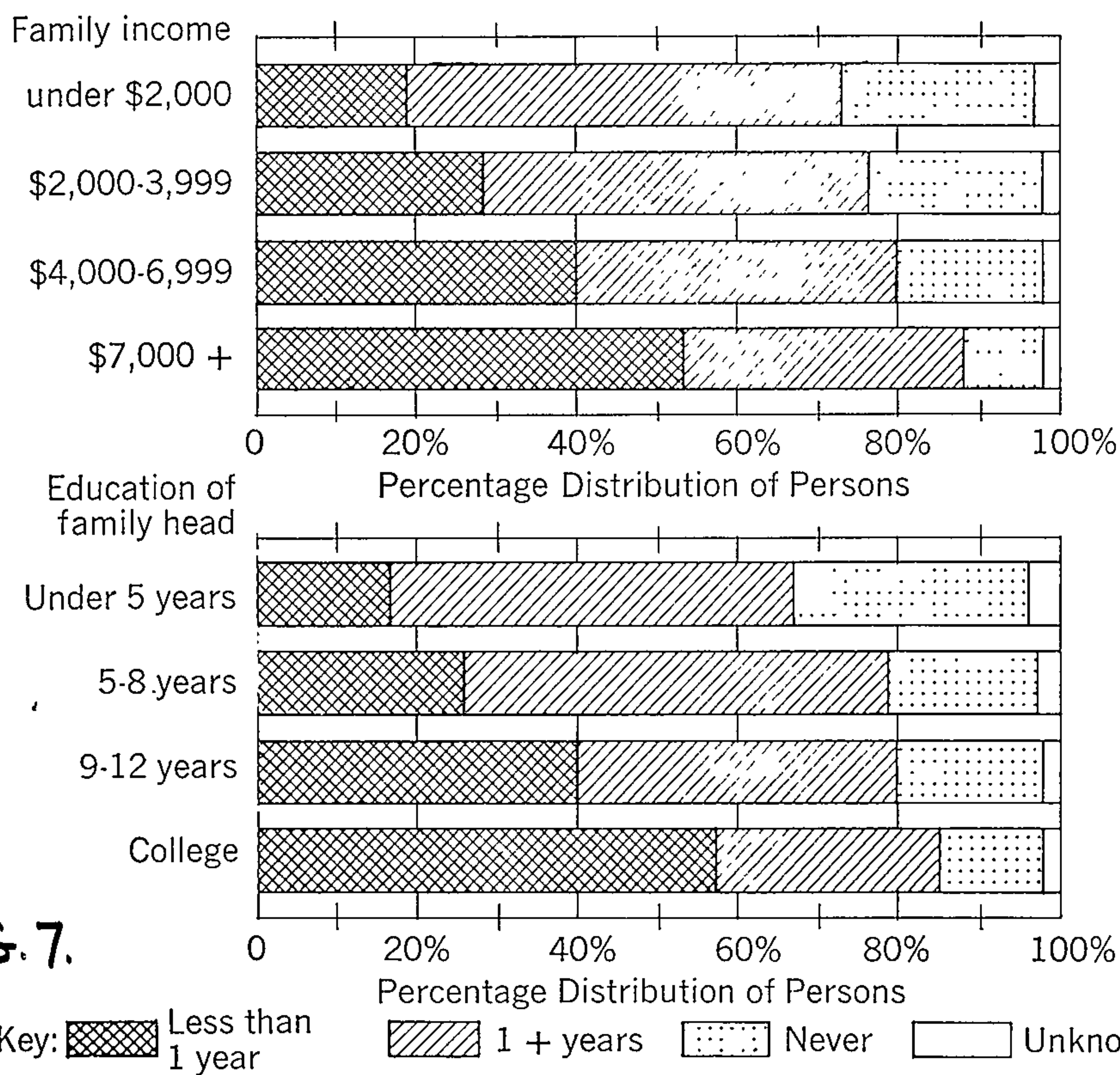


FIG. 4.—Time interval since last dental visit according to family income and education of family head, 1957–58. Source: Adapted from Division of Public Health Methods, U.S. Public Health Service, *Health Statistics from the U.S. National Health Survey: Dental Care, Interval and Frequency of Visits, United States, July 1957–June 1959*, U.S. Public Health Service Publication No. 584-B14 (Washington: Government Printing Office, 1960), p. 5.

2.4 Attitudes to Dental Care

Freidson and Feldman (26) summed up the situation by saying that, 'the prospective patient assesses his dental condition and the seriousness of the consequences if he does not seek dental care. This self diagnosis is weighed or balanced against the factors of cost, anticipated pain, and inconvenience, to see if going to the dentist is 'worth it'. The final results, the use or avoidance of dental services is thus a complex product of the education involved in self-diagnosis, of the income level in weighing costs, of the dental health and past dental experience involved in anticipating pain, and of the social experience involved in assessing inconvenience'.

A person must be aware of his disease, he must believe that the dentist will provide relief from his troubles, the person must be able physically to seek treatment (i.e. be free from economic and psychological barriers), he should have adequate support from his relatives and peers and lastly he should be aware of the beneficial results of consulting the dentist. Fanning (24) found that 42% of South Australian students believed that they did not require dental treatment at present. She also found that the greatest barriers to seeking dental treatment were time and cost, with dislike or fear of dentistry, and lack of available dentist being other barriers.

Pelton (27) found that time and cost were the biggest barriers to dental care but with laziness coming a close third.

Dislike, or fear of dentistry is often a result of past dental experience, although Martin has written that anxiety about dental treatment and resistance to dentistry is of an irrational character and can be explained by early infantile oral fixations or regressions (28).

Contrary to many dentists' expectations, fear of the drill (sound, feel and anticipation of pain) and not fear of injections constituted the most hated treatment procedure (29,30).

Despite these adverse attitudes to dentistry, Pelton (31) in his student dental health program at the University of Alabama found that utilisation of the dental health service there ranged from 57 per cent up to 97 per cent in any one year.

3. UNIVERSITY HEALTH SERVICES

Student health services in Australia are relatively new when compared to those in other countries such as the United Kingdom and America. It was only fifteen years ago that Adelaide opened her student health service, Sydney was soon to follow; however, it is amazing that such universities as that of Tasmania have no student health service (at the time of writing, one is planned). Macquarie university health service consists of one nursing sister. The University of Western Australia has only recently initiated a student health service.

The usual Australian health service (32) has one or two physicians with a low student/doctor ratio; although the Australian National University with its 5,044 students and two full time and one part-time physician probably has the best ratio of Australian universities.

The University of Sydney has the largest complement of medical staff with three full time and three part time physicians, two part time psychiatric consultants, two nursing sisters, a part time social worker, two secretaries and a student counsellor.

As other countries have done, Australia's student health services are rapidly expanding. There are, however, no facilities for overnight patients, or consultant facilities (apart from part time psychiatric consultations) and no official dental service.

In comparison, British universities such as Edinburgh have specialist facilities including eye, skin and gynaecological consultants, comprehensive dental services and overnight beds for sick students. Although it might be argued that these benefits are only available through their nationalised health scheme, it may be observed that the United States of America, by no means a welfare state, enjoys many of these facilities.

Students Health Services are obviously an attraction to students, as nearly all students at Sydney University consult the health service at least once in their academic lifetime, whilst more than one third of the student body go yearly (32).

The cost of a university health service is a difficult matter to estimate. The Australian National University calculated that the service cost \$9.80 per student in 1972. This cost of service is borne by the University.

It is interesting to note that an editorial in the 'Medical Journal of Australia' (33) reads:

"Undoubtedly, the community expects higher education to come down to the market place and accept a social role as well as its ineluctable intellectual responsibility. Thus the universities must acknowledge within their walls, permeable to community pressures, a social task in caring for the whole man, and not only for his academic aspirations and development".

W.H.O. (34) reports that, 'the problems associated with the growth of higher education give added point to the consideration of special services concerned with student health, social welfare and academic progress. The health service may set a valuable example of the application of social and preventive medicine to the needs of a community. Universities cannot properly discharge their responsibilities to students, parents and the community as a whole without providing health services, ideally comprehensive and autonomous'. (1)

Australian University health services have a hard task before them if they are to realise this overall objective of the World Health Organisation. Universities in Australia are beginning to accept this responsibility of caring for the social, medical and psychological aspects of their students, as may be seen by the rapid expansion of university health services and the enthusiasm of both administrative and health care staff to the success of those health services.

Dental care in the health services seems to have been conveniently forgotten, which is not surprising as a dental service would probably cost, in Australia, three to four times the cost of the health service. Nevertheless it is generally agreed that dental health is necessary for general health, therefore if a university hopes to provide comprehensive medical care as suggested by W.H.O., dental care must be an integral part of the service.

4. UNIVERSITY DENTAL HEALTH SERVICES

4.1 America

The list of dental services in university health services in America sounds impressive, however, Pelton ⁽³⁵⁾ points out that nearly all student dental care programmes in existence are located in universities having dental schools, and only a quarter of the institutions having dental schools are involved with student dental health programmes.

Pelton groups the American student dental health programmes into three sections based on seniority.

1) The universities of California, Harvard, Michigan and Minnesota are the oldest: Minnesota commencing dental care for students in 1921. Not all the students at the university are covered by the service, even though the Health Service at Minnesota has eighteen operatories, with a staff of 13 to 16 part time dentists, and four full time and one part time hygienists. At that university health service, students eligible for treatment are those who have paid a special student fee in the health service plan. Of the student population of 40,897, only 19.9 per cent used the dental services. The service at Minnesota is intended as a convenience, not a money saver. Students are charged fees equivalent to those of private dentists and all services are charged for.

Michigan University dental health service primarily treats those students who need dental services which cannot be delayed until a student is seen by his personal dentist. Prophylaxis and oral hygiene instruction are also offered and only routine restorations are carried out. Endodontics, surgical extraction of teeth and gold work are referred from the health service clinic to the dental school. Students are charged for services as given. 10 per cent of students make use of the dental facility.

Harvard University charges a health fee to students which covers medical and hospital service and emergency items of dental procedure. Basic dental services are provided on a fee for service basis at charges below those of local private dentists. Dental hygienists there, offer oral hygiene instruction and topical fluoride therapy. Previously bite wing X-rays accompanied routine physical examination for all first year students at the College; this has now, unfortunately, been largely discontinued.

California (Berkeley) University dental service offers remedial care which, although not emergency, could not wait until the student could consult his personal dentist. If a student has a local dentist, strictly only emergency treatment is given. Interestingly, a fee for broken appointments is charged; a fee for service operates at reduced prices; over 10 per cent of services were for treatment of third molars.

2) Alabama University and Miles College, Alabama.

Of this second group of universities, Alabama university provides a more complete form of dental service for students at the schools of medicine, nursing, optometry and dentistry. It is a prepaid scheme, with every student paying a compulsory annual fee of \$36 American. Currently the programme serves only the 850 students enrolled in the aforementioned schools. It has four operatories, emphasizes and practises preventive dentistry, routine restorative work, endodontics and surgical extractions: it will not perform orthodontics, periodontal surgery and prosthetic work.

Every student must be certified dentally fit as a condition of entry to the programme. Students are able to choose whether they wish to have their dental care by the student dental health service or by private practitioners who submit their bills to the dental service.

Miles College has planned a similar programme to that at the University of Alabama although it plans to utilise new, operating auxiliaries, in place of dentists.

3) Ohio State University, University of Denver and Bowling Green State University, Tufts University.

Ohio State University has one full time dentist to cope with the needs of 45,000 students.

Bowling Green State University has one dentist for 14,500 students, financed by a general fee charged to students plus fee for service. It is interesting to note that when the programme began, the policy was to provide emergency treatment. However, emergency demands did not require the full time of the staff.

Tufts University provides emergency, diagnostic and preventive services (partially provided by hygienists) financed by the health service fee. Restorative work is financed on a fee for service (reduced fees) basis.

4) State University of New York.

runs an interesting programme; basically a screening programme, it emphasizes prevention, provides emergency and referral treatment and is supported by the student fee for health care.

These programmes, never comprehensive, provide dental services of a kind, to a minority of students. The programmes are not standardised to an ideal, nor are they satisfying the dental needs or demands of American students.

The University of Alabama gives a fairly full coverage in terms of treatment with the annual fee of \$36, a realistic, but by American standards, low charge, for high class dental services. New York State University is one other programme worthy of further study providing essential services with emphasis on preventive treatment (but excluding routine conservative measures) which is 'free' to students.

4.2 Britain

Most of the larger universities in Britain have dental units in the health centres. The deciding factor in providing these dental services is probably the re-imburement of fees for service, through the Government Nationalised Health Scheme. (Although the recent move to force the patient to pay 50 per cent of the dental fees may change, student utilisation of dental services).

Nottingham University, with a student population (undergraduates = 5,500) similar to that of the Australian National University is described in more detail. The dental service consists of two full time dentists operating in three surgeries. Although the dentists work within the National Health Service, they are paid on a salary basis, also carry out work outside the scheme; e.g., preventive programmes, epidemiology surveys, socio-dental investigations into attitudes and knowledge of dentistry. There is a waiting list of three to four weeks for routine conservative work with an hour reserved each day for dental emergencies. The nett cost to the university for providing the service is 1 pound (sterling) per student⁽³⁶⁾

4.3 Finland

Student dental services in Finland started in 1955, and have been expanding since. At the University of Helsinki the service is financed by a fee for service plus a portion of the general health fee. Any type of treatment could be carried out for students although ninety per cent of the work load consists of fillings, temporary dressings, finishing and 'tooth cleaning'.

The number of students utilising the service has been increasing since the service commenced. In 1968, 14,050 students were treated in Finland of a student population of 48,400 or approximately 30% of students.

Because of pressure of work load, large scale effective preventive measures are neglected. There is no modern recording of students' individual dental health status; generally only the more acute operations are carried out.

The rapidly increasing charges for service and increasing subscription fee is seen by Rantanen to be factors which may make organised care, with a wide range of treatment for students, increasingly impractical. (37)

4.4 Australia

Not one of the Australian or New Zealand universities has a dental service operating within the university health service.

Students at Sydney University may receive treatment at the dental hospital, fees vary according to a means test. The hospital is situated approximately one mile from the campus. A private practitioner works full time on-campus on a fee for service (10% reduction on Australian Dental Association recommended fee) basis. This service commenced June 1972.

At the University of Adelaide, students, if eligible on a financial assessment may receive treatment at the dental hospital.

Universities of Melbourne and La Trobe (Victoria) are considering proposals for the institution of student dental health services; although in Melbourne the student representative council has an arrangement with a friendly benefits society for dental treatment at a discount (the Australian National University S.R.C. has a similar arrangement). Students in Melbourne also may be treated at the dental hospital (close to the university), if financially eligible.

