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A PROTOCOL FOR THE
NATIONAL ORAL HEALTH SURVEY
IN FIJI

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SUMMARY

The basic oral health survey is an essential and effective planning tool. Although all the countries in the world have some dental services to meet the needs of their population, it has been established that these services are usually insufficient to fulfil these needs. There is also universal recognition by the population itself and dental health administrators of the need for improvement of dental services and for more adequate fulfilment of dental needs. Worldwide experience has shown that a simple numerical increase in dental facilities, services, manpower and financial resources is not sufficient to achieve adequate dental care according to the existing needs. The limited resources and infinite needs indicate the necessity to plan and develop dental programs that are directed to overcoming the specific dental problems in the most efficient and effective manner.

In dentistry, the prevalence and severity of diseases and their changes over time are best established by periodic oral health surveys, based on appropriately developed protocol with acceptable format. In Fiji, the prevalence and distribution of dental diseases and conditions cannot be clearly ascertained due to the unavailability of recent data. Furthermore, in the absence of periodic oral health surveys, the effectiveness of the existing dental services in meeting the need of the population cannot be evaluated or monitored, hence restricting the effective planning of the dental services. It is quite evident that there is a need for periodic surveys based on a protocol that will include all the dental diseases and conditions currently prevailing in Fiji. The oral health surveys will provide regular up to date data which will guide the dental health planners to effectively plan and properly monitor the existing dental services and programs.

The value of any survey will depend on how it was planned, for the closer the attention to detail, the better the prospects of a fruitful survey. In this thesis, the essential requirements in the planning of a oral health survey had been reviewed along with the definitions and the methods of examining, and the criteria of recording the major oral diseases such as dental caries, periodontal diseases, malocclusion and tooth loss. The dental attitudes and behaviours in relation to the utilisation of the dental services was also reviewed.
In this thesis, the national oral health surveys of Australia, New Zealand and the United States of America were reviewed in relation to their respective objectives, methods used and benefits achieved which assisted the author to develop a suitable protocol for the national oral health surveys in Fiji. The protocol developed in this thesis included the clinical assessment and the criteria of recording the major oral conditions prevailing in Fiji, and a set of questions to assess the attitudes and behaviours that could affect the utilisation of the dental services. The developed protocol also included the proposed objectives, administrative arrangements, proposed timing, calibration of examiners and recorders and the selection of population samples for the national oral health surveys in Fiji.

A discussion of the positive outcome of the planning of dental services based on valid data acquired from national oral health surveys in Australia, New Zealand and the United States of America prompted the author to make relevant recommendations at the end of this thesis. The author emphasised the need for regular national oral health surveys to be conducted in Fiji. It is also recommended that the national oral health surveys in Fiji be based on the protocol which is developed in this thesis.
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DEDICATION

To the memory of my father
Waisake Ratubalavu
who did not live to see how far
I have progressed in my career.

To my mother
Taina Ratubalavu
for the love and wise words that has provided me
with inspiration throughout my life.

To my beloved husband
Neumi Leweni
for the love and understanding that
has given me peace of mind
during challenging times.

To my adorable daughters
Arieta, Taina and Elenoa
the thought of them gave me strength
and endurance during the
time of my study.
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1. INTRODUCTION

Information about the variation of health and disease in human population is of fundamental importance in the planning and delivery of health services. Rational planning of health care services should be based on factual information pertaining to existing and predictable future needs of the target population (Abramson 1994).

The fact that health services are already operating in an area does not eliminate the need for defining the health status of the population served. There is always a need for up to date information for the best utilisation of an operating service when circumstances are changing. In developing countries, the lack of basic data on the frequency and distribution of different diseases makes it difficult to effect rational allocation of the limited resources available for disease prevention and patient care (Barker, Hall 1991). Too many hospitals have been built, equipped and staffed without knowledge of the particular disease problems affecting the communities they are intended to serve. Systems of community health care have been elaborated which are inappropriate to the needs of the people.

In all countries, there is a continuing need for numerical data on disease distribution to determine priorities for the health services and to direct health planners to plan health activities that will be appropriate to the community's need. The need for health services in a community can be measured by the frequency of diseases. Analysis of the utilisation of health services may require study of such factors as the community's preference for government health services as opposed to traditional healers. The effectiveness of health services can be measured by the resulting reduction in disability.

In dentistry, the dental service is concerned with the prevention and treatment of oral diseases and their sequelae. The need to plan and develop dental programs that are directed to overcome dental problems in the most efficient and effective manner is important. The type of treatment and preventive services to be implemented that will be appropriate for the community will depend on the availability of data pertaining to certain factors such as:
i. the prevalence and severity of oral disease by age, sex, ethnic groups and geographical area
ii. existing treatment needs according to age, sex, ethnic groups and geographical area
iii. recognised fundamental determinants of the pathogenesis of oral diseases
iv. environmental variables and socio-economic and cultural characteristics of the population which are likely to influence future trends in oral diseases and indirectly, preventive and treatment needs.

A complete description of the health problems of a community will comprise an account not only of the distribution and frequency of different diseases, but also of the community's view of its own problems and its use of existing health services. If the data are not available or limited, than a oral health survey is the vehicle by which such relevant basic data could be obtained. These oral health surveys are defined as surveys to collect the basic information about oral disease status and treatment needs that is needed for planning or monitoring oral health care programs (WHO 1987).

The ability to assess a populations' oral health status quickly and economically will enable a national program to plan and implement cost-effective dental public health strategies to meet the country's specific need (Kathy et al 1988). Probably one of the most significant changes in recent years has been the increasing emphasis on epidemiological surveys of oral health needs, and there can be little doubt that simple, properly designed surveys at low cost are invaluable to planners. Such surveys have ranged from a World Health Organization "pathfinder" surveys to a full-scale national surveys. Although the more ambitious investigations may appear to be an attractive means of obtaining information on oral health needs, the cost in terms of money, time, and personnel has to be carefully balanced.