5. SURVEY OF DENTAL NEEDS

5.1 Introduction

Late in 1970, the Students Representative Council at the Australian National University sent questionnaires to 3800 of the students. An unrepresentative 30 per cent of forms were returned. The questionnaire survey was to determine whether the students wanted an on-campus dental service (93% wanted a service): what type of service was preferred (68% felt that it should be a comprehensive service): how it was to be financed (of the schemes offered, preference was shown to favour a compulsory membership scheme with a small annual contribution of \$5.00)

In August 1971 the administrative council's Student Welfare Committee considered these possibilities and then requested the Dental Faculty of the University of Sydney to undertake a survey to determine the dental condition of students, what their treatment needs might be, and what their views and reactions to an on-campus dental service might be.

The examinations for the survey were carried out on the 11th - 13th April 1972 with a 'follow-up' on the 10th - 11th May.

The students completed a questionnaire (Appendix 1) on dental habits and attitudes before the examination, no help or advice was given when filling in the questionnaire.

The aims of the survey were to:

1. Investigate the caries and periodontal disease prevalence in a sample of the university students.

2. Determine the treatment needs of that group of students.

3. Investigate dental attitudes and past utilisation of dental services.

5.2 : Method

Sampling: The number of students enrolled by the ANU at 30.4.72 by level of study and whether those students were part time or full time was:

Postgraduates N = 896

Undergraduates N = 2405 Full Time
 N = 1743 Part Time

A random sample of 308 full time, 290 part time and 65 graduate students were selected by computer from the Administration lists of students.

This sample was stratified by age, full time and part time students, post graduate and undergraduate.

At the first visit of three days, to the Australian National University, only 45% of students presented themselves to examiners, Boyles and Barnard who used one recorder and a tape recorder to record the examination information.

SAMPLE RESPONSE Initial Visit

Full time :	191 of 308	(62%)
Part time :	72 of 290	(24%)
Graduates :	38 of 65	(58%)
TOTAL :	301 of 663	(45%)

TOTAL RESPONSE (including follow up)

Full time :	257 of 308	(83%)
Part time :	120 of 290	(41%)
Graduates :	45 of 65	(70%)
TOTAL :	422 of 663	(63%)

Only one examiner (Boyles) with a recorder, were present at the follow up examinations. It will be noted from the figures that only 41% of the sample of part time students were examined, this was considered as unrepresentative, therefore results of this group are presented more briefly and can be of only relative value (see appendix 2 for results).

Examination:

Examinations were carried out in a well lit common room in one of the halls of residence at the Australian National University by the two examiners, Barnard and Boyles. Lighting for examinations was from a portable 'planet' 12 volt dental light, using a portable dental chair to seat the student. The examinations were completed in approximately two to three minutes, plane mouth mirrors and Ash No. 49 probes were used to examine for caries, periodontal disease and oral hygiene status. No radiographs were taken.

Data Recorded:

All data was recorded on the form (Appendix 1). Basic data: for each subject the following information was recorded by the subject: name, identification number, date of examination, sex, age, faculty and year, full time or part time status. Dental data: Examiners noted the following details which were recorded by the recorder on the form.

State of the full or partially edentulous arches: whether an upper arch or lower arch was needing dentures, had dentures, which were satisfactory or defective. Whether a partial denture or bridge was required, present and satisfactory, or present but defective.

Note: indication for bridges or partial dentures was the decision of the examiners.

Dental Caries

Examination for caries followed the guidelines laid down by the Federation Dentaire Internationale ⁽³⁸⁾ and World Health Organization's manual "Oral Health Surveys". ⁽³⁹⁾

A systematic approach was adopted, proceeding in an orderly manner from one tooth or tooth space to the adjacent tooth space completing first one arch then the next.

The order of examining arches was upper left, from tooth 1 to 8, then upper right, lower left and lower right, starting from central incisor, each tooth was examined for caries once only.

All of the 32 permanent teeth were examined because the survey was concerned with treatment needs.

Notations

Sound tooth (S) - a tooth is considered sound if it showed no evidence of treated or untreated caries.

Decayed tooth (D) - teeth with clinical dental caries and no previous filling.

Filled tooth (F) - teeth which were filled and showed no clinical signs of secondary decay or marginal leakage.

Filled but decayed tooth (D+F) - filled teeth that were secondarily carious but saveable. These teeth are included with the decayed teeth (DT) in the decayed component of the DMF ⁽⁴⁰⁾ index.

Teeth Indicated for Extraction (X) - non functional teeth.
(XD) - due to caries, pulp involvement by exposure, periapical abscess; if only roots remain this was noted.

(XP) - extraction indicated through periodontal disease - gross loss of supporting structure.

(X0) - extraction for other reasons.

Note: some subjective judgement was required for XD teeth as to whether they should be restored or extracted.

(X) teeth are included in the (D) teeth for the DMF index.

Missing teeth (M) - teeth erupted but missing by reason of caries (MD), periodontal (MP) or other reasons (MO).

Missing teeth but space closed (MSC) when less than 3mm.
separates the teeth bounding it mesio distally.

Dental caries data is presented as the mean number of teeth affected by caries, i.e., DT, FT, (D+F)T, MT, XT, and the DMF teeth index. The data is also presented as DS, FS, D+FS, to give a DMF surfaces index⁽⁴¹⁾.

The DMFS index uses five surfaces of each tooth, coding designated by the first letter of the surface, namely: Buccal (B), lingual (L), mesial (M), distal (D), and occlusal (O). The DMFT index and its components is used rather than the DMFS index for comparison with other surveys.

Periodontal Disease

The status of the periodontal tissues was assessed by the well-established system of Russell (42).

- Score 0 - Negative - there is neither overt inflammation in the investing tissues nor loss of function due to destruction of supporting tissues.
1. - Mild gingivitis - there is an overt area of inflammation in the free gingivae, but this area does not circumscribe the tooth.
 2. - Gingivitis - inflammation completely circumscribes the tooth, but there is no apparent break in the epithelial attachment.
 6. - Gingivitis with pocket formation - the epithelial attachment has been broken and there is a pocket (not merely a deepened gingival crevice due to swelling in the free gingivae). There is no interference with normal masticatory functions - the tooth is firm in its socket and has not drifted.
 8. - Advanced destruction with loss of masticatory function - The tooth may be loose, may have drifted; may sound dull on percussion with a metallic instrument; may be depressible in it's socket.

If there was doubt, the lower score was assigned. The index score for each subject is the arithmetic average of the scores for the teeth in the mouth.

The data concerning periodontal status is presented as the mean periodontal index score per person.

The proportion and number of students with periodontal pockets is also noted and presented in the results.

Oral Hygiene Index

The simplified version of the Oral Hygiene Index, as described by Greene and Vermillion ⁽⁴³⁾ is used.

Selected surfaces of six teeth are used in making this estimation of oral hygiene status. For the purpose of this examination, each surface that is used, buccal or lingual, is considered to encompass half of the circumference of the tooth. The buccal surface of a molar, for example, is considered to include half of the mesial surface and half of the distal. The posterior teeth used for the assessment are the first fully erupted teeth, distal to the bicuspid area on each side of each arch. In most cases this will be a first molar, but in others it may be a second or third molar. The buccal surfaces of upper molars and the lingual of lowers are examined. In the anterior portion of the mouth, the labial surfaces of the upper right central incisor and the lower left central incisor are examined when one or both of these teeth is missing, the adjacent central incisor is substituted.

Oral Debris Index

The surface area covered by debris is estimated by running a number five explorer along the surface being examined and noting the occlusal or incisal extent of the debris as it is removed from the tooth surface and adheres to the explorer.

- Scoring: X = No tooth
- 0 = No debris or stain present
- 1 = (a) Soft debris covering not more than the gingival third of the exposed tooth surface.
(b) The presence of the extrinsic stains without debris regardless of surface area covered.
- 2 = Soft debris covering more than one third but not more than two thirds of the exposed tooth surface.
- 3 = Soft debris covering more than two thirds of the exposed tooth surface.

Calculus Index

A number five explorer is also used to estimate surface area covered by supragingival calculus and to probe for subgingival calculus.

- Scoring: X = No tooth
- 0 = No calculus present
- 1 = Supragingival calculus covering not more than one third of the exposed tooth surface.
- 2 = Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface, and/or the

presence of individual flecks of subgingival calculus around the cervical portion of the tooth.

3 = Supragingival calculus covering more than two thirds of exposed tooth surface and/or a continuous heavy band of subgingival calculus around the cervical portion of the tooth.

Calculating the Index

The debris scores are totaled and divided by the number of surfaces scored. The calculus score is determined similarly. The debris and calculus scores are then added to give the examinee's Simplified Oral Hygiene Index.

A further scoring for the whole mouth was carried out marking calculus - not present, present, supragingival and/or subgingival.

Dental Care Needs

Dental care needs, namely, emergency or regular were noted with particular reference to special types of treatment need - oral surgery, endodontics crowns, periodontal treatment and orthodontic treatment.

Student Questionnaire (see appendix 1)

A questionnaire was completed by the student. This was expected to reveal students' attitudes to dentistry and utilisation of dental services. The results are presented in tabular form in the next section.

5.3 Results

For full time students, the results are given in summary form in this section. The results of part time students are presented in the appendix because the number of students examined were not considered to be representative of the part time student body (only 45% of the sample group were examined).

Age Sex Distribution

A total of 302 full time students were examined. Their age-sex distribution is presented in Table 1. The age distribution is presented in four groups: 17-19 years, 20-24 years, 25-29 years and over 30 years. The average age of the group was noted to be 21.7 years, 68% of students being male.

Mean Number of Teeth

These are presented by age group and sex. Table 2 shows the mean number of teeth which are present in the oral cavity and which have erupted into the oral cavity. The teeth present may be decayed, filled, or indicated for extraction. The average number of teeth present in the mouth is the fairly high number of 28.1. There appears to be little difference between sexes which appears to be contrary, in considering the earlier eruption of third molars in females.

Dental Caries Prevalence

Prevalence is presented, using the DMF teeth and DMF surfaces index with their component parts.

Those component parts are:

1. unfilled teeth which were decayed: (D) teeth (Table 3)
2. filled teeth which were also decayed: (D+F) teeth (Table 4)
3. decayed teeth which were indicated for extraction (X) teeth, are shown separately (Table 6).

For the purpose of the DMFT index, these teeth were included in the (D) component.

4. missing teeth, extracted because of caries: (M) teeth (Table 7)
5. filled teeth, with no evidence of decay: (F) teeth.

To enable the total decayed component of the DMFT index to be calculated, the total number of decayed teeth (i.e. D plus (D+F) teeth) is also presented (Table 5).

Finally these components are grouped to form the DMFT index (Tables 10 and 11) and presented graphically (Figure 9).

Tables showing the total number of decayed teeth i.e., 'D' teeth (which includes 'X' teeth) plus (D+F) teeth, emphasises the low order of untreated caries prevalence of this group of students, namely 2.18 decayed teeth per person.

Decayed Teeth (Table 5)

The mean number of untreated decayed teeth shows a tendency to decrease with age with males having more decayed teeth than females.

Comparisons by age may not be valid for all indices due to the low sample numbers of females in age groups 25-29 years and above 30 years. (Large standard errors and deviations may be seen in the tables for these age groups).

Missing Teeth (Table 7)

The mean number of teeth missing as a result of caries for the group was 1.08 with 62% having had no permanent tooth extracted because of caries. Females tended to have a higher mean number of teeth extracted because of decay than males.

The number of missing teeth due to caries is low and there were very few teeth noted as being due for extraction (XT), these being in only 8 of the 302 students.

Filled Teeth (Table 8)

The mean number of filled teeth increased with age but with no sex difference.

A useful indication of the efficiency of past treatment is the expression of the percentage of filled teeth to DMF teeth as presented in Table 9, Figure 8. Obviously, the closer the ratio approaches 100 per cent, the more efficacious the past dental treatment has been. The value of 76.1% for the whole group is indicative of a very high level of past dental care in the student group.

DMFT Index

The summary of decayed, missing and filled teeth is presented in Tables 10 and 11, Figure 9. A DMF value of 13.8 teeth for the group with a decayed component of 2.2 teeth shows a very low caries attack rate with a correspondingly low proportion of teeth in need of treatment. The DMF shows little difference between the sexes but increases with age. The low numbers in the age groups 25-29 years and 30+ years probably explains the dramatic changes in DMF at those ages.

DMFS Index

The DMF surfaces index ⁽⁴¹⁾ are presented in tables 12,13,14,15 for the purpose of completeness. Very little additional information may be gained from these tables. The ratio of DMFT:DMFS was 2.2:1.

AGE	SEX	NUMBER	% of group	MEAN AGE	S.D..	S.E..
17-19yrs	M	74	25%	18.8 yrs.	0.6	0.07
	F	56	19%	18.9 yrs.	0.7	0.09
20-24yrs	M	82	27%	21.9 yrs.	1.4	0.16
	F	43	14%	21.5 yrs.	1.3	0.19
25-29yrs	M	28	9%	27.0 yrs.	1.6	0.29
	F	4	1%	27.5 yrs.	2.3	1.15
30 + yrs	M	11	4%	32.3 yrs.	2.5	0.76
	F	4	1%	40.0 yrs.	4.8	2.40
TOTAL	M	195	65%	22.1 yrs.	3.9	0.38
	F	107	35%	21.1 yrs.	4.4	0.42

TABLE 1. AGE - SEX DISTRIBUTION.

SAMPLE No. 302 FULL TIME STUDENTS.

AGE	SEX	MEAN NO. TEETH	S.D.	S.E.	(M+F)	S.D.	S.E..
17-19yrs	M	28.0	2.1	0.25	} 27.9	2.0	0.18
	F	27.7	1.8	0.25			
20-24yrs	M	28.8	2.2	0.24	} 28.5	2.8	0.25
	F	28.0	3.7	0.56			
25-29yrs	M	28.3	2.5	0.46	} 28.4	2.5	0.44
	F	28.7	3.0	1.49			
30+yrs	M	28.4	3.6	1.10	} 26.1	8.0	2.06
	F	20.0	13.6	6.79			
TOTAL	M	28.4	2.3	0.17	} 28.1	3.0	0.17
	F	27.6	3.9	0.37			

TABLE 2. MEAN NUMBER OF TEETH PRESENT IN MOUTH BY SEX AND AGE.

	<u>17-19yrs.</u>	<u>20-24yrs.</u>	<u>25-29yrs.</u>	<u>30+yrs.</u>	<u>TOTAL.</u>
<u>MALES</u>	29.3	30.2	30.6	31.4	30.0
<u>FEMALES</u>	29.1	29.9	30.5	30.8	29.6
<u>M + F</u>	29.2	30.1	30.6	31.2	29.8

TABLE 2a. MEAN NUMBER OF ERUPTED TEETH.

(Includes mean numbers of teeth present + 'M' teeth + teeth extracted for impactions or other reasons.)