For a more practical and economical oral health survey, the World Health Organization designed the 'pathfinder methodology'. The methodology uses a stratified sampling technique, which aims to include the most important population subgroups likely to have differing disease levels, and to cover a standard number of subjects in specific index age groups in any one location (WHO 1987). The index age and age groups recommended in this methodology are 12, 15, 35 - 44, and 65 - 74 years. Sampling sites are usually chosen so as to provide results for population groups
likely to have different disease rates. The standard number of subjects in each index age groups to be examined ranges from 25 - 50 for each cluster or sampling point. By means of this methodology, statistically significant and clinically relevant information for planning is obtained at minimum expense.

Pathfinder survey can be classified as either pilot or national, depending on the number of sampling sites and the age groups or index ages included. A national pathfinder survey incorporates sufficient examination sites to cover all important subgroups of the population that may have differing disease levels or treatment needs, and at least three of the index ages or age groups. A pilot survey is one that includes only the most important subgroups in the population and only one or two index ages which are usually 12 and 15 years. The pilot survey provides the minimum amount of data needed for commencing planning in many situations.

Pathfinder was developed primarily to assist developing countries with limited resources, those that had neither the manpower, the time nor the financial means to conduct a comprehensive survey.

For the survey to be an effective planning tool, the World Health Organization recommends that it should be carried out at 5 yearly intervals after the initial baseline survey. These periodic surveys will enable oral health planners to assess and monitor any changes in disease levels or patterns. Change in the disease level or pattern will indicate a need for change or modification of the existing dental program in order to meet the specific need of the community. In addition, the periodic survey will enable the planners to evaluate the appropriateness and effectiveness of services being provided.

The actual planning and implementation of dental programs do require a lot of time and utilises a lot of available resources. Thus, unless monitoring systems are properly established through periodic surveys, valuable time, money and manpower resources can be ineffectively utilised. Moreover, in developing countries like Fiji, extreme care should be taken to prevent wastage of the scarce resources which should only be channelled towards programs which will meet the need of the country.
In Fiji, the government continues to provide bulk of the health services in preventive, promotive, curative and rehabilitative through its national health service system. The policy of the Ministry of Health is to build a healthy population through vigorous health care programs encouraging people to be responsible for their own health. Oral health forms an integral part of the total health care system. As in other developing countries, oral diseases are prevalent in Fiji. They impair the quality of life and impose financial burdens on the society which has minimal resources.

An analysis of the dental services record in Fiji in the 1980s revealed that they were only coping with a fraction of the country's need of dental care (Davies et al 1993). According to the last national oral health survey which was carried out in 1985/1986, the prevalence of dental caries was generally low which mostly affect pit and fissure surfaces, whilst periodontal disease was found to be a major public health problem (Davies et al 1992).

Without any follow-up surveys after a lapse of 10 years, the current prevalence and distribution of dental diseases in Fiji cannot be clearly ascertained. Furthermore, the effectiveness of the dental services in meeting the need of the population over the same period of time cannot be evaluated or monitored. This sad state of affairs is indicative of the need for regular oral health surveys to provide up to date data which will direct planners to plan the type of services which will best meet the needs of the population having regard, of course, to the resources available in Fiji.

Under the authority of the Ministry of Health, the mission statement of the dental division states:

"To lead the national efforts in the maintenance of good oral health of the citizens of Fiji, and to promote and encourage the retention of their natural teeth for life by planning and delivery of comprehensive preventive and curative dental services"

(Ministry of Health, Fiji 1994).

The dental division, mandated to be responsible for the oral health of the population has proposed a set of objectives in order to achieve the mission. The objectives include the following:

i. Oral Health Goals for the year 2004:
   * 50% of children at age 5-6 years old to be caries free
   * DMFT at age 12 years to be lower than 2.8
   * reduction in the prevalence of adult (15+ years) affected with periodontal disease by 30%
* reduction by 25% in edentulous at the 55+ age group

ii. Oral health promotion and prevention to be encouraged through primary health care approach with the following objectives:

* to increase knowledge of oral health in all sections of the community by providing dental health information in all health care institutions and facilities throughout the country
* to increase coverage of primary schools to about 80%
* oral health education to be integrated with general health education as part of the school curriculum
* to expand on the fissure sealant and atraumatic restorative treatment technique program to include more primary schools

iii. Delivery of dental service should be made accessible, available and affordable to the people so that there is an increase by 15% in the utilisation of dental services.

iv. Manpower and training:

* to increase dental workforce to meet the goals and strategies of the dental division by increasing the workforce mix to 1 dentist: 2 dental therapists: 3 dental hygienists: 3 dental assistants
* the training of dental personnel to be consistent with the demand of care and the need for different cadre of dental personnel

For the dental division to accomplish its mission and objectives, effective planning based on up to date data is mandatory. In Fiji, there has never been any data collected on the prevalence and distribution of malocclusion. From clinical experience, there has been a notable increase in the demand for orthodontic treatment. Since not all patients with malocclusion seek treatment, the prevalence and distribution of this condition amongst the population cannot be assessed from those who seek professional help.

Therefore it is quite evident that there is a need for periodic surveys with a protocol that will
include all the dental diseases and conditions currently prevalent in Fiji which will provide regular up to date data for planning and monitoring of the dental service, hence the purpose of writing this thesis.

1.1 AIMS OF THE THESIS

The aims of this thesis are:

i. To review the benefits of regular Oral Health Surveys

ii. To review methods of National Oral Health Surveys

iii. To develop a protocol for the National Oral Health Survey in Fiji

To accomplish these aims, the writer will initially define the major oral diseases and conditions and than will review the literature on oral health survey planning and assessments of these diseases and conditions. The national oral health surveys of Australia, New Zealand and the United States of America will also be reviewed in relation to the respective objectives, methods used and benefits which will assist the writer in the development of a suitable protocol for the national oral health survey in Fiji.
2. DEFINITIONS OF MAJOR ORAL DISEASES AND CONDITIONS

Standard definitions of dental diseases and conditions are essential to the study of problems in dental health. In a survey, the definitions of diseases should be phrased in terms of objectively observable facts, and should be sufficiently clear and explicit to avoid ambiguity amongst examiners.

Definitions can be based on specified criteria which may be manifestations or causal experiences. Manifestational criteria include physical signs, symptoms, the course of the disease or the response to therapy, whilst the 'causal' criteria are types of experience begun at a time preceding the illness, and often loosely called the 'cause' of the illness.

2.1 DENTAL CARIES

Dental caries is a disease of the mineralised tissues of the teeth, namely the enamel, dentine and cementum, caused by the action of microorganisms on fermentable carbohydrates (Kidd, Joyston-Bechal 1987). It is characterised by demineralisation of the mineral portion of these tissues followed by disintegration of their organic material.

The World Health Organization defined dental caries as a localised, post-eruptive, pathological process of external origin involving the softening of the hard tissue and proceeding to the formation of a cavity (WHO 1972).

Dental caries is a multifactorial disease in which there is an interplay of four principal factors: the host (primarily the saliva and teeth), the microflora, the substrate or diet and time. For dental caries to occur, conditions within each of these factors must be favourable such as a susceptible host, a cariogenic oral flora, a suitable substrate, all simultaneously occurring within a sufficient length of time (Newbrun 1983).

The development of dental caries is a dynamic process of demineralisation of the dental hard tissues by the products of bacterial metabolism, alternating with periods of remineralisation. This pathologic process occurs on a continuum, in which any lesion may range from changes at the molecular level to gross tissue destruction and cavity formation.
From a microscopic lesion which cannot be detected and impossible to positively diagnosed by present clinical methods, dental caries proceeds to a cavity (or clinical caries) which can be diagnosed by a clinical examination. Macroscopic alteration of the enamel in initial caries preceding cavitation occurs without apparent break in the enamel surface. On smooth enamel surfaces, the earliest visible changes are usually manifested as a loss of transparency resulting in a opaque chalky region ("white spots"). In locations where caries has progressed more slowly or become arrested, brown or yellow pigmentation of the enamel may be seen. In pit and fissures, visual changes such as chalkiness or yellow, brown or black discolouration may be seen. In newly erupted teeth, brown stained pits or fissures are indicative of underlying decay, while in teeth of older individuals it may be due to arrested or remineralised lesions.

Dental caries is commonly considered to be a chronic disease in man because lesions develop over a period of months or years. In children, estimates vary widely on the speed at which any incipient lesion (diagnosed by a "catch of the probe") develops into a clinical cavity. The average time from the stage of incipient caries to clinical caries is 18±6 months (Newbrun 1983).

Dental caries can be classified according to the anatomical site of the lesion. The lesion may commence in pits and fissures or on smooth surfaces. Smooth surface lesions may start on enamel or exposed root cementum and dentine (root caries). Alternatively, caries may develop at the margin of a restoration and this is called recurrent or secondary caries.

Dental caries may also be classified according to the severity or rapidity of the attack. In a mild challenge the most vulnerable teeth and surfaces, such as the occlusal surfaces of the permanent molars, are attacked. A moderate challenge may involve occlusal and approximal surfaces of posterior teeth whilst a severe challenge will involve anterior teeth, which are normally caries-free.

The Oral Health Unit of the World Health Organization in Geneva maintains a Global Oral Data Bank compiled from the published literature and from its own surveys of the worldwide prevalence of caries and periodontal diseases, updated as often as possible. Study of these data has led to the generalisation that, whilst dental caries levels have been historically high in industrialised countries, they are now falling rapidly. Conversely, many developing countries, which have had low levels of caries, now showing a rising incidence, with a cross-over between the levels in developed and developing countries occurring at around DMFT 3 at age 12 years (Johnson 1991).
2.1.1 **Clinical Caries**
Clinical caries is defined as a cavity diagnosed by mouth mirror and probe examination (WHO 1962). It is a stage in the process of dental caries.

For the purpose of recording in the survey, only clinical caries is recorded to indicate the presence of caries. The stages of caries that precede cavitation, as well as other conditions similar to the early stages of caries, are excluded because they cannot be reliably diagnosed during the survey.

2.1.2 **Past Caries**
Past caries is manifested either by a filling or by loss of the due to dental caries. During the survey, care needs to be exercised in discriminating between teeth missing because of caries and those missing due to other causes such as periodontal diseases.

2.1.4 **Life Caries Experience**
Past caries and existing clinical caries together constitute the life caries experience.

2.1.5 **Incidence (increment) of Clinical Caries**
This is the term used to express the frequency with which new cavities appear during a stated period of time. It is usually expressed as an average annual rate per person.

2.1.6 **Rampant Caries**
This is the name given to a sudden rapid destruction of many teeth, frequently involving surfaces of teeth that are ordinarily caries-free. This condition is mostly observed in the deciduous dentition of infants who continually suck a dummy or comforter containing, or dipped into, a sugar solution. It may also be seen in the permanent dentition of teenagers and is usually due to taking frequent cariogenic snacks between meals.

2.1.7 **Arrested Caries**
In distinct contrast to rampant caries, arrested caries is when the carious lesion does not progress. It is seen when the oral environment has changed from conditions predisposing to caries to conditions that tend to arrest the lesion.
2.2 PERIODONTAL DISEASES

Periodontal disease is a generic name given to those inflammatory conditions of bacterial origin which begin with the inflammation of the gingiva and proceed, in time, to loss of attachment and bony support of tooth (FDI 1984).

All the elements supporting the teeth such as the gingiva, periodontal ligament, cementum and alveolar bone constitute the periodontium. The gingiva extends from the gingival margin to the mucogingival junction (except on the palate) and this width becomes greater with age. In health the colour of the gingiva is uniform and pink, but variation occurs due to degree of keratination, pigmentation, thickness and vascularity. Healthy gingival tissue is firm and immobile. The other components of the periodontium are not clinically accessible and are protected from the oral environment by the gingiva.