AGE	SEX	MEAN DT.	S.D.	S.E.	DT (M+F)	S.D.	S.E.
17-19	M	1.87	2.5	0.29	1.54	2.2	0.20
	F	1.11	1.7	0.23			
20-24	M	1.42	1.9	0.21	1.21	1.7	0.15
	F	0.81	1.2	0.18			
25-29	M	0.82	1.6	0.30	0.91	1.7	0.29
	F	1.50	2.4	1.19			
30+	M	1.36	3.0	0.91	1.00	2.6	0.68
	F	0	0	0			
TOTAL	M	1.50	2.2	0.16	1.31	2.0	0.12
	F	0.96	1.5	0.15			

TABLE 3. MEAN NUMBER OF DECAYED TEETH
BY SEX AND AGE

AGE	SEX	MEAN (D+F)	S.D.	S.E.	(M+F) MEAN (D+F)	S.D.	S.E.
17-19	M	0.65	0.9	0.10	0.73	1.1	0.09
	F	0.84	1.2	0.16			
20-24	M	1.10	1.5	0.17	1.05	1.6	0.14
	F	0.95	1.7	0.27			
25-29	M	0.89	1.2	0.23	0.88	1.2	0.22
	F	0.75	1.5	0.75			
30+	M	0.73	1.5	0.45	0.60	1.3	0.34
	F	0.25	0.5	0.25			
TOTAL	M	0.88	1.3	0.09	0.87	1.3	0.08
	F	0.86	1.4	0.14			

TABLE 4. MEAN NUMBER OF DECAYED AND FILLED TEETH (D+F),

BY AGE AND BY SEX.

4

AGE	SEX	MEAN		
		MEAN D+(D+F)T.	D+(D+F)T. (sex pooled)	%with ZERO D+(D+F)T.
17-19	M	2.51	2.27	20.8
	F	1.95		
20-24	M	2.51	2.26	24.8
	F	1.77		
25-29	M	1.71	1.78	31.2
	F	2.25		
30+	M	2.09	1.60	53.3
	F	0.25		
TOTAL	M	2.37	2.18	25.3
	F	1.82		

TABLE 5. MEAN NUMBER OF DECAYED TEETH (D),
PLUS DECAYED AND FILLED (D+F) TEETH
BY SEX AND BY AGE.

AGE	SEX	MEAN "M"	S.D.	S.E.	% NO. "M"	MEAN ^{TOTAL}	% ZERO
7-19	M	0.64	1.1	0.13	66.2%	0.79	66.2%
	F	0.98	1.7	0.23	66.1%		
0-24	M	0.67	1.2	0.13	70.7%	0.94	67.2%
	F	1.44	3.8	0.58	60.5%		
5-29	M	1.61	1.9	0.35	42.8%	1.47	43.8%
	F	0.50	0.6	0.29	-		
30+	M	2.00	3.0	0.91	36.4%	4.13	33.3%
	F	10.00	15.0	7.49	-		
TOTAL	M	0.87	1.5	0.11	63.1%	1.08	62.2%
	F	1.49	4.1	0.39	61.7%		

TABLE 7. MEAN NUMBER OF TEETH EXTRACTED BECAUSE OF DENTAL CARIES, ("M"TEETH),
BY AGE AND BY SEX.

SEX	NO. OF STUDENTS	MEAN "X"	S.D.	S.E.
MALE	6	0.04	0.25	0.018
FEMALE	2	0.04	0.30	0.029
TOTAL	8	0.04	0.27	0.015

TABLE 6. MEAN NUMBER OF TEETH REQUIRING EXTRACTION THROUGH DECAY, ("X"TEETH)
BY SEX NOT AGE.

AGE	SEX	MEAN 'F' TEETH	S.D.	S.E.	%ZERO	(M+F) MEAN	S.D.	S.E.	%ZERO
-19	M	9.3	4.8	0.56	4.1%	} 9.6	4.8	0.42	3.1%
	F	9.9	4.8	0.64	1.8%				
-24	M	10.7	4.6	0.51	1.2%	} 10.8	4.7	0.42	1.6%
	F	10.9	4.8	0.73	2.3%				
-29	M	13.2	5.2	0.98	3.6%	} 13.6	5.1	0.91	3.1%
	F	16.3	4.3	2.17	-				
0+	M	9.6	7.7	2.32	(+)	} 10.8	8.4	2.17	(+)
	F	14.3	10.4	5.22	(+)				
TOTAL	M	10.5	5.1	0.37	3.6%	} 10.6	5.1	0.29	3.3%
	F	10.7	5.1	0.50	2.8%				

MEAN NUMBER OF FILLED TEETH

BY SEX AND BY AGE GROUP.

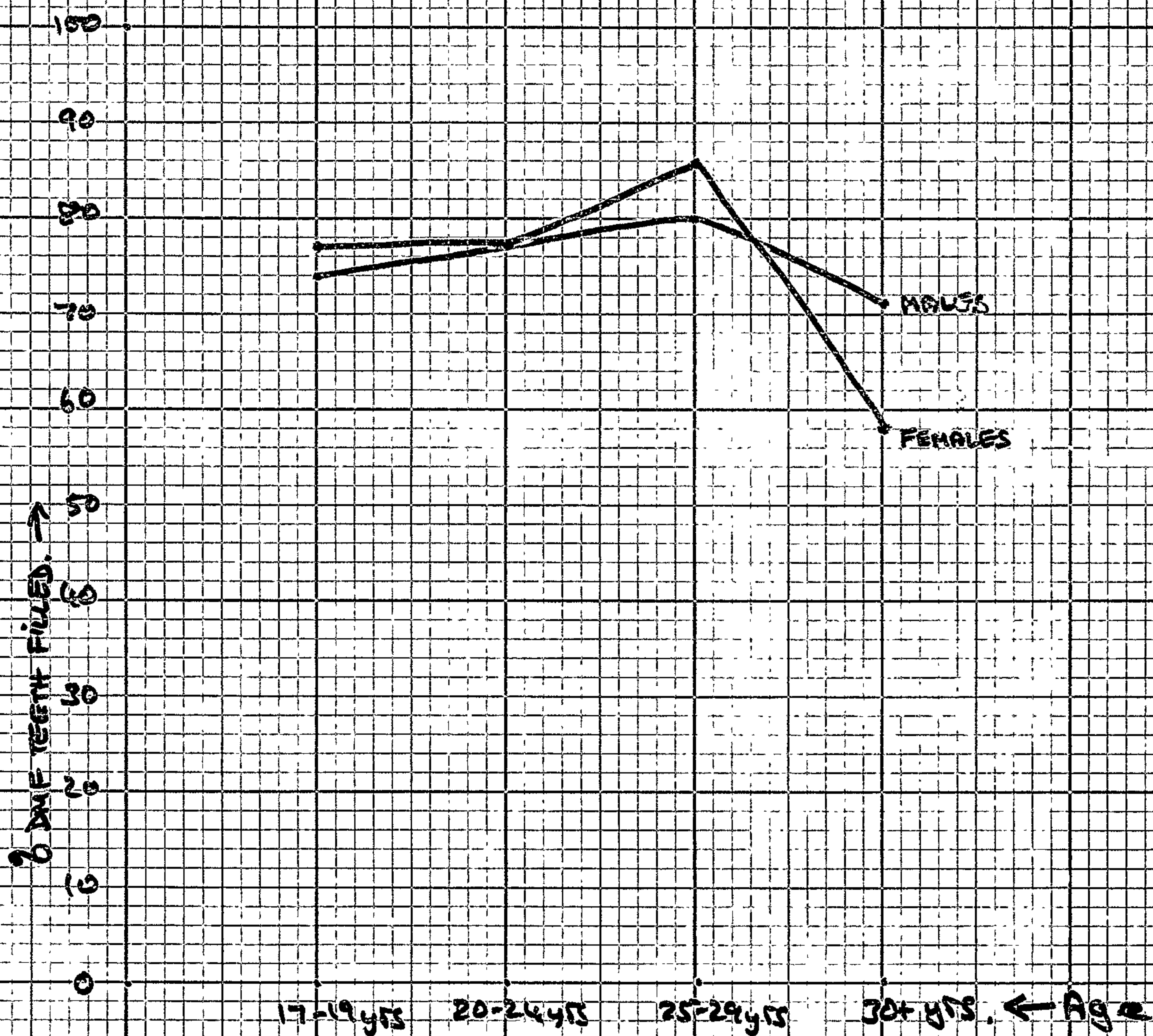
TABLE.8.

AGE	SEX	F	DMF	F:DMF%
17-19	M	9.3	12.5	74.4%
	F	9.9	12.8	77.3%
20-24	M	10.7	13.9	77.0%
	F	10.9	14.1	77.3%
25-29	M	13.2	16.5	80.0%
	F	16.3	19.0	85.8%
30+	M	9.6	13.6	70.6%
	F	14.3	24.5	58.4%
17-19	MALES + FEMALES	9.6	12.6	76.2%
20-24	"	10.8	14.0	77.1%
25-29	"	13.6	16.8	81.0%
30+	"	10.8	16.5	65.5%
TOTAL	"	10.5	13.8	76.1%

TABLE 9. RATIO OF F:DMF TEETH PER CENT
BY AGE AND SEX.

PERCENTAGE OF DMF TEETH FILLED.

FIG. 8.



AGE	D.	M.	F.	DMFT.
17-19	2.2	0.8	9.6	12.6
20-24	2.3	0.9	10.8	14.0
25-29	1.8	1.5	13.5	16.8
30+	1.6	4.1	10.8	16.5
TOTAL	2.2	1.1	10.6	13.8

TABLE 10. MEAN NUMBER OF DECAYED, MISSING, AND FILLED TEETH,
AND DMF TEETH INDEX, SEX POOLED.

N.B. (D) TEETH includes decayed but filled (D+F) teeth,
and teeth indicated for extraction (X) teeth.

AGE	SEX	MEAN DMFT	S.D.	S.E.	(M+F)	S.D.	S.E.
7-19	M	12.5	5.3	0.62	12.6	5.4	0.48
	F	12.8	5.6	0.75			
20-24	M	13.9	4.8	0.54	14.0	5.1	0.45
	F	14.1	5.5	0.84			
25-29	M	16.5	6.4	1.21	16.8	6.3	1.12
	F	19.0	6.1	3.03			
30+	M	13.6	9.9	3.0	16.5	10.0	2.59
	F	24.5	5.4	2.72			
TOTAL	M	13.7	5.7	0.41	13.8	5.8	0.34
	F	14.0	6.0	0.58			

TABLE 11. MEAN DMFT. BY AGE AND BY SEX.

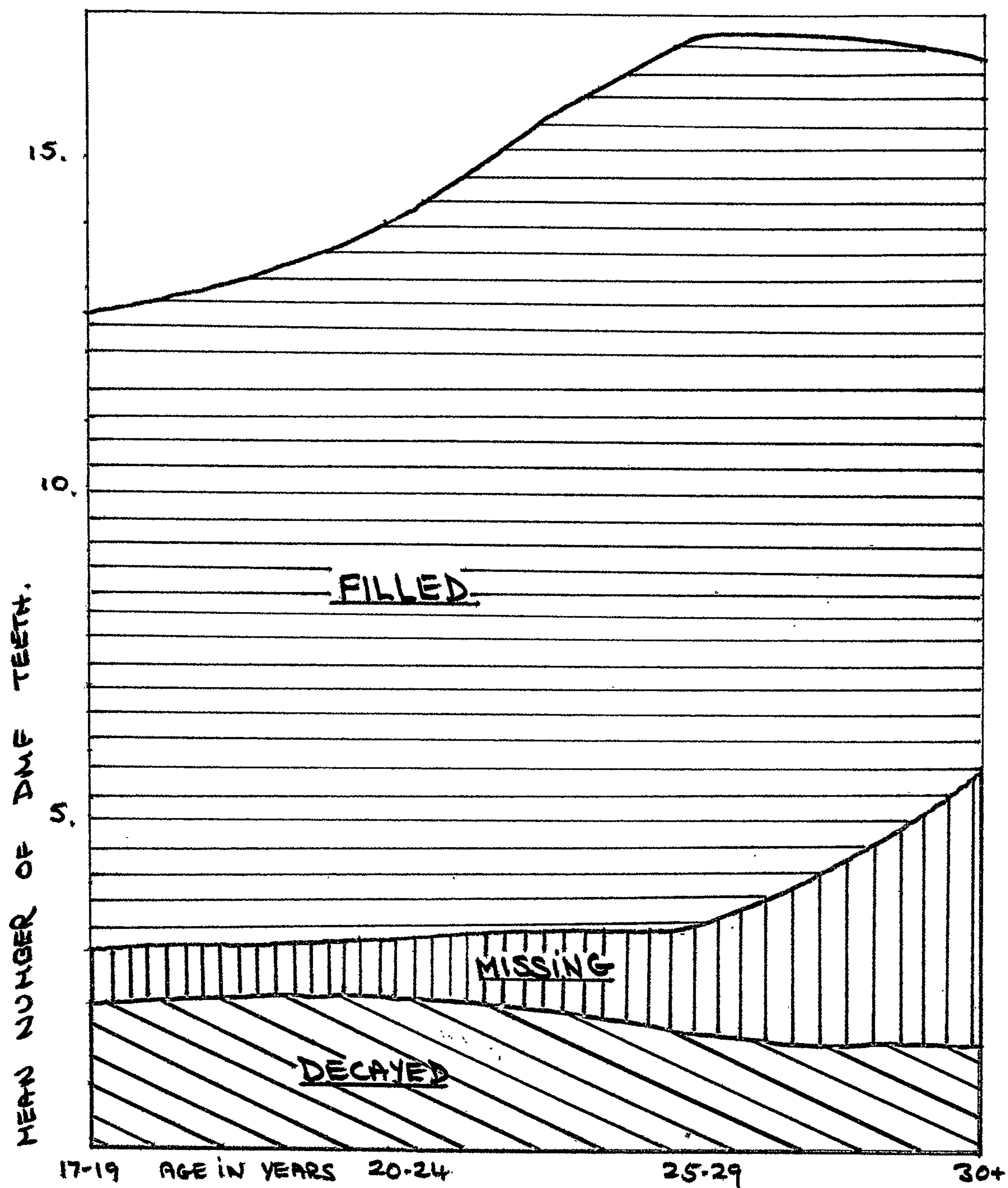


FIG. 9. TO SHOW PREVALENCE OF CARIES
BY D: M: F TEETH BY AGE (SEX-POOLED).

TABLE 12. FILLED SURFACES.

<u>AGE</u>	<u>SEX</u>	<u>MEAN F.S.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>MALE + FEMALE.</u>	<u>S.D.</u>	<u>S.E.</u>
7-19	M	18.5	11.6	1.4	18.9	12.0	1.1
	F	19.5	12.6	1.7			
20-24	M	23.7	13.3	1.5	23.6	13.2	1.2
	F	23.3	13.1	2.0			
25-29	M	29.6	14.6	2.8	30.7	14.7	2.6
	F	38.0	14.8	7.4			
30+	M	22.3	21.5	6.5	25.8	23.0	5.9
	F	35.5	27.3	13.6			
TOTAL	M	22.5	13.9	1.0	22.4	13.9	0.8
	F	22.4	14.0	1.4			

TABLE 13. DECAYED BUT FILLED SURFACES. (D+F) S.