Periodontal disease is a progressive, multifactorial disease whose course may be transient, undergoing cycles of exacerbation and spontaneous remission (Cripps 1984). Periodontal disease was previously divided into gingivitis and periodontitis; the former thought to inevitably lead to the later. Current information, however, indicates that there are a number of periodontal diseases, with rather specific local bacterial etiologies and host-parasite interactions that lead to clinical manifestations. Moreover, gingivitis apparently does not always lead to periodontitis.

While there is a familial pattern of periodontal disease, it is not transmissible. The causative factors are hereditary, nutrition and environment, both local and systemic. With few exceptions, the progression of the disease varies with age and the presence of dental plaque. Resistance, or the immunity of the host, plays a key role in the onset and development of periodontal disease. It has been called a "plaque-associated disease", proliferating along the root surface at the expense of the fibres of the periodontal membrane. There appears to be no correlation between inflammation and the advanced disease (Cripps 1984). However, individuals with a low threshold of resistance, there may be a shift in the microbial flora to account for the progress of gingivitis to chronic destructive periodontitis.
In 1989 the World Workshop in Clinical Periodontics classified periodontal disease as follows:

2.2.1 **Gingivitis:**

In its mildest form, periodontal disease is characterised by the slight inflammatory changes of the gingiva and the condition is referred to gingivitis. Gingivitis associated with plaque is apparently the most common and it is clinically characterised by redness, gingival bleeding, oedema or enlargement and gingival sensitivity or tenderness. Other forms of gingivitis which are induced by secondary factors are:

2.2.1.1 **Acute Necrotizing Ulcerative Gingivitis (ANUG):** which is an acute, recurring, gingival infection of complex aetiology, characterised by necrosis of the tips of gingival papillae, spontaneous bleeding, pain and fetor oris. Recurrent episode of ANUG are apparently likely and a chronic condition can develop which leads to periodontitis and is termed as necrotizing ulcerative gingivo-periodontitis.

2.2.1.2 **Steroid Hormone-Influence Gingivitis:** manifests as puberty gingivitis, pregnancy gingivitis and gingivitis associated with birth control medication and steroid therapy. These forms of gingivitis are characterised by an apparent exaggerated response to plaque, reflected by intense inflammation, redness, oedema and enlargement.

2.2.1.3 **Medication-Influenced Gingival Overgrowth:** can occur as a result of certain medication such as phenytoin, cyclosporin and nifedipine. Clinically, the lesions start as a beadlike enlargements of the gingival margin and papilla. If the enlargement continues, marginal and papillary growth will unite resulting in the formation of pseudopockets.

2.2.1.4 **Desquamative Gingivitis:** is characterised by desquamation or sloughing of the gingival epithelium leaving an intensely red surface.

2.2.1.5 Other forms of gingivitis are associated with blood disorders, nutritional deficiencies, genetic factors, mouthbreathing and viral infections.
2.2.2 **Periodontitis:**

When deeper tooth-supporting structures are affected, the condition is called periodontitis. Clinically, periodontitis is characterised by the presence of gingival inflammation, pocketing and loss of alveolar bone. There are four major forms of periodontitis:

2.2.2.1 **Adult Periodontitis:** may have its onset during adolescence and continues for the life of the individual. It is usually not clinically significant until the mid-thirties. Prevalence and severity increases with age and also directly related to the presence of plaque and calculus.

2.2.2.2 **Rapidly Progressive Periodontitis:** occurs in the young adult populations and typically in the early twenties through mid-thirties. It is characterised by severe gingival inflammation and rapid loss of connective attachment and alveolar bone support. This condition is also related to some systemic diseases such as diabetes mellitus, Down's Syndrome, AIDS, neutropenia.

2.2.2.3 **Prepubertal Periodontitis:** can occur as a generalised or localised disease. *Generalised prepubertal periodontitis* affects deciduous and permanent teeth and begins with eruption of deciduous teeth. It is characterised by severe gingival inflammation, rapid bone loss, mobility and tooth loss. *Localised prepubertal periodontitis* affects only some of the deciduous teeth and is less aggressive.

Early epidemiological research presented a picture of almost universal susceptibility, especially when oral hygiene was poor. However, recent basic clinical and epidemiological studies has modified the understanding of periodontal diseases leading to the current perception which was summarised by Burt (1988) as follows:

i. Only a small proportion of persons exhibit severe widespread periodontitis. Mild gingivitis is common and most adults demonstrate some loss of bony support and loss of probing attachment.

ii. Gingivitis and periodontitis are associated with different bacterial flora. Gingivitis precedes periodontitis, however, not all sites with gingivitis later develop periodontitis.
iii. Although usually related to age in population, periodontitis is not a natural consequence of aging.

iv. Periodontitis is not the major cause of tooth loss in adults.

For the purpose of recording in the survey, there are basically three indicators of periodontal status used. These are:

i. the presence or absence of gingival bleeding

ii. supra- or subgingival calculus

iii. periodontal pocket; which are subdivided into shallow (4-5mm) and deep (6mm or more)

2.3 MALOCCLUSION

Crowded, irregular and protruding teeth have been a problem for some individuals since antiquity. Malocclusion has proved to be a difficult entity to define because individual perceptions of what constitute a malocclusion problem differ widely. However, Harty and Ogston defined malocclusion as an abnormal occlusion characterised by an incorrect relationship between the dental arches in any spatial plane or by abnormal anomalies in tooth position (Harty, Ogston 1993). Others interpret malocclusion as anomalies which include any variation in occlusion that are aesthetical or functionally unacceptable.

Perfectly interdigitating teeth arranged along a perfectly regular line of occlusion are quite rare. For many years, epidemiologic studies of malocclusion suffered from considerable disagreement among the investigators about how much deviation from the ideal should be accepted within the bounds of normal.

Malocclusion in most instances result not from some pathologic process but from distortions of normal development (Proffit 1986). In some patient, the problem is entirely the result of some environmental influence, such as mandibular deficiency secondary to a childhood fracture of the jaw. In others, the aetiology could be entirely genetic, as in the characteristic malocclusion that accompanies some rare genetic syndrome.
Protruding, irregular or maloccluded teeth can cause three types of problems for the patient:

i. psychosocial problems related to impaired dentofacial aesthetics

ii. problems with oral function, including difficulties in jaw movement, temporomandibular joint disturbances, and problems with mastication, swallowing or speech

iii. problems of accentuated periodontal disease or tooth decay related to malocclusion.

Existence of these problems indicate significant need for treatment or the correction of the condition. Dental and facial appearance is a major factor in the perception of need for treatment. However, not all patients with any of these problems, even those with extreme anatomic deviations from the normal, seek treatment (Proffit 1986).

In the survey, two levels of anomaly are recorded to categorise malocclusion. These are:

i. very slight anomaly such as a twisted or tilted tooth, or slight crowding or spacing

ii. anomalies that are generally regarded as causing an unacceptable effect on facial appearance, or a significant reduction in masticatory function or impairment of speech.

2.4 TOOTH LOSS

The end result of untreated dental caries and periodontal disease is tooth loss. Tooth loss, especially total tooth loss or edentulism, is the ultimate failure; the dental equivalent to death (Burt, Eklund 1992).

While loss of teeth is an end product of oral disease, it is also a reflection of patients attitudes, dentists attitudes, the availability and accessibility of care (including ability to pay), and the prevailing philosophies of care.

For centuries, tooth loss was considered an inevitable part of the human condition and was thus generally accepted with resignation. Tooth retention in the 1990s is however, much improved in developed nations. These changes came about with improvements in restorative dentistry, increasing affluence and its accompanying improvement in attitudes towards tooth retention, and significant research advances in preventing dental disease.
The extent of tooth loss is directly related to the wearing of and need for dentures. Hence, for the purpose of recording in the survey, the denture status is measured by the wearing of partial or full dentures and the need for dentures.

2.5 DEFINITION OF RELATED TERMS

2.5.1 Treatment Need:

*Need* for dental care can be defined as that quality of dental health care which expert opinion judges ought to be consumed over a relevant time period, in order for people to remain or become as "dentally healthy" as is permitted by existing knowledge (Spencer, 1980). Requirement for care, as determined by expert opinion, has been termed *normative need*. Normative need may be expressed in terms of items of dental care, or need equivalents such as time, cost or manpower requirements.

*Perceived need*, also referred to as *subjective need* or *felt need* is need as determined by the patient or public. Perceived need can often differ considerably from normative need: a dentist thinks the patient needs a root canal treatment followed by a crown when the patient wants the tooth extracted.

Need for dental care may be subdivided in terms of diagnostic need, preventive need or disease, disability, or dysfunction-oriented needs. Diagnostic and preventive needs are a reflection of philosophy of care held by the provider. Need for dental care arising from diseases, disabilities or dysfunction are discernible, although still subject to individual clinical variation in interpretation.

Any consideration of need for dental care should include the notion that there may be both unmet needs and the contemporary notion of excessively met needs or care provided when no need exists. Needs may be characterised either as *initial, backlog* or *incremental* needs. Initial needs are requirements for care to achieve dental health for the individual or group entering the program for the first time. Backlog needs refer to the requirements of the individual or group of entrants.
or re-entrants to a program where there has been some dental neglect prior to entry and a considerable amount of care may be required to achieve dental health. Incremental needs imply periodic provision of care at specified intervals of time and refer to the care required to achieve dental health for the individual or group who has previously received all required care and who therefore has only the increment of needs to be treated since he was last made dentally healthy.

2.5.2 Utilisation:

*Utilisation* of dental services is the actual attendance by members of the public at dental treatment facilities to receive dental care *(Burt, Eklund 1992)*. Utilisation is expressed as the proportion of a population who attended a dentist within a given time, usually a year, or as the number of visits per person made over a year.

*Demand* for dental care is the expression by a patient or the public of a desire to receive dental care to attend to their perceived needs. *Potential demand or latent demand* is a desire for care that is not being met for some reason, usually a problem with access.

The overall utilisation of dental services continues to increase over time *(Hayward et al 1989)*. However, Hayward and his colleagues observed that there was consistent disparities in the use of dental services among various demographic categories. They proposed that the possible explanation for these differences include financial barriers, availability of accessible providers, ignorance of the benefits of preventive dental care, or differences in attitudes, behaviour or beliefs about dental care.

2.5.3. Prevalence and Incidence of Dental Diseases

The most fundamental population measure of a disease is its *prevalence*. This is the proportion (or percentage) of a population affected by the disease at designated time *(Downer et al 1994)*. As an example, the caries prevalence of children would be the proportion of children in the population on a specified age who had one or more decayed, missing or filled teeth.

*Incidence* is the number of new cases of a disease in a defined population within a specified period of time. It is a measurement of the rate at which a disease progresses. Therefore in order to measure incidence, two examinations are required: one at the beginning and one at the end of a
given time period. The incidence of the condition is then the increase or decrease in the number of new cases occurring in a population within that time period (Kidd, Joyston Bechal 1987).

2.5.4. Indices

An index has been defined as a numerical value describing the relative status of the population on a graduated scale with definite upper and lower limits, which is designed to permit and facilitate comparison with other population classified by the same criteria and methods (Strifflier, Young, Burt 1983). Index is often used broadly to mean any form of disease quantification, including proportions and rates (Burt, Eklund 1992).

Ideally, an index should possess the following properties:

* **Clarity, Simplicity, and objectivity.** The examiner should be able to memorise the criteria, and the index should be reasonably easy to apply so that there is no undue time lost while carrying out the survey. The criteria should be clear and unambiguous, with mutually exclusive categories.

* **Validity.** The index must measure what it is intended to measure.

* **Reliability.** The index should be able to measure consistently at different times and under a variety of conditions

* **Quantifiability.** The index should be amenable to statistical analysis, so that the status of a group can be expressed by a distribution, mean, median, or other statistical measures.

* **Sensitivity.** The index should be able to detect reasonably small shifts, in either direction, in the condition.

* **Acceptability.** The use of the index should not be painful or demeaning to the subject.