<u>AGE</u>	<u>SEX</u>	<u>MEAN (D+F) S.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>MALE + FEMALE.</u>	<u>S.D.</u>	<u>S.E.</u>
7-19	M	0.54	0.8	0.10	0.56	0.9	0.08
	F	0.60	1.0	0.14			
20-24	M	0.89	1.4	0.16	0.86	1.5	0.13
	F	0.81	1.6	0.25			
25-29	M	0.82	1.2	0.22	0.81	1.2	0.21
	F	0.75	1.5	0.75			
30+	M	0.27	0.5	0.14	0.27	0.46	0.12
	F	0.25	0.5	0.25			
TOTAL	M	0.71	1.2	0.08	0.70	1.2	0.07
	F	0.67	1.3	0.12			

N.B. (D + F) surfaces are included in 'D' surfaces.

TABLE 14. DECAYED SURFACES. (D.S.)

<u>AGE</u>	<u>SEX</u>	<u>MEAN D.S.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>MALES + FEMALES.</u>	<u>S.D.</u>	<u>S.E.</u>
-19	M	2.93	3.6	0.42	2.71	3.5	0.30
	F	2.41	3.3	0.44			
-24	M	3.05	4.1	0.45	2.70	3.7	0.33
	F	2.02	2.7	0.42			
-29	M	2.07	2.8	0.54	2.16	3.1	0.54
	F	2.70	4.9	2.43			
0+	M	2.82	5.5	1.64	2.13	4.8	1.20
	F	0.25	0.5	0.25			
TOTAL	M	2.85	3.8	0.27	2.62	3.6	0.21
	F	2.19	3.1	0.30			

N.B. 'D' Surfaces include (D + F) Surfaces.

TABLE 15. DMFS.

<u>AGE</u>	<u>SEX</u>	<u>MEAN DMFS.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>MALES + FEMALES.</u>	<u>S.D.</u>	<u>S.E.</u>
-19	M	24.6	14.0	1.63	25.6	15.2	1.34
	F	26.9	16.8	2.24			
-24	M	30.1	15.0	1.66	30.9	17.2	1.53
	F	32.6	20.7	3.16			
-29	M	39.8	19.0	3.58	40.2	18.5	3.27
	F	43.3	17.1	8.53			
0+	M	35.1	30.4	9.17	37.9	30.2	7.80
	F	45.8	32.6	16.3			
TOTAL	M	29.7	17.1	1.22	29.9	17.9	1.03
	F	30.5	19.4	1.88			

Teeth Missing for Reasons other than Dental Caries

Periodontal: no teeth were thought to have been extracted for periodontal reasons, even in the older age groups.

Oral Surgery: 6% of the group had had teeth removed because they were impacted. These were virtually all third molar teeth, however, if there was some doubt about whether a third molar had been extracted for impactions or decay, it was assigned to this category, probably thus giving exaggerated values in this category (Table 16).

Orthodontics: nearly 20 per cent of the group had had teeth extracted for orthodontic reasons, with the older age groups having had fewer orthodontic extractions than the younger age groups (Table 17).

AGE	S.D.	S.E.	MEAN	% PEOPLE
17-19	0.28	0.02	0.03	1.5%
20-24	0.42	0.04	0.07	4.0%
25-29	1.11	0.19	0.47	18.7%
30+	1.49	0.38	0.93	33.3%
TOTAL	0.62	0.04	0.14	6.0%

TABLE 16. MEAN NUMBER OF TEETH MISSING, REMOVED FOR IMPACTIONS.

N.B. Third molars which have been extracted were generally assigned to this category, a portion of those teeth might have been also decayed.

AGE	S.D.	S.E.	MEAN	% PEOPLE
17-19	1.2	0.10	0.51	20.0%
20-24	1.2	0.10	0.53	21.6%
25-29	0.9	0.16	0.28	12.5%
30+	0	0	0	0
TOTAL	1.1	0.06	0.47	18.9%

TABLE 17. MEAN NUMBER OF TEETH MISSING, FOR ORTHODONTIC REASONS.

Oral Hygiene Status

Tables (18,19,20 and Figure 10) show the debris, calculus, and oral hygiene index scores, by age and by sex.

The Debris index shows a sex difference, females having less debris than males. Little change with age is seen. For the group as a whole, only 7% of students were completely free of debris.

Calculus index shows an increasing mean score with age, having little sex difference. 84% of the total group had no calculus.

Oral hygiene index shows that the state of oral hygiene worsens with age due to increase of the calculus component of the index. Males have poorer oral hygiene than females, due to differences in the debris index.

The oral hygiene index in its simplified version only covers 6 teeth in each mouth and the presence of subgingival or supragingival calculus on a whole mouth basis is given in Table 21.

TABLE 18. MEAN DEBRIS INDEX.

AGE	MALE	FEMALE	MALE + FEMALE.	S.D.	S.E.
17-19	0.76	0.61	0.70	0.5	0.04
20-24	0.91	0.73	0.85	0.6	0.05
25-29	0.97	0.45	0.91	0.6	0.10
30+	0.96	0.45	0.83	0.5	0.13
TOTAL	0.86	0.65	0.79	0.5	0.03

TABLE 19. MEAN CALCULUS INDEX.

AGE	MALE	FEMALE	MALE + FEMALE.	% ZERO	S.D.	S.E.
17-19	0.07	0.02	0.05	89%	0.4	0.03
20-24	0.10	0.10	0.10	84%	0.3	0.02
25-29	0.22	0.32	0.23	69%	0.5	0.08
30+	0.51	0	0.37	73%	0.7	0.19
TOTAL	0.13	0.06	0.11	84%	0.3	0.02

TABLE 20. MEAN ORAL HYGIENE INDEX.

AGE	MALES	FEMALES	MALES + FEMALES.	S.D.	S.E.
17-19	0.83	0.63	0.75	0.5	0.05
20-24	1.01	0.84	0.95	0.7	0.06
25-29	1.20	0.77	1.15	0.9	0.15
30+	1.47	0.45	1.20	1.1	0.27
TOTAL	1.00	0.71	0.90	0.7	0.04

TABLE 21. WHOLE MOUTH CALCULUS, BY SEX AND BY AGE.

AGE AND NUMBERS (N.)	NO CALCULUS		SUPRA-GINGIVAL		SUB-GINGIVAL	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
female N=56 17-19 male N=74	44 (60%)	39 (70%)	21 (28%)	15 (27%)	9 (12%)	2 (3%)
female N=43 20-24 male N=84	49 (60%)	28 (65%)	26 (32%)	5 (14%)	7 (8%)	9 (21%)
female N=4 25-29 male N=28	11 (39%)	2 (50%)	9 (32%)	1 (25%)	8 (29%)	1 (25%)
female N=4 30+ male N=11	5 (45%)	1 (25%)	0 (0%)	2 (50%)	6 (55%)	0 (0%)

TOTAL N=115

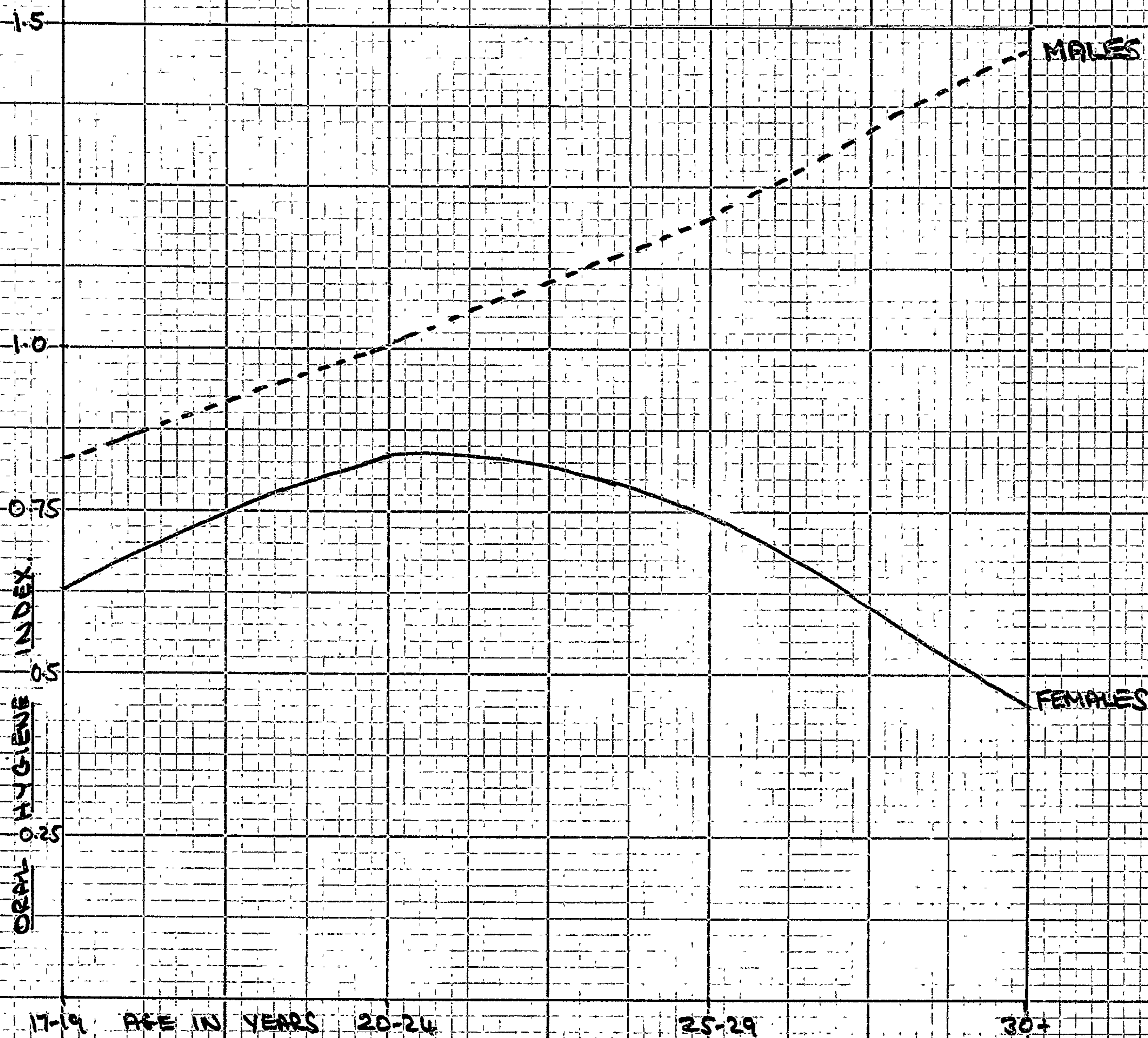


Fig. 10. Oral Hygiene Index (simplified).
by age and sex.

Periodontal Disease

This is represented by Russell's Periodontal index and the mean number of pockets per individual. As can be seen, periodontal index scores increase with age, males having a consistently higher score than females, only 8% of subjects had no gingivitis or periodontitis.

The mean number of pockets is seen to increase with age. It should be noted that the actual numbers of subjects involved was very small. A periodontal probe was not used in the survey, thus diminishing the accuracy of periodontal scores exceeding 2 (per tooth) and the mean number of pockets.

Figure 11 shows graphically the mean periodontal index (by age only) and its correlation to oral hygiene index.

Dental Care Needs (Table 24)

After the dental examination, an assessment was made whether the subject needed emergency or routine dental care. Only 4 per cent of the group (13 students) were thought to require immediate attention to their teeth or periodontia. Type of treatment required: notably 12 per cent of students required probable surgical removal of teeth, all but two being third molar teeth. No patients were thought to require orthodontic treatment.

Prosthetics (Table 25)

Subjects were examined for their prosthetic treatment requirements. If there was an edentulous arch, partial or complete, the subject was recorded as:

1. requiring a denture (or bridge)
2. prosthesis present but defective
3. prosthesis present and satisfactory

The recommendation for the prosthetic replacement of missing teeth is possibly an arbitrary decision, even more so, whether to have a fixed bridge, or removable plastic or metal denture. This is of course yet another examiner variable. Note 7% of students were thought to require partial dentures.

AGE	MALE	FEMALE	MALE + FEMALE.	S.D.	S.E.
17-19	0.68	0.45	0.58	0.5	0.04
20-24	0.85	0.68	0.79	0.5	0.05
25-29	1.16	0.48	1.08	1.1	0.20
30+	1.33	0.85	1.20	1.1	0.28
TOTAL	0.86	0.56	0.75	0.7	0.04

TABLE 22. RUSSELL PERIODONTAL INDEX.

MEAN INDEX BY SEX AND BY AGE.

	17-19	20-24	25-29	30+
MEAN NO. OF PATIENTS WITH POCKETS	0.02	0.04	0.06	0.20
% NO. OF PEOPLE WITH POCKETS.	2.3%	4.0%	6.3%	20.0%

TABLE 23. MEAN NUMBER OF SUBJECTS WITH ONE OR MORE
PERIODONTAL POCKETS, BY AGE (SEX POOLED).

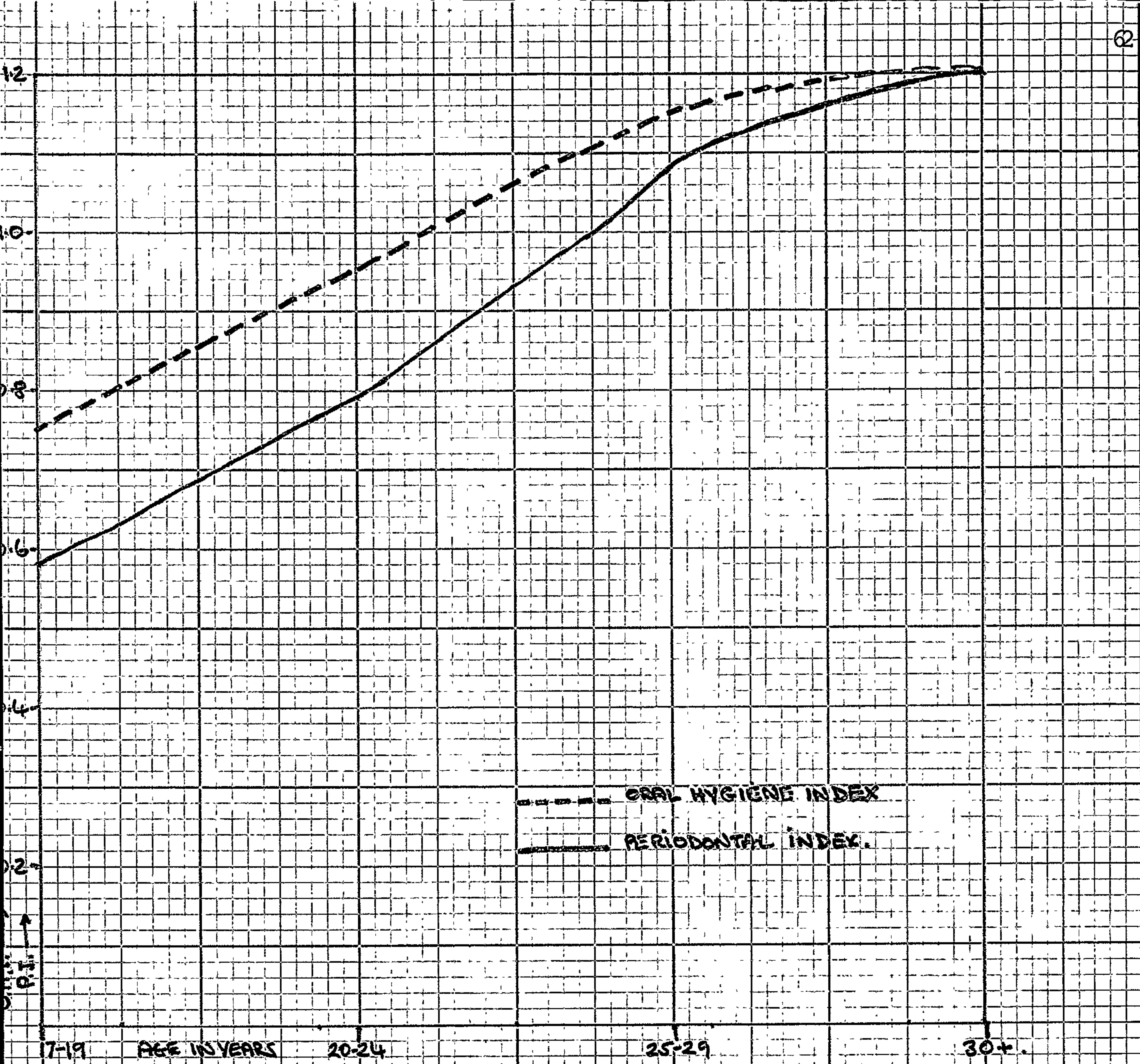


Fig. 11. To show Russell Periodontal index and Oral Hygiene Index. By age (sex pooled).