There is no perfect index and there are no generic, all-purpose indices that meet every need (Burt, Eklund 1992). However, the choice of the index in any given situation should be made on the basis of how closely the index approximates them and by the requirements of the study in which the index is being used.
3. PLANNING FOR ORAL HEALTH SURVEY

In 1971, the World Health Organization stated that all health programs should contain the following basic elements: situation analysis, problem identification and objective formulation, formulation and analysis of alternative strategies, strategy selection, program formulation and evaluation. For an oral health planner an oral health survey will be the vehicle to use to analyse the existing programs/services, identify problems that may be hindering the program from achieving its objectives, formulate alternative strategies and to evaluate the effectiveness, efficiency, appropriateness and accessibility of the programs/services.

The 1987-88 National Oral Health Survey in Australia was recommended by the National Health and Medical Research Council which recognised the importance of a national oral health survey particularly for planning purposes with regard to dental workforce needs, dental under-graduate and continuing education, and dental services. In Fiji, the proposed national oral health survey in 1998 was recommended by the National Oral Health Committee of the Ministry of Health which had recognised the need to establish and develop basic oral epidemiologic data on which to base future preventive and promotive dental programs.

Like any other form of investigation, a survey will take time, cost money and pose administrative problems. Even a simple study is wasteful if it fails to produce the desired information. It is therefore extremely important to carefully plan the whole operation before any steps are taken to execute it. There should, at all times, be close collaboration between the statistical advisers (statistician) and the authorities which are directly concerned with the subject of the survey. This collaboration should start at the earliest stages of planning and continue until the publication of the final report and the completion of the post-survey evaluation.

The value for any survey will depend on how it was planned, for the closer the attention to detail, the better the prospects of a fruitful survey. The essential requirements in the planning of oral health survey are:

3.1 DETERMINATION OF OBJECTIVES

In the determination of the objectives, the planners will move into an active process, offering
specific proposals for actual changes to be made in the community. The explicit formulation of survey objectives is an essential step in the planning of a survey. It has been stated that "a question well-stated is a question half-answered", but "a question that is poorly stated or unstated is unlikely to be answered at all" (Abramson 1994). Also "if you don't know where you're going, it will be difficult to select a suitable means of getting there". In fact, "if you're not sure where you're going, you're liable to end up someplace else". Hence, the objectives of the survey will direct the subsequent planning of the survey.

The objectives of a study will determine the type of data that will be needed and the form in which they should be collected. Unless the objectives are clearly defined before the study begins, unnecessary data or data in unusable form may be gathered at considerable cost whilst data which are really essential for the survey may be overlooked. Thus, clear and precise statement of objectives will restrict the collection of data to those which are relevant. It should be routine to ask the simple but searching question, "why is this measurement included and what use will be made of the results?"

3.2 PROTOCOL

It is essential to have a written set of instructions which will clearly define all procedures, criteria of assessment and terms that is going to be used during the survey. This protocol must be discussed with the statistician who will ultimately be responsible for the analysis of the results. The protocol should include survey methods and procedures and other practical details such as the personnel, equipment and facilities that will be needed.

If several examiners are taking part in the survey, all participants should discuss and approve the protocol and must than accept the impositions of collective discipline.

The protocol should be written in such detail that any other experienced investigator can repeat the survey based on its contents.

3.3 SAMPLE SELECTION

In very small population groups it is possible to examine everyone and thus get a true measure of the prevalence of oral diseases and conditions. This practice is not feasible in large and diverse'
populations because resources in terms of time, manpower and finance are not always available for the collection and analysis of such vast amount of data. However, sufficiently precise data can be obtained from a sample provided the sample is representative of the population to which the results will be generalised.

3.3.1 *Methods of Sampling*

The method of sampling is critical and the advice of a statistician should be obtained to provide guidance. The following methods of sampling are generally used:

3.3.1.1 **Random sampling**: (or simple random sampling) is a technique whereby every individual in the population being sampled has the same probability of being selected, hence having equal chance of being included in the sample. A *sampling frame* is required which could be from an official list such as a census list which shows the names of all the individuals from the population. Each individual is assigned a number than certain numbers are selected by reference to random number tables. This method of sampling ensures that all individuals will have the same probability of being selected; that the law of chance alone will decide which individual in the population will be selected. However, if the sampling frame used is an incomplete and biased representation of the population, the sample will inevitably be biased.

3.3.1.2 **Cluster sampling**: In cluster sampling, a simple random sample is selected not of individual subjects, but of groups or clusters of individuals. The sampling units are clusters, and the sampling frame is a list of these clusters. The clusters maybe villages, apartment buildings, classes of school children, housing units or families.

It is more convenient for administrative and economic reasons to investigate people living in a relatively small number of households or villages rather than more scattered places of residence. However, the technique has the disadvantage that if the clusters contain similar persons (high intraclass correlation), it will be difficult to estimate the precision with which generalisations may be made to the population.
3.3.1.3 **Systematic Sampling**: sampling is when every nth person is selected from a list or from other ordering of the population. It has a practical advantage over a simple random sample for a systematic sample can be drawn without an initial listing of all persons in the population. Hence, a systematic sample can be drawn by selecting every third patient admitted to a hospital or every person whose personal identity numbers, social security number, hospital registration number ends with a predetermined and randomly selected digit or digits.

3.3.1.4 **Stratified Sampling**: In stratified sampling, the population (the sampling frame) is initially divided into subgroups or *strata* according to one or more characteristics such as sex, age, or area of residence, than random or systematic sampling is performed independently in each stratum. (stratified random sampling, stratified systematic sampling)

3.3.1.5 **Multi-Stage Sampling**: In a survey covering a district, province or country, an initial sample may be taken from units of the population such as villages. The villages are listed and a random sample of the required number selected. Than a listing of individuals within the chosen village is made and a sample taken from them. This is two-stage sampling.

The same procedure of subdividing the population into progressively smaller units may be extended to three or more stages as required. This method of sampling has the advantage that a listing of persons is only required for the relatively small unit from which the final selection is made.