TABLE 24. DENTAL CARE NEEDS BY TYPE OF SERVICE..

<u>TYPE OF SERVICE</u>	<u>NUMBER REQUIRED</u>	<u>PERCENTAGE (OF PERSONS REQUIRING SERVICE)</u>
ORAL SURGERY	37	12.2%
ENDODONTICS	5	1.9%
CROWNS	7	2.3%
BRIDGES	3	1.0%
PERIODONTAL	9	3.0%
PARTIAL DENTURE	21(21 STUDENTS)	7.0%
FULL DENTURE	0	0
EXTRACTION (simple)	12(8 STUDENTS)	2.6%
RESTORATIONS	656(226 subjects)	74.8%

TABLE 25. PROSTHETIC REQUIREMENTS..

FULL DENTURES.....	UPPER PRESENT SATISFACTORY	: 2 (0.7%)
	LOWER PRESENT SATISFACTORY	: 1 (0.3%)
PARTIAL DENTURES.....	REQUIRED	: 3 (1.0%)
(UPPER)	PRESENT DEFECTIVE	: 6 (2.0%)
	PRESENT SATISFACTORY	: 0
PARTIAL DENTURES.....	REQUIRED	: 12 (4.0%)
(LOWER)	PRESENT DEFECTIVE	: 0
	PRESENT SATISFACTORY	: 1 (0.3%)
BRIDGES.....	UPPER PRESENT SATISFACTORY	: 2 (0.7%)
	LOWER REQUIRED	: 3 (1.0%)
TOTAL PROSTHETIC NEEDS (including BRIDGES) : 24 (8.0%)		

The Questionnaire

Expenditure on Dentistry in One Year (Tables 26,27)

Little difference was seen in yearly expenditure on dentistry between males and females. There was a tendency for mean expenditure to increase with age. The number of students with no expenditure on dentistry in the previous year fell as the age increased.

If the total group is looked at, 52% had no expenditure on dentistry in the past year. Of the remaining 48%, 62% spent an average of twenty five dollars, whilst 28% spend an average of seventy five dollars. These figures probably reflect the fact that as the student becomes older, the responsibility for payment of dental fees falls more on his shoulders.

The mean personal expenditure for dentistry for the whole group was \$13.40.

TABLE 26. MEAN EXPENDITURE, IN DOLLARS, ON DENTISTRY IN ONE YEAR, BY SEX AND BY AGE.

AGE	MALES	FEMALES	MALES + FEMALES
17-19	11.5	11.9	11.7
20-24	12.6	11.8	12.3
25-29	21.6	27.2	22.3
30 +	14.0	31.2	18.6
TOTAL	13.5	13.2	13.4

TABLE 27. DISTRIBUTION OF STUDENTS, BY AGE AND SEX, WHOSE ANNUAL EXPENDITURE
IS SHOWN BELOW.

		MALES.											
	NONE	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	OVER 90	DOLLARS	
19	46(62%)	8	4	2	6	3	2	0	0	0	3		
24	44(54%)	10	10	5	1	3	3	2	2	0	2		
29	9(32%)	2	5	3	3	2	2	0	0	1	1		
+	6(54%)	0	1	2	1	0	0	1	0	0	0		
AL	105(58%)	20	20	12	11	8	7	3	2	1	6		
		FEMALES.											
19	28(50%)	6	10	4	2	1	3	0	1	0	1		
24	22(51%)	3	6	6	2	0	3	1	0	0	0		
29	2 -	1	0	0	0	0	0	0	0	0	1		
+	1 -	0	0	1	0	1	0	1	0	0	0		
AL	53(50%)	9	17	11	4	2	6	2	1	0	2		
		MALES + FEMALES..(N= 302)											
19	74(57%)	14	14	6	8	4	5	0	1	0	4		
24	66(53%)	13	16	11	3	3	6	3	2	0	2		
29	11 (34%)	2	6	3	3	2	2	0	0	1	2		
+	7(47%)	0	1	3	1	1	0	2	0	0	0		
AL	158(52%)	29	37	23	15	10	13	5	3	1	8		

Patterns of Utilisation of Dental Services

A. Number of Months Since last Visit to Dentist (see Tables 28,29; Figures 12,13)

72% of students said they had visited the dental surgeon within the past year. (As can be seen from Table 28, this time interval was 1-11 months: if the students who said they saw a dentist 12 months ago are included, this figure then becomes 78%)

Nine per cent of students had not been to see a dentist within the past three years. The length of time since the last visit varied markedly with sex and age (Figure 13). Average length of time since last visit was 6.8 months for females and 11.7 months for males.

B. Number of Visits to Dentists in Past Year (Tables 30,31; Figure 14)

The mean number of visits to the dentist in the past year was 1.6 with little differences in age or sex.

45% had been more than once in the past year.

These figures show a high utilisation of dental services with a high proportion of patients attending the dentist on a regular basis.

C. Type of Service received at dentist on last visit:

Presented in Table 32. The high proportion of extractions may be explained by removal of impacted third molars - a common condition of young adults. 26% of students had their teeth 'cleaned'. This question was probably interpreted by the students as the type of dental service which was carried out at the last visit to the dentist. This would give a biased picture of dental services,

e.g. dentists often complete a course of treatment by polishing the teeth, so a large number of students would have had their teeth 'cleaned' at their last visit.

TABLE 28 NUMBER OF MONTHS SINCE STUDENT LAST VISITED THE DENTIST.
BY AGE.. SEX POOLED.

AGE	NUMBER OF MONTHS					TOTAL
	1 - 5	6 - 11	12 - 23	24 - 35	36 +	
17 - 19	71	33	18	2	5	129
20 - 24	53	34	17	9	12	125
25 - 29	13	6	4	4	5	32
30 +	3	5	1	2	4	15
TOTAL	141 (47%)	77 (25%)	40 (13%)	17 (6%)	26 (9%)	301 (100%)

TABLE 29. MEAN NUMBER OF MONTHS SINCE LAST VISIT TO DENTIST.
BY AGE AND BY SEX.

AGE	MALE	FEMALE	M + F
17 - 19	8.0	6.1	7.2
20 - 24	13.0	8.2	11.4
25 - 29	14.2	4.5	13.0
30 +	20.9	4.0	16.4
TOTAL	11.7	6.8	10.0

PERCENTAGE OF STUDENTS

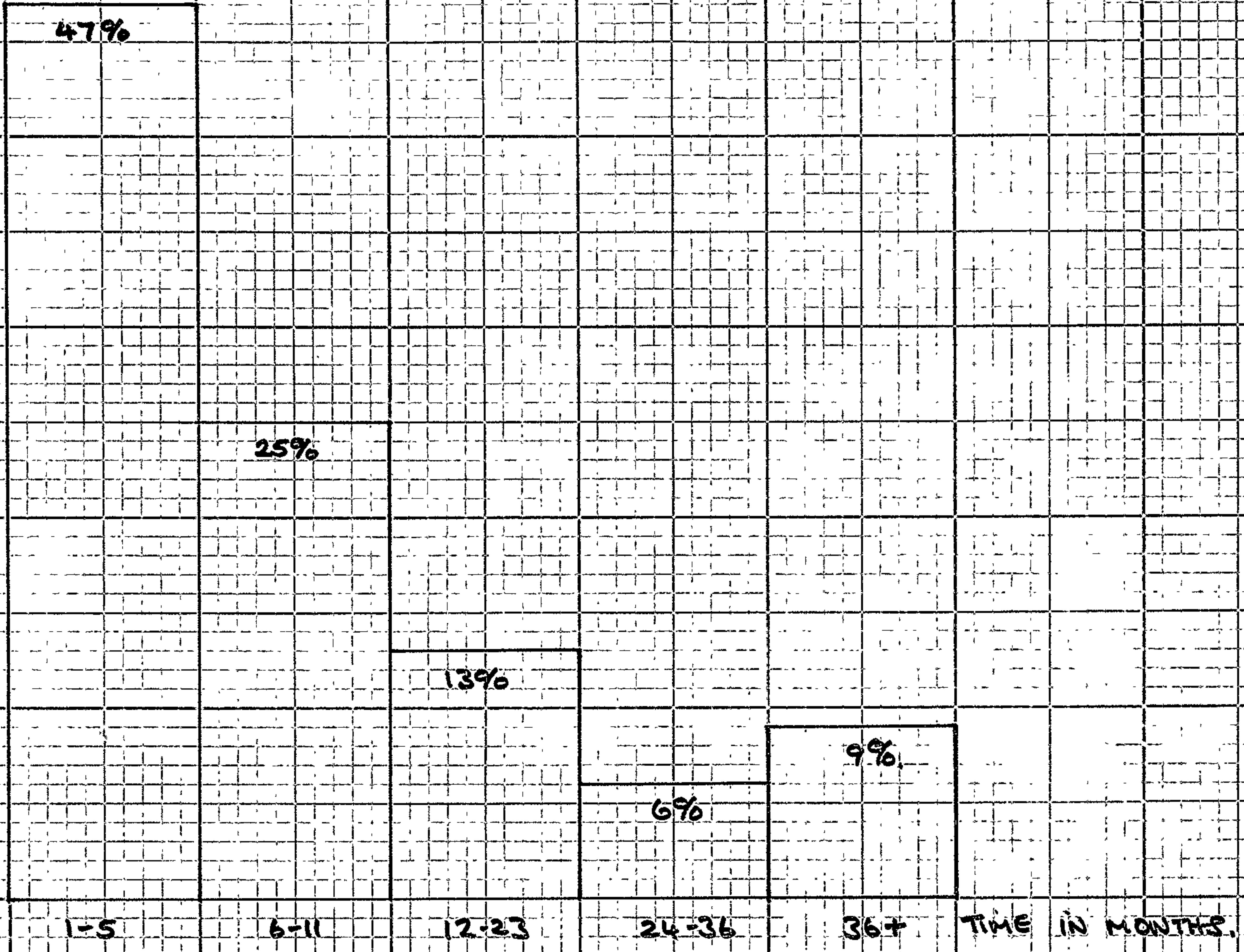


Fig. 12. to show length of time since last visit to dentist.

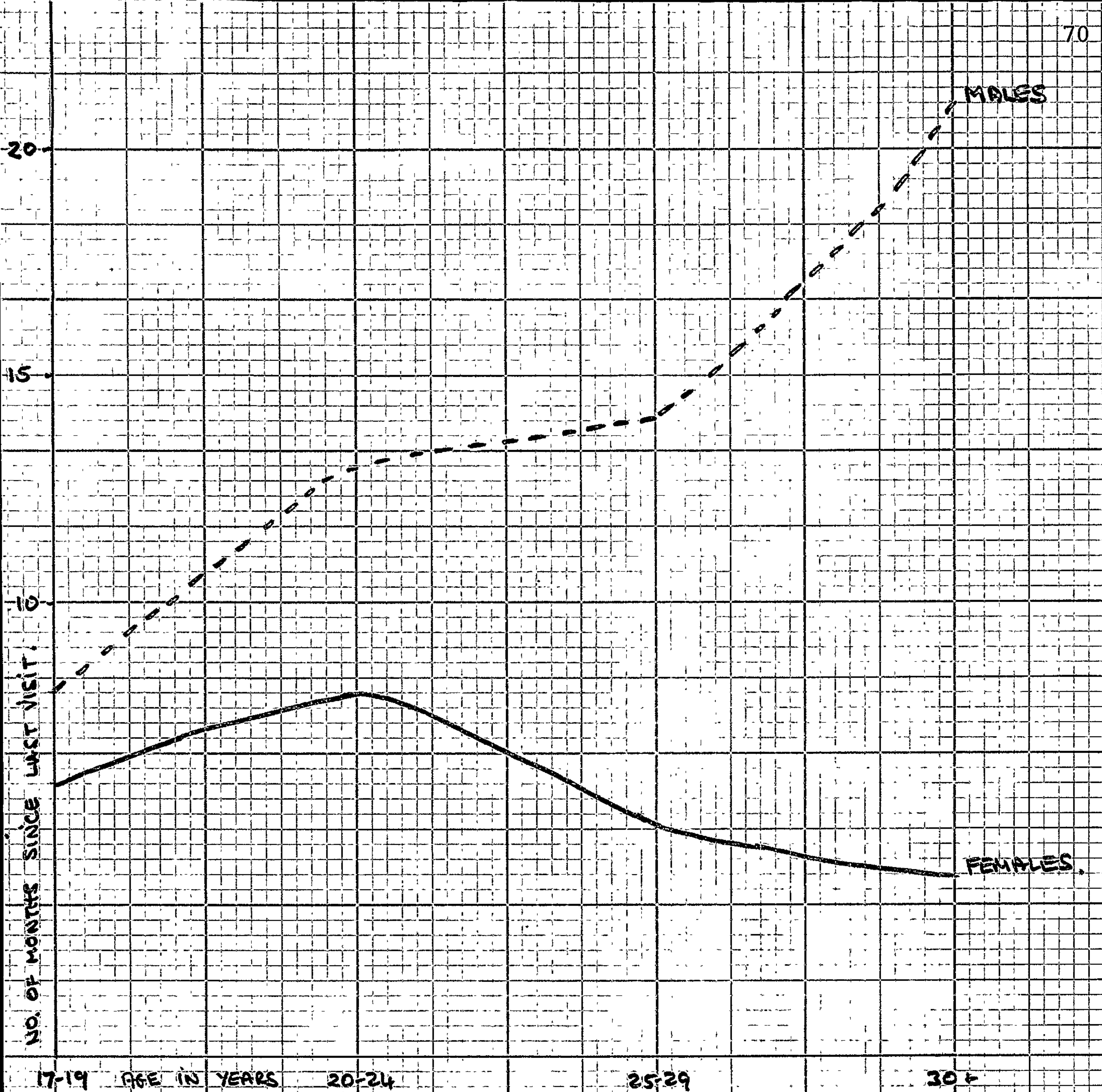


Fig. 13. mean number of months since last visit to dentist.