3.3.2. **Sample Size**

If numbers are too small, it may be impossible to make sufficiently precise and confident generalisations about the situation in the population and thus, be impossible to achieve the objectives of the survey. On the other hand, it is wasteful to study more subjects than these objectives require. Abramson (1994) stated that, "samples which are too small can prove nothing; samples which are too large can prove anything." Thus, to avoid wasteful use of resources, it is important to know the number of people that must be included in the sample to obtain the required data.
The size of the sample will be determined largely by the precision with which the planner wishes to estimate the oral health status of the population. The more precision required, the larger the sample will need to be. For example, whether the estimate for average number of decayed, missing or filled teeth (DMFT) in a population is accurate to the nearest 1DMFT or 0.01DMFT makes little difference in formulating plans for a treatment program, but makes a very big different in required sample size.

3.4 APPROVAL

It is essential to obtain permission from appropriate local, regional or national authority. If school populations are to be examined, the school authorities should be contacted and seeking their approval of the program. When adult populations are to be studied, the health authorities of the area should be notified as there may be a need for timing the survey to fit in with other health activities. It is also advisable to acquaint the dental profession in the area with the details of the survey for they can be helpful in explaining the purpose of the survey to the population.

3.5 SCHEDULING

The preparation of an orderly schedule for data collection will ensure that valuable time and effort are not wasted. If the general level of oral diseases in the population is known, the examiner can estimate how much time, on the average, each examination will take. A daily and weekly schedule can than be prepared which will be invaluable for all survey personnel and to school and health authorities.

There should be some flexibility in the itinerary, so that unanticipated delays will not create major rescheduling problems. Schedules should not be too demanding for fatigue is a major contributor to inaccuracy and inconsistency of data collection.

3.6 STANDARDISATION OF EXAMINERS

For the survey, it is essential for participating examiners to be trained to render consistent
judgements. The objectives of calibration training are:

i. to ensure uniform interpretation, understanding and application of the criteria for the various diseases and conditions which are to be observed and recorded

ii. to ensure that an individual examiner can examine to a consistent standard and that variations between examiners are minimised

If the survey is going to be carried out by a single examiner, he should determine how consistently he can apply the diagnostic criteria by examining a group of at least 20 patients twice, on successive days. By comparing the results of the two examinations, the examiner will be able to determine the extent and nature of his diagnostic and recording errors.

If the survey will involve a group of examiners, it is essential to assess the consistency of each examiner and the variations between examiners by having each examiner examine the same group of 20 or more patients. The essential of a group of examiners is that they should be able to examine with reasonable consistency using a common standard. Unless the members of a survey team can examine in a consistent manner, regional or group variations in disease prevalence or severity may be missed or wrongly interpreted. Examiners may change the way they apply diagnostic criteria during the course of a long series of examinations.

Consideration must be given to the fact that examiners are a source of variability and therefore the smaller the number of examiners, the less number of sources of variability. An examiner must have a recorder. It cannot be overemphasised that the recorders must also undergo briefing and practice in the filling up of recorder forms. A good recorder is a good complement to the examiner, as he can alert the examiner of any deviation of diagnosis.

3.7 DUPLICATE EXAMINATIONS

During the course of a long series of examinations, the examiners may change the way they apply diagnostic criteria. To reduce this tendency, and to measure its extent, they are to conduct
duplicate examinations on about 10% of the sample in the main survey. The examiner is not to know when he / she is doing a duplicate examination for it might affect the thoroughness or quality of the re-examination. In a large survey, it is preferable to perform duplicate examinations at the beginning, about half-way through the survey, and at the end of the survey. This will give information on changes occurring during a survey period.

3.8 STANDARDISATION OF METHODS OF EXAMINATION

The method of examination will be determined by the aims of the survey, the units of measurement to be used, and the ability of the examiners to obtain consistent results. Details of the methods must be standardised and kept uniform throughout the course of the survey.

Details which require to be standardised include:

i. **Physical equipment**: for an oral health survey, WHO recommends that each examiner should have the following instruments: caries explorers, plane mouth mirrors, periodontal probes designed according to approved specifications, pans for sterilising instruments, concentrated sterilising solution, wash basins, cloth or paper handtowels, soap and gauze pads for removing debris from around the teeth. Sufficient numbers of instruments should be available to avoid the need to interrupt examinations while used ones are sterilised.

A light-weight portable dental chair with a head-rest for the patient is desirable but not essential since a straight chair with a tall back on which the patient’s head can rest will be sufficient. For examiners, a chair that can be adjusted for height is useful in preventing fatigue through bending down to examine small children.

ii. **The conditions under which the examinations are done**: the lighting should be as consistent as possible throughout the survey. If electricity is not available at some locations, natural light should be used at all locations. On the other hand, if electricity is available at all locations, than natural light should be excluded as far as possible.
iii. The diagnostic criteria.

iv. The method of recording the results: the design of the record form will be determined by the nature of the data to be collected and the method of processing the results. If a computer is to be used, a coding system should be drawn up in consultation with the statistician.

3.9 PREPARATION OF SURVEY REPORT

The structure of the report should include the following:

i. Statement of the purpose of the survey: this should include a clear description of the aims of the survey and the expected ways in which the results will be used.

ii. Materials and methods: this will include:
   * area and population surveyed
   * the nature of the information collected and the methods used
   * sampling method
   * personnel and physical arrangements at the examination sites
   * statistical analysis and computational procedure
   * cost analysis
   * data on the reliability and reproducibility of the results

iii. Results: this can be presented in several ways. If brevity is important, the text should contain a written description of the more important results only. Summary tables may be included in the text. Illustrations such as graphs, histograms, bar-charts, or pie-charts can be used to illustrate points that are neither easily explained in the text nor easily visualised from tables. Figures and tables should be labelled clearly so that they are readily comprehensible.

iv. Discussion: in which an attempt is made to explain the extent to which the survey met the objectives for which it was designed, to highlight results of particular interest, to discuss their significance and to suggest further work that is required to elucidate some interesting results.

v. Summary and conclusions: this should be brief and may be set out in an itemised list.
4. REPORTING OF ORAL DISEASES AND CONDITIONS

Oral health assessment is carried out to determine the nature and extent of oral diseases or other conditions in the community. These measurements will provide data on oral health status which will enable oral health administrators to obtain more comprehensive estimates for preventive, curative and restorative programs. In addition the data can also be effectively used for the purpose of planning and developing oral health programs.