TABLE 30. TO SHOW MEAN NUMBER OF VISITS TO DENTIST IN PAST YEAR.

<u>AGE</u>	<u>MALE</u>	<u>FEMALE</u>	<u>MALE + FEMALE.</u>
17-19	1.7	2.0	1.8
20-24	1.5	1.3	1.4
25-29	1.2	2.5	1.4
30+	0.8	3.0	1.4
TOTAL	1.5	1.7	1.6

TABLE 31. THE NUMBER OF TIMES IN THE PAST TWELVE MONTHS THAT
THE STUDENT HAS SEEN A DENTIST.MALES N= 195

AGE	NUMBER OF VISITS.									
	NONE	1.	2.	3.	4.	5.	6.	7.	8.	9.
17-19	14 (19%)	27	20	7	1	2	1	0	1	1
20-24	24 (29%)	23	22	6	4	2	0	0	0	1
25-29	10 (35%)	7	8	1	2	0	0	0	0	0
30+	5 (45%)	3	3	0	0	0	0	0	0	0
TOTAL	53 (27%)	60	53	14	7	4	1	0	1	2

FEMALES N= 107

17-19	5 (9%)	18	21	5	2	4	0	0	0	1
20-24	8 (18%)	18	15	1	1	0	0	0	0	0
25-29	1	1	1	0	0	0	0	1	0	0
30+	1	1	0	0	0	1	1	0	0	0
TOTAL	15 (14%)	38	37	6	3	5	1	1	0	1

MALES + FEMALES

TOTAL	68	98	90	20	10	9	2	1	1	3
	(22%)	(33%)	30%	6.5%	3%	3%	0.7%	0.3%	0.3%	1.0%

33%

30%

22%

15%

ONCE

TWICE

MORE THAN
TWICENOT IN
PAST 12 MONTHS.

1

Fig. 14. Number of times in past 12 months
that the student has seen a dentist.

TABLE 32. TYPE OF SERVICE RECEIVED AT DENTIST.

REGULAR 256 85%
 EMERGENCY 46 15%

TYPE OF SERVICE	SEX	AGE				TOTAL	+++
		17-19	20-24	25-29	30+		
EXTRACTIONS	M	9	6	5	2	32 (10.6%)	
	F	5	4	0	1		
FILLINGS	M	46	54	9	6	179 (59.2%)	
	F	32	30	0	2		
DENTAL PLATE, NEW.	M	1	0	1	0	3 (1.0%)	
	F	0	0	0	1		
DENTAL PLATE, REPAIR.	M	1	1	1	0	3 (1.0%)	
	F	0	0	0	0		
ORTHODONTICS	M	0	0	0	0	1 (0.3%)	
	F	1	0	0	0		
GUM TREATMENT	M	0	0	0	0	3 (1.0%)	
	F	1	2	0	0		
CLEANING	M	19	18	7	4	78 (25.8%)	
	F	17	12	1	0		
EXAMINATION, CHECK UP.	M	13	14	2	0	52 (17.0%)	
	F	11	10	2	0		
OTHER	M	4	7	3	2	19 (6.3%)	
	F	1	1	1	0		

N.B. ++ Not on original questionnaire, added by students.

+++ Multiple choice answer.

Attitudes Towards Dentistry

A. Awareness of dental needs (Table 33)

Surprisingly 60% of students thought they did not need dental care at present, although nearly 75% required conservative work. This may be explained by the fact that many of those students had visited dentists recently or more importantly, are not aware of their dental needs or the value of regular 'preventive' dentistry, including regular examinations. Rather interestingly, although 26% of students received 'tooth cleaning' at their last visit to the dentist, nobody thought they needed their teeth 'cleaned' by the dentist. (Table 34).

B. Dental Services needed, but dentist not consulted (Table 35)

Twenty three per cent of the group with little sex difference did not see a dentist when they thought they required services. This tendency increased with age.

The most usual reason given for not visiting the dentist was through lack of money. Other reasons also appear on Table 36.

TABLE 33. IS DENTAL CARE REQUIRED AT PRESENT?

ANSWER	SEX	AGE				TOTAL
		17-19	20-24	25-29	30+	
YES	M	27	28	14	5	110 (36%)
	F	14	19	2	1	
NO	M	46 ++	48	14	5	182 (60%)
	F	41	23	2	3	
DON'T KNOW +++	M	0	6	0	0 ++	8 (3%)
	F	1	1	0	0	

N.B. ++ Subjects did not complete the questionnaire.

+++ This section not on the original questionnaire.

TABLE 34. TYPE OF DENTAL CARE STUDENT THINKS HE NEEDS.

TYPE OF CARE	AGE + SEX.										TOTAL	%
	17-19		20-24		25-29		30+		M+F			
	M	F	M	F	M	F	M	F				
EXTRACTIONS	3	2	1	1	1	0	1	0		9	8%	
FILLINGS	14	12	21	13	12	2	3	1		78	70%	
NEW PLATE	1	0	0	0	0	0	0	0		1	1%	
REPAIR PLATE	0	0	0	0	0	0	0	0		0		
ORTHODONTICS	2	0	0	0	0	0	0	0		2	2%	
PERIODONTICS	0	0	2	1	1	0	1	0		5	4%	
CHECK UP	3	0	4	3	1	0	0	0		11	10%	
CLEANING	0	0	0	0	0	0	0	0		0		
OTHERS?	3	0	2	1	0	0	0	0		6	5%	
TOTAL (of those who answered this section.)	26	14	30	19	15	2	5	1		112	100%	

TABLE 35 HAVE THERE BEEN TIMES IN THE PAST TWELVE
MONTHS WHEN YOU HAVE NEEDED THE SERVICES
OF A DENTIST BUT DID NOT SEE A DENTIST?

YES:

<u>SEX</u>	<u>17-19 yrs.</u>	<u>20-24 yrs.</u>	<u>25-29 yrs.</u>	<u>30+ yrs</u>	<u>TOTAL</u>
Male	14 (20%)	19 (26%)	7 (28%)	3 (22%)	43 (23%)
Female	12	14	0	0	26

NO:

<u>SEX</u>	<u>17-19 yrs.</u>	<u>20-24 yrs.</u>	<u>25-29 yrs.</u>	<u>30+ yrs</u>	<u>TOTAL</u>
Male	59	63	21	7	150
Female	44	19	4	4	71

TABLE 36. REASON FOR NOT VISITING THE DENTIST

(Age and Sex pooled)

(for those who felt they need dental services but did not consult dentist)

<u>REASON</u>	<u>TOTAL</u>	<u>PERCENTAGE</u>
Could not afford	34	47%
Expected trouble would disappear	19	29%
Lack of time	17	25%
Fear of pain	13	18%
No dentist available nearby	11	16%
Other*	7	10%
	101	145

TOTAL 69 students gave 101 reasons for not visiting dentist.

* Other: i.e. prefer to see own dentist in Sydney or waiting list too long.

Table 36 shows that 69 students (23%) avoiding the dentist when dental treatment was thought to be necessary. This is a fairly high figure for this group, although this situation may have been only temporary.

C. Attitude to Regular TreatmentTABLE 37 DO YOU USUALLY VISIT THE DENTIST FOR
EMERGENCY OR REGULAR CARE?

<u>Age</u>	<u>Sex</u>		<u>Regular</u>	<u>Emergency</u>	
17-19 yrs.	Male)	(86%)	62	12	
	Female)		50	6	
20-24 yrs.	Male)	(81%)	64	18	
	Female)		37	6	
25-29 yrs.	Male)	(63%)	16	12	
	Female)		4	0	
30+ yrs.	Male)	(80%)	8	3	
	Female)		4	0	
<u>TOTAL</u>	Male	(77%)	150	45	(23%)
	Female	(89%)	95	12	(11%)

Table 37 shows 89% of females and 77% of students visited the dentist for regular treatment. Twice as many males as females visited the dentist for emergency care only. What constitutes regularity in dental care was not defined for the student.

Discussion of Results of Survey

The prevalence of dental disease and the need for dental care has been established for a sample of students at the Australian National University and some interesting observations emerge from this study. Although the sampling method was adequate, only sufficient numbers of full-time students were finally examined to enable valid conclusions to be drawn.. The proportion of the part-time students sample examined was inadequate.

The prevalence of dental caries was much lower than expected for an Australian group in this age range, as shown by DMF indices, and the components of the indices, i.e. decayed teeth, missing teeth, teeth indicated for extraction, and filled teeth. It is true that a certain percentage of decayed surfaces would have been missed because of the lack of radiographic evidence, but intra- and inter-country comparisons are usually made on data without radiographic supplement to examination.

Duncan (44) found that taking no radiographs made a difference of 0.5 DMF in the total count. Others (45,46,47) have found significantly more decay, mostly interproximal, when taking radiographs. This was said to be more necessary when undertaking surveys for treatment needs. Ockerse went so far as to say that in examinations of groups of persons in caries studies, clinical examination alone is inadequate (48).

Kite and Swanson found that 20% more students in a university survey had higher DMF indices after taking radiographs (45).

In Table 38, comparison of the DMF figures of the group of A.N.U. students with others, some of which included examinations with radiographs, shows the resistance to caries attack by the student group. Many other surveys are not comparable because: Decayed teeth which are also filled are included in the "F" teeth.

28 teeth only used as basis for index.

Even making allowance for the fact that radiographs were not taken, the decayed number of teeth compared with the total DMF teeth shows a remarkably low rate of caries attack.

The reason for this low rate of attack is open to speculation. Fluoridation of Canberra's water supplies occurred in September, 1964. This would have affected the decay rate slightly. Socio-economic and educational status of the group would tend to be high, this may possibly relate to ingestion of fluoride tablets when young, better oral hygiene habits and better diet and nutrition. Finally A.C.T. has an extensive and efficient school dental service, thus enforcing good dental habits and restoring dentitions to their optimum function.

The majority of students lived in the A.C.T. and Queanbeyan at time of enrollment. Figures were: Total students 58.1%, Undergraduates 63.6%, and post-graduates 32.4%.

TABLE 38. COMPARISON OF DMF FIGURES.

<u>GROUP</u>	<u>AGE</u>	<u>DECAYED</u>	<u>MISSING</u>	<u>FILLED</u>	<u>DMF.</u>
A.N.U.	17-24 yrs	2.3	0.9	10.1	13.3
++	18-24	2.0	5.2	7.5	14.7
++ U.S.A. 1962. National Health Survey (4). No radiographs.					
Note the missing teeth component (mostly from dental caries) in this age group.					
A.N.U.	17-19	2.3	0.8	9.6	12.7
++	17-19	6.9	1.3	10.9	19.1
++ New Zealand. National Health Survey 1962. (11). Radiographs were taken.					
Note low missing teeth high filled teeth component.					
A.N.U.	21.8	2.2	1.0	10.8	14.0
MELBOURNE+	21.0	4.7	3.9	11.1	19.7
Melbourne University students 1963 (49). Radiographs taken.					
A.N.U.	21.8	2.2	1.0	10.8	14.0
SYDNEY+	22.9	5.7	1.8	10.1	18.6
+Sydney dental student survey. 1966. (50). Radiographs taken.					

The periodontal condition was considered to be good, 4.3% having periodontal pockets, compared with 13% of Sydney dental students ⁽⁵⁰⁾. The Russell Periodontal Index of 0.75 compares favourably with a study by Dale, of Australian Soldiers ⁽⁵¹⁾ of 0.94. However, Russell ⁽⁴²⁾ has suggested that scores in the range of .1 - 1.9 correspond to the clinical signs of gingivitis and incipient destructive disease. This emphasizes the need for early detection and treatment of periodontal diseases especially in the group who value oral health so highly.

Periodontal disease is a problem of growing concern, especially related to the older students, whose treatment needs will correspondingly increase. Part time students, because of their higher mean age, would have a much greater demand for periodontal treatment, especially surgery, than for full time students. It is noted that Russell's Periodontal Index is not indicative of treatment needs; Davies ⁽⁵²⁾ has now formulated a new index, with special relevance to treatment needs, but this was not available prior to this dental survey.

Treatment Needs

12.2% of students had impacted erupted third molar teeth. These were thought likely to prove troublesome eventually. Treatment would likely to be surgical removal of the offending teeth. Third molars are likely to be treatment problems in this age group; in fact, pericoronitis is a common cause for complaint among students. Pelton found 30% of erupted third molar teeth

needed extraction, mostly for impactions (53). Barnard found 23% of dental students had impacted third molars (50).

Other types of services required, demonstrate the relatively low order of treatment needs of the group, e.g. only eight per cent of full-time students needed replacement teeth by prostheses. Although Appendix II shows the higher need for prosthetic services in the part-time student body, conclusions drawn, concerning prosthetic needs for the whole group will be biased because the estimate will be based on treatment needs of full-time students only.

The results of the questionnaire show that the personal expenditure on dentistry was low, probably because of parental contributions, that a high proportion of students have visited a dentist within the last year and consult the dentist on a regular basis; that students were probably aware of the condition of their oral health status, and that a certain percentage (23%) avoided dental services (possibly only temporarily). From this information one would expect general acceptance and high utilisation of an on-campus dental service, although an obvious factor affecting utilisation will be that of costs.

Types and Costs of Dental Services which could be provided on-campus.

Two important variables must be considered at this stage: What type of service is envisaged? and how many students are to be covered by this service?

Type of service: four types of programmes are presented:

1. Emergency treatment only plus advice on dental matters, referral.
2. Emergency treatment, inspections, referral and preventive dentistry programme.
3. Emergency, preventive and treatment services with limitations on certain types of service, e.g. Crown and bridge, orthodontics, prosthetics, periodontal surgery, etc.
4. Fully comprehensive treatment programme.

Obviously the more comprehensive the programme is, the higher the costs will be; related to initial capital costs, salaries of personnel, running costs and costs of materials. A selection of surgery designs with expected costing for equipment and personnel will be suggested later in this section.

The number of students covered: this is divided into two components: full time students (numbering 2405) and for the total student body at the Australian National University (numbering 5044).

Tables 39,40,41 are presented with estimated total working time required for various dental services needed by the student body. (extrapolated from the treatment needs of the sample group of students). Estimated time for services has been derived from the 1961 Australian Dental Practice Survey (54).

1. Emergency

It was evident from the survey that the needs for an emergency treatment would be low: common demands for services would probably be for the infrequent acute 'toothache' and for pericoronitis which apparently is more prevalent in times of stress, such as term examinations.

A permanent 'full time' dentist employed for emergency dental services, advice and referral would be idle much of the day. A part time dentist might be of some value, although an emergency might arise when he is unavailable, thus defeating the purpose of an emergency service.

It would be possible to run an emergency service with full time personnel if there were other matters to occupy the dentist; such as, limited treatment on a fee for service basis, dental surveys or preventive services.

Costs: (See table 42)

<u>Personnel</u>	1 dentist	\$10,000
	1 assistant/receptionist	2,500
<u>Equipment</u>	1 fully equipped surgery	\$ 5,719
		\$18,219

Costs are for establishing surgery and salaries in the first year of operation. Note cost of installation, plumbing, electric wiring, office furniture, etc. are not included.

TABLE 39. ITEMS OF SERVICE REQUIRED PER PERSON
AT EXAMINATION

SERVICE	F/TIME UNDERGRAD N = 257	F/TIME POSTGRAD N = 45	P/TIME STUDENTS N = 120	TOTAL (not weighted) N = 422
Prophylaxis	0.36	0.60	0.39	0.39
Periodontal Treatment	.03	.04	.05	.03
Extractions				
Simple	.05	-	.05	.03
Surgical	.12	.16	.12	.12
Amalgam				
1 Surface	1.34	.93	.65	1.10
2 Surface	.25	.44	.14	.24
3 Surface	.25	.51	.26	.28
Composite Filling	.30	.51	.22	.30
Crown Porcelain	.02	.02	-	.02
Bridge	.01	-	-	.01
Partial Denture				
Plastic	.01	-	.01	.01
Metal	.04	.04	.11	.06
Full Dentures	-	-	.01	.002
Reline Denture	-	-	.01	.002
Root Fillings	.02	-	-	.01

TOTAL TIME REQUIRED FOR ITEMS OF SERVICE.

TABLE 40. FULL TIME UNDERGRADUATE STUDENTS. N = 2,405.

<u>ITEM</u>	<u>ITEM/PERSON</u>	<u>TIME(hours)</u>	<u>TOTAL TIME(hours)</u>
PROPHYLAXIS	0.36	0.33	286
SIMPLE EXTRACTION	.05	.25	30
SURGICAL EXTRACTION	.12	.66	190
MALGAM 1 SURFACE	1.34	.25	806
MALGAM 2 SURFACES	.24	.33	190
MALGAM 3 SURFACES	.25	.50	301
COMPOSITE FILLING	.30	.33	238
DOT FILLINGS	.02	1.30	63
BROWN	.02	1.30	63
X-RAYS + X-RAYS	1.0	.17	409
TOPICAL FLUORIDE	1.0	.33	794

TABLE 41. TIME REQUIRED FOR SERVICES FOR ALL STUDENTS. N = 5044.

<u>ITEM</u>	<u>ITEM/PERSON</u>	<u>TIME(hours)</u>	<u>TOTAL TIME(hours)</u>
PROPHYLAXIS	0.39	0.33	649
SIMPLE EXTRACTION	.04	.25	50
SURGICAL EXTRACTION	.12	.66	399
MALGAM 1 SURFACE	1.10	.25	1387
MALGAM 2 SURFACE S	.24	.33	399
MALGAM 3 SURFACES	.28	.50	706
COMPOSITE FILLING	.30	.33	499
DOT FILLING	.01	1.3	66
BROWN	.02	1.3	131
X-RAYS + X-RAYS	1.0	.17	857
TOPICAL FLUORIDE	1.0	.33	
			<u>TOTAL 1665</u>
			<u>6808 HOURS</u>

Estimated Time from 1961 Dental Practice Survey (ref.54)

TABLE 42. COST OF SURGERY EQUIPMENT (Extracted from
1972 A.D.A. Facts and Figures (55))

Unit	\$1,973
air bearing handpiece	183
exhauster	481
operating and ceiling lights	544
chair and stool	1,699
steriliser (hot air)	175
surgery cabinets and fittings	546
surgical and operative instruments	500
x-ray unit	780 (585)
	\$6,881
	(5,161)

Laboratory Equipment

Compressor, lathe, hanging motor	744
lab. instruments (note: no furnace)	(558)

Hygienist Surgery

1 chair and stool	\$1,699
*Motor and handpiece	500
operating and ceiling lights	544
*instruments	200
	\$2,943
	(2,207)

*Estimates

Prices in brackets are 25 per cent less, because equipment purchased by government agencies, i.e. universities, obtain special discount (approximately 25 per cent) on dental equipment.

Other Unestablished Costs

1. Office furniture, floor covering, basic plumbing, electric wiring, etc.
2. Costs of materials
3. Cost of administration
4. Cost of repairs and maintenance.

Dental Personnel
(estimated salaries)

Dentist	\$10,000
Hygienist	3,500
Dental Assistant	2,500
Receptionist	2,500

2. Emergency and Preventive

The most basic treatment of this kind would be examinations, one a year, with bite wing radiographs, topical applications of stannous fluoride together with oral hygiene instruction, prophylaxis and dental health education. The emergency service would also be offered.

	<u>Full Time Students</u>	<u>All Students</u>
<u>Time taken:</u>		
1. Examination, bite wings	409 hours	857 hours
2. Topical fluoride	494 hours	1665 hours
3. Prophylaxis	286 hours	647 hours
4. Oral hygiene instruction (OHI), dental health education.	230 hours	345 hours
5. Emergency treatment	230 hours	345 hours
TOTAL:	<u>1949 hours</u>	<u>3861 hours</u>

Estimated time for (4) and (5) - one hour per day for both; full time students only. For all students $1\frac{1}{2}$ hours per day for dental health education and emergency treatment.

FULL TIME STUDENTS ONLY

Assuming a dentist works 1,610 hours per year, (46 weeks x 5 days x 7 hours), if he worked all those hours at the chairside, he might be able to cover the full time students (2405 in number) assuming 80% or less utilisation.

However, emergency treatment might consume more time than 1 hour per day; there is no time allowable for dental administration or programme evaluation - two variable time factors, nevertheless important for the successful dental health programme. Moreover, a dentist would probably find that spending his whole time carrying out the above services would be unsatisfying in consideration of his overall dental training and knowledge.

This problem would be overcome by the utilisation of the operating auxiliary, the dental hygienist, to perform many of the prophylaxes and applications of topical fluoride solutions.

Eventually, in this situation, a receptionist would have to be employed to ensure smooth-running of the operation.

COST:Personnel:

1 dentist	\$10,000
1 hygienist	3,500
1 dental chairside assistant	2,500
1 receptionist	2,500
	\$18,500

Equipment:

1 fully equipped surgery	\$5,719
1 hygienist surgery	1,207
Laboratory equipment	588
TOTAL:	\$ 26,984

ALL STUDENTS (N=5044)

TIME REQUIRED: 3,861 hours.

If the dentist in charge of the programme spent 1200 of his annual 1600 hours in carrying out routine preventive and emergency treatment (the remainder of time being spend in administration and evaluation of the programme), then 2661 hours remain.

The estimated time for service was based on general dental practitioners so that time estimates for services by hygienists may be more. For the remaining 2661 hours, two hygienists would suffice (especially in consideration of the probable less than 100% utilisation. Part time students would be expected to have a much lesser degree of utilisation).

Costs (1st year)Personnel

1 dentist	\$10,000
2 hygienists	7,000
1 dental chairside assistant	2,500
1 receptionist	2,500

Equipment

1 fully equipped surgery	5,719
2 hygienist surgeries	4,414
laboratory equipment	558
<u>TOTAL:</u>	<u>\$32,592</u>

Limited Treatment and Preventive Programme

Time required.

include also (230+345 hours) hours per year for oral hygiene instruction and dental health education respectively.

Full time students only	time = 3600 hours
all students	time = 7088 hours

Limited Treatment

Includes emergencies, routine conservation of teeth including porcelain crowns and root fillings. Excludes periodontal surgery, artificial replacement of teeth and orthodontic treatment.

If the prophylaxes and topical fluoride treatment and oral hygiene instruction were carried out by dental hygienists and the examinations and operative treatment by dentists, then:

	<u>TIME</u>	
	<u>Full Time Students</u>	<u>All Students</u>
Hygienists	1310 hours	2659 hours
Dentists	2290 hours	4429 hours
	<u>3600 hours</u>	<u>7088 hours</u>

Full Time Students (Assuming 80% approximate utilisation)

Required

<u>Personnel:</u>	1½ - 2 dentists	\$15,000
	1 Hygienist	3,500
	2 Assistants	5,000
	1 Receptionist	2,500

PERSONNEL: \$26,000

<u>Equipment:</u>	2 fully equipped surgeries (but only 1 x-ray unit)	\$ 9,737
	1 hygienist surgery	2,207
	Laboratory equipment	558

EQUIPMENT: \$12,502

All Students

<u>Personnel:</u>	3 dentists	\$30,000
	2 hygienists	7,000
	4 assistants	10,000
	1 receptionist	2,500

PERSONNEL: 49,500

Equipment:	3 fully equipped surgeries	\$14,313
	(only 1 x-ray unit)	
	2 hygienist surgeries	4,414
	Laboratory equipment	558
EQUIPMENT:		\$19,285
TOTAL:		\$78,785

Costs of Dental Service

Using items of service required per person at examination (Table 39) and the Australian Repatriation fee schedule (1972), costs for services may be estimated (Tables 43 and 44). Interestingly, these figures support those obtained from the costs related to time in the preceding tables.

Dentists usually operate on approximately 50% of gross being absorbed in practice expenses so net income = \$34,265. If annual incomes of dentists in private practice in 1972 were to be approximately \$12,000, then this would be equivalent to the amount of money spent on the work done by 2½ to 3 dentists. (Figure of \$12,000 may be derived from the annual increase in earnings from 1969 figure of \$10,818 quoted in 'Facts and Figures', (55)).

Cost of limited treatment and preventive

Programme for full time students only:
Total cost using Repatriation (1972) fees = \$85,331.
Assuming 80% utilisation = \$68,265. This would be equivalent to 27.5 dollars per student (N=2405).

Total Student Group:

Similarly assuming 80% utilisation, costs would be 119,783, or 23.6 dollars per student. A fully comprehensive service would probably cost at least 25-30 per cent more than these costs.

Cost of Preventive and Emergency Programme

<u>Costs:</u>	<u>Full Time Students</u>	<u>All Students</u>
Prophylaxis	5,196	11,802
Examination, Bitewings	12,987	27,238
Topical Fluoride	20,430	30,264
Emergency (estimate)	2,300	3,450
Oral Hygiene Instruction (estimate)		
TOTAL:	40,913	72,754

This is approximately 11.5 dollars per student (total student group) and 13.5 dollars per student (total full time students only) assuming 80% utilisation.

BLE 43. COST OF DENTAL SERVICES USING REPATRIATION FEE SCHEDULE(1972).
LIMITED TREATMENT AND PREVENTIVE PROGRAMME.

ITEM	FEE	F/TIME UNDERGRAD. STUDENTS.		ALL STUDENTS.		
		ITEM/PERSON	TOTAL COST	ITEM/PERSON	TOTAL	COST
OPHYLAXIS	\$6.00	0.36	866 \$5196	0.39	1967	\$11802
MPLE EXO	\$4.65	0.05	120 \$558	0.04	202	\$558
RGICAL EXO	\$16.40	0.12	289 \$4740	0.12	605	\$9922
ALG.1 SURF.	\$5.20	1.34	3223 \$16760	1.10	5548	\$28850
ALG.2 SURF.	\$6.30	0.24	577 \$3635	0.24	1210	\$7623
ALG. 3 SURF	\$8.20	0.25	601 \$4928	0.28	1412	\$11578
MP. FILLING	\$6.55	0.30	721 \$4723	0.30	1513	\$9910
OT FILLING	\$20.00	0.02	48 \$960	0.01	50	\$1000
OWNS	\$109.00	0.02	48 \$5232	0.02	101	\$11009
AM + X-RAYS	\$5.40	1.00	2405 \$12987	1.00	5044	\$27238
PICAL FL.	\$6.00	1.00	2405 \$20430	1.00	5044	\$30264
TOTAL		4.70	\$85331	4.50		\$149754

BLE 44. COSTS OF EXCLUDED ITEMS OF SERVICE.

IDGE	\$250.00	0.01	24	\$6000	0.01	50	\$12500
RIODONTAL EATMENT	\$105.40	0.03	72	\$7589	0.03	151	\$15915
RTIAL DENT. TAL.	\$72.85	0.04	96	\$6994	0.06	303	\$22073
RTIAL DENT. ASTIC.	\$36.90	0.01	24	\$885	0.01	50	\$1845
LL DENTURES	\$122.00	-	-	-	0.002	10	\$1220
LINE DENT..	\$21.05	-	-	-	0.002	10	\$210
				<u>TOTAL COST \$18,938.</u>			
					<u>TOTAL COST \$53,763.</u>		

B.... Fee for crowns from A.D.A. fee schedule (1972)

Fee for bridge is an estimate.

Fee for periodontal treatment - Full gingivectomy.

Fee for partial dentures - "average 5-tooth denture."

Discussion of Costing

1. In costing of surgery layout, consideration must be given to possible further expansion, especially with regard to plumbing and wiring of further surgeries.
2. A critical factor in costing any service would be the utilisation of that service, and the number of hours per week that the dental personnel are idle. The most important factor to influence utilisation of an on-campus service would probably be whether the students had to pay voluntarily for services. University dental services in other countries have shown that services using a voluntary 'fee for service' basis have no more than 40% utilisation (e.g. Finland) whereas utilisation with a compulsory dental health fee covering all services averages well over 70% (e.g. Alabama, U.S.A.), annually ranged from 57% to 97%.
3. A service incorporating a preventive programme would expect to see a decreasing need and demand for treatment as the number of students pass from 'backlog care' to maintenance care. This is demonstrated in the university health service at Alabama where students leaving the course had an average of $\frac{1}{2}$ decayed tooth, compared to 5 decayed teeth of those entering the programme.
4. Costing of personnel has included hygienists to carry out prophylaxes, topical fluoride therapy, exposing and developing radiographs.

5. Conclusions drawn for the costings involved for the total student body may not be entirely valid, as they are estimated from the services needed for full time undergraduates only. Part time students (over 40% of the student body) were not included. This may explain the discrepancies in the costs per student between those for the undergraduates and those for the total number of students.

Recommendations

In considering the high cost involved in initiating any dental service on-campus, it is difficult to make specific recommendations.

Cautiously, accepting monetary constraints, I feel that initially a service should be set up which offers emergency, advice and a full preventive programme on a voluntary attendance basis to all students, with no direct charge to student. This could be expanded to include a comprehensive range of dental services on a fee for service basis (reduced fees), or on a per capita dental health fee basis. This per capita fee would, however, even with limited treatment services, be approximately 25 dollars per person (using Repatriation fee schedule)*

*(A commercial insurance company charges 45 dollars per year for single members of a dental insurance scheme, to obtain approximately 80% repayment of fees with a comprehensive listing of services).

Summary

A dental survey of a stratified random sample of students at the Australian National University was undertaken by examiners Boyles and Barnard to determine the prevalence of dental disease, treatment needs and attitudes to dentistry.

Of the sample of 663 students, 422 were examined. The percentage of full time undergraduates and postgraduate students examined was sufficient for the purpose of the survey. Part time students, with only 41% of the selected sample having been examined were excluded from the main survey results (the results are presented, however, in Appendix 2). Examinations took from 2-3 minutes, using a standard probe, and plane mouth mirror, standard lighting and seating position. A student questionnaire was completed by the student, immediately before the examination.

Prevalence of caries was found to be remarkably low in the group, even allowing for the fact that radiographs were not taken. Dental fitness in the group was high, as shown by the ratio of filled to DMF teeth.

Oral Hygiene as measured by Greene and Vermillion's simplified oral hygiene index, was fairly good, females showing a higher standard of oral cleanliness than males.

Russell's periodontal index showed the low amount of disease in the supporting structures of the teeth; males having higher indices than females.

Prosthetic needs - only eight per cent of students were thought to require prostheses.

Oral Surgery - 12 per cent of students had impacted third molar teeth.

No student seen was thought to require orthodontic treatment.

The questionnaire revealed the patterns of utilisation of dental services and attitudes to dentistry.

From the results of the survey it may be concluded that students at the Australian National University have a fairly low prevalence of dental diseases, reasonably low treatment needs, high utilisation of dental services on a regular basis and a general awareness and receptiveness of oral status and dental practice.

Estimates of costs of different types of dental services which could be considered for an on-campus dental service were made.

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SIMPLIFIED ORAL HYGIENE INDEX:

Type	U. R. Molar B	U. R. Cen. B	U. L. Molar B	L. L. Molar B	L. L. Cen B	L. R. Molar L	Total Score
Plaque							
Calculus							

Calculus (Whole Mouth): No Teeth ☐ None ☐ Supra gingival ☐ Subgingival ☐
present

Periodontal Index: (1 decimal) No Teeth present ☐

One or more pockets: No Teeth present ☐ Yes ☐ No

Dental Care: Nil ☐ Emergency ☐ Regular ☐

Present Dental Care Needs: Nil ☐ Emergency ☐ Regular ☐

Oral Surgery.....Endodontics.....Crowns.....

Periodontal.....Orthodontics.....

Additional Data:

a) How many times in the past 12 months have you seen a Dentist? times
Expenditure on Dentistry in one year.....

b) How long ago was your last visit to Dentist? months

What was this appointment for? () Regular Treatment
() Emergency Treatment

Which of the following did you have done?

() Extraction () Teeth Straightening
() Filling () Gum Treatment
() Dental Plate - New () Cleaning
() Dental Plate - Repair () Other (specify)

c) Have there been times in the past 12 months when you have needed the services of a dentist, but did not see a dentist? () Yes () No

c+) What was the main reason you did not see a dentist on these occasions?
() Could not afford () Expected trouble would disappear
() Fear of Pain () No dentist available nearby
() Lack of Time () Other (specify)

d) Do you require dental care at present? () Yes () No

d+) If you do require Dental care at the moment, what kind of dental care do you require?

() Extraction () Teeth straightening
() Filling () Gum Treatment
() Dental Plate - New () Other
() Dental Plate - Repair

e) Do you usually visit a dentist for:

() Regular Care () Emergency Care only

APPENDIX (2).RESULTS OF SURVEY.

PART TIME STUDENTS, N=120. AGE AND SEX POOLED.

	<u>MEAN</u>	<u>ZERO</u>	<u>ST.DEV.</u>	<u>ST.ERR.</u>
AGE	28.6	0	7.6	0.70
TEETH PRESENT	26.5	3	6.5	0.59
'D' TEETH	0.6	82	1.0	0.10
'F' TEETH	13.1	5	5.8	0.53
'D+F' TEETH	0.8	64	1.0	0.09
'M' TEETH	3.7	52	6.8	0.62
'X' TEETH	0.1	115	0.3	0.03
'DMF' TEETH	18.2	0	6.4	0.58
'D' SURFACES	1.6	45	2.2	0.20
'F' SURFACES	31.1	5	17.7	1.62
'D+F' SURFACES	0.6	75	1.0	0.09
'DMF' SURFACES	50.2	0	29.6	2.70
DEBRIS INDEX	0.7	12	0.4	0.04
CALCULUS INDEX	0.04	105	0.13	0.01
O.HYGIENE INDEX	0.7	12	0.5	0.04
PERIO. INDEX	0.7	15	0.8	0.08
NO. POCKETS	0.1	110	0.3	0.03
IMPACTIONS(REMOV.)	0.3	105	1.0	0.09
NO. VISITS DENT.	1.5	34	1.4	0.13
EXPENDITURE \$	18.0	38	22.3	2.04
LAST VISIT DENT..	12.0	0	15.7	1.43
MISSING TEETH (not carious or impacted)	0.1	112	0.6	0.06

AGE DISTRIBUTION.

AGE	No.	AGE	No.	AGE	No.	AGE	No.
18	1	27	7	36	3	44	0
19	2	28	6	37	2	45	1
20	3	29	6	38	4	46	1
21	8	30	4	39	3	47	1
22	15	31	5	40	1	48	1
23	8	32	1	41	1	49	0
24	6	33	3	42	2	50	1
25	8	34	0	43	2	56	1
26	11	35	2				

TOTAL NO.=120

AVERAGE AGE.=29.1yrs.

ST. DEV.= 7.6

ST. ERR.= 0.70

CALCULUS (WHOLE MOUTH).

	NO.	%
NO TEETH PRESENT	5	4%
NO CALCULUS	65	54%
SUPRA-GINGIVAL	44	37%
SUB-GINGIVAL	6	5%

DENTAL CARE.

NIL	N= 3	3%
EMERGENCY	N= 1	1%
REGULAR	N=116	96%

DENTAL CARE NEEDS.

NIL	N= 3
EMERGENCY	N = 3
REGULAR	N = 114

SPECIALTIES

ORAL SURGERY	N = 20 (16.7%)
PERIODONTAL	N = 3 (2.5%)
OTHER TREATMENT	0

PROSTHETIC REQUIREMENTS.

UPPER..	PRESENT SATISFACTORY.	N = 4(3.3%)
	" DEFECTIVE	N = 3(2.5%)

FULL DENTURES.

LOWER	PRESENT SATISFACTORY	N = 2(1.7%)
	" DEFECTIVE	N = 1(0.8%)

UPPER	REQUIRED	N = 4(3.3%)
	PRESENT DEFECTIVE	N = 7(5.8%)
	" SATISFACTORY	N = 3(2.5%)

PARTIAL DENTURES.

LOWER	REQUIRED	N = 12(10%)
	PRESENT DEFECTIVE	N = 3(2.5%)
	" SATISFACTORY	N = 0

<u>BRIDGES</u>	UPPER SATISFACTORY	N = 3(2.5%)
	LOWER REQUIRED	N = 2(1.7%)

BRIDGES.

EXPENDITURE ON DENTISTRY (ONE YEAR)

- 9 dollars.	N = 10(9%)
0 - 19 "	N = 29(24%)
0 - 29 "	N = 13(11%)
0 - 39 "	N = 11(10%)
0 - 49 "	N = 4(3%)
0 - 59 "	N = 3(2.5%)
0 - 69 "	N = 3(2.5%)
0 - 79 "	N = 1(0.5%)
0 - 89 "	N = 1(0.5%)
90+	N = 3(2.5%)

0 EXPENDITURE N = 38(32%)

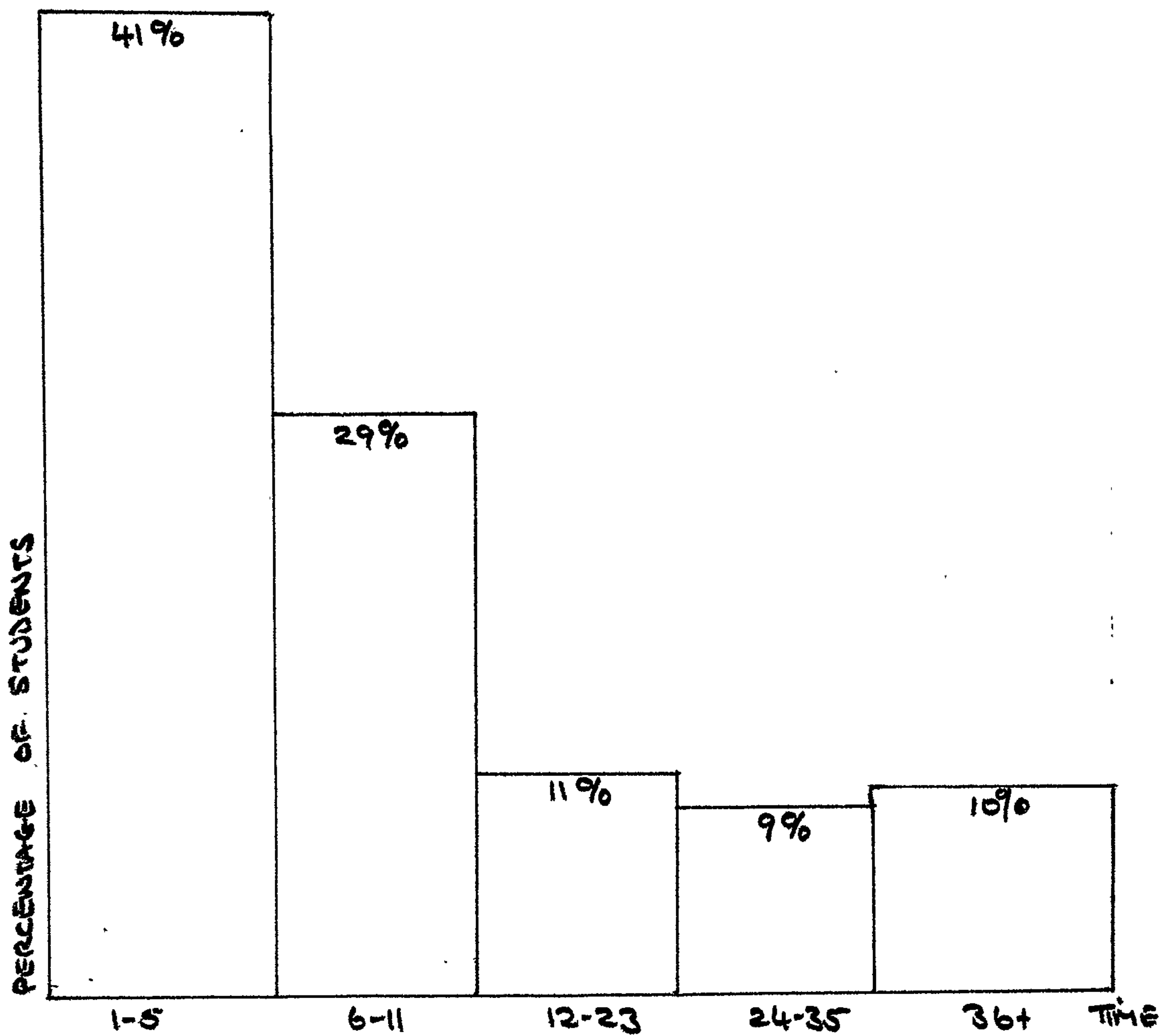
four students did not answer this question)

NUMBER OF MONTHS SINCE LAST VISIT TO DENTIST.

MONTH	N = 23	12 MONTHS	N = 3
"	N = 5	13 "	N = 2
"	N = 9	18 "	N = 7
"	N = 6	22 "	N = 1
"	N = 6	TOTAL(12-23months)	13(11%)
TOTAL(1-5months)	49(41%)	24 MONTHS	N = 6
MONTHS	N = 21	30 "	N = 5
"	N = 4	TOTAL(24-35months)	11(9%)
"	N = 3	36 MONTHS	N = 7
"	N = 5	48 "	N = 2
0 "	N = 0	50 "	N = 1
1 "	N = 2	84 "	N = 1
TOTAL(6-11months)	35(29%)	99 "	N = 1
		TOTAL(OVER 30 months)	12(10%)

THE NUMBER OF TIMES IN THE PAST 12 MONTHS THE STUDENT HAS SEEN A DENTIST.

NOT IN THE PAST 12 MONTHS	N = 34(28%)
ONCE	N = 33(28%)
TWICE	N = 37(31%)
THREE TIMES	N = 6(5%)
FOUR TIMES	N = 5(4%)
FIVE TIMES	N = 1(1%)
SIX OR MORE TIMES	N = 4(3%)



NUMBER OF MONTHS SINCE LAST VISIT TO DENTIST

WHAT WAS THIS APPOINTMENT FOR?

REGULAR TREATMENT : N = 99 (82%)
EMERGENCY TREATMENT : N = 21 (18%)

WHAT DID YOU HAVE DONE AT THAT APPOINTMENT?

EXTRACTIONS	N = 12 (10%)
FILLINGS	N = 78 (65%)
DENTAL PLATE-NEW	N = 2 (1.7%)
DENTAL PLATE-REPAIR	N = 2 (1.7%)
TEETH STRAIGHTENING	N = 1 (0.8%)
GUM TREATMENT	N = 2 (1.7%)
CLEANING	N = 28 (23.3%)
OTHER	N = 5 (4%)
EXAMINATIONS	N = 16 (13.3%)
TOTAL +	N = 101 (121%)

+ (19 did not answer.)

(multiple choice question.)

HAVE THERE BEEN TIMES IN THE PAST 12 MONTHS WHEN YOU HAVE NEEDED
THE SERVICES OF A DENTIST, BUT DID NOT SEE A DENTIST ?

YES : N = 28 (23%) NO : N = 92 (77%)

+WHAT WAS THE REASON FOR NOT SEEING THE DENTIST ON THOSE OCCASSIONS ?

COULD NOT AFFORD	N = 7(25%)
FEAR OF PAIN	N = 1(4%)
LACK OF TIME	N = 10(36%)
EXPECTED TROUBLE WOULD DISAPPEAR	N = 6(21%)
NO DENTIST NEARBY	N = 0
OTHER	N = 8(28%)

+percentages are of those who did not see the dentist.

DO YOU REQUIRE DENTAL CARE AT PRESENT ?

YES : N = 57.....47%
NO : N = 56.....46%
DON'T KNOW : N = 7.....7%

WHAT KIND OF DENTAL CARE DO YOU REQUIRE ?

EXTRACTIONS	N = 4 (5%)
FILLINGS	N = 36 (63%)
NEW PLATE	N = 3 (5%)
REPAIR PLATE	N = 2 (3%)
TEETH STRAIGHTENING	N = 0 (0)
GUM TREATMENT	N = 4 (7%)
CHECK UP	N = 6 (10%)
CLEANING	N = 0 (0)
OTHER	N = 4 (7%)

N.B. percentages are of those who thought they needed treatment.

DO YOU USUALLY VISIT THE DENTIST FOR :

REGULAR CARE ? N = 100 (83%)
EMERGENCY CARE? N = 20 (17%)