4.1 ASSESSMENT OF DENTAL CARIES

Dental caries presents interesting challenges in a survey. The first challenge arise from the fact that one is dealing with symptoms (cavities in teeth) which may affect several sites and/or several teeth in the individual and often to a varying degree of destruction (Thystrup, Fejerskov 1994). Caries lesions present with a spectrum of clinical features, depending on how far the destruction has progressed on a particular surface: early demineralisation may be detected only after careful drying and examination of the surface, where as the more advanced lesion can be easily detected by the presence of a cavity, and in between the two is a broad range of clinical signs of past or current caries attack.

In a survey, the actual index to be used to quantify dental caries should be one that fulfills the purpose of the survey in the simplest, most economical and reliable manner (WHO 1962). A major consideration for any caries index is the fact that dental caries is a cumulative disease. An evaluation of the caries level within a community should include quantification of the entire caries experience, both present and past.

Traditionally, dental caries has been assessed through the use of Decayed, Missing, and Filled (DMF) Index introduced by Klein, Palmer and Knutson in 1938 for the permanent teeth and adapted for the deciduous teeth (def) by Gruebbel in 1944 (Spencer 1980). The DMF, an irreversible index, describes $D$ for decayed teeth; $M$ for teeth missing due to caries; and $F$ for teeth that had been previously filled. Filled teeth were presumed to have been unequivocally decayed prior to restoration. The DMF score for any one individual can range from 0 to 32, in whole
numbers. A mean DMF score for a group, being the total of individual values divided by the number of subjects examined, can have fractional values. The DMF index can be applied to whole teeth (designated as DMFT) or to surfaces (DMFS).

The DMF index needs to be modified to account for such factors as teeth that have been filled and redecayed, secondary caries, crowned teeth, bridge pontics or for any other such attribute (Burt, Eklund 1992). As with modern preventive and restorative procedures, DMF index has been considered as outmoded for it does not account for sealed teeth and teeth that had been restored with composite restorations for aesthetic reasons.

Over the years the DMF index has been criticised but has withstood the test of time and remains in universal use for quantifying caries (Downer et al 1994).

The def index for the deciduous teeth described $d$ as decayed indicated for fillings; $e$ denoted deciduous teeth indicated for extraction; and $f$ denoted filled teeth. In the def index, teeth missing for caries are not recorded because of the frequent difficulty of distinguishing between extracted and naturally exfoliated deciduous teeth. Modifications of the def index can be as follows:

i. $d m f$ for use in children before ages of exfoliation. ($m$ denotes teeth missing due to caries)

ii. $d m f$ applied only to the primary molar teeth

iii. the $d f$ index in which missing teeth are ignored

However, the World Health Organization's recommendation for deciduous teeth is to use the same criteria as for permanent teeth except that missing teeth are disregarded after 9 years of age and only recorded as missing under this age if normal exfoliation would not be sufficient explanation for absence.

Another method of measuring dental caries have been identified such as the Graingers Hierarchial Method which is an ordinal scale designed to simplify the recording of the caries status of a population using five zones of severity of the caries attack (Burt, Eklund 1992). Although tests
of its validity and acceptability indicate it may be useful, it has not yet received wide acceptance.

4.2 ASSESSMENT OF PERIODONTAL DISEASES

During the 1950s and 1960s, large epidemiologic studies revealed the universal nature of periodontal disease and the general impression was that close to 100% of adults were affected by periodontal disease in one way or another (Gjermo 1994).

Amongst dental epidemiologists, there has, since the 1940s, been a great general interest in the development of suitable index for the quantification of the prevalence and severity of periodontal disease in individuals as well as in population groups in all parts of the world (Ainamo, Ainamo 1994). Early attempts to measure periodontal diseases concentrated on separate counts of gingivitis, periodontitis, and in association, calculus and soft deposits.

When the World Health Organization Global Oral Data Bank was initiated in 1969, the Periodontal Index (PI) and the Simplified Oral Hygiene Index (OHI-S) were the two preferred methods of data accumulation (Barnes 1994). Although a great amount of data was collected, it was of little significance in estimating the magnitude and severity of periodontal conditions, especially for public health epidemiology. Russels Periodontal Index (PI) as well as the subsequent Ramfjord's Periodontal Disease Index (PDI) were both based on mean scores per subjects examined which are clearly less suitable for identification of the distribution of disease within a population (Ainamo, Ainamo 1994). Furthermore the OHI-S index on its own could not give a useful picture of the periodontal conditions and was too quickly "saturated" in populations where oral hygiene was unsatisfactory.

This climate of uncertainty and lack of confidence in methods of assessing periodontal diseases led to the development of the Community Periodontal Index Treatment Need (CPITN) (Pilot et al 1986). This index was jointly developed by the International Dental Federation and the World Health Organization. It is now an established method to indicate levels of periodontal conditions in population groups.
The expressed purpose of the CPITN was to provide a global standard of measurement of treatment needs of diverse populations for use by health planners and administrators (Page, Morison 1994). It is a quick and simple index and has permitted comparisons between industrialised and non-industrialised countries to be carried out in addition to trends across age groups (Clerehugh 1993).

Major features of the CPITN method are: using the specially designed periodontal probe, considering the dentition divided into six sextants, scoring index teeth in each sextant and recording only the highest score for each sextant. The CPITN measures the presence or absence of bleeding on probing, calculus, shallow 4mm or 5mm pockets and deep pockets of 6mm or more (Clerehugh 1993). The scores are: 0 = healthy; 1 = bleeding on probing; 2 = calculus; 3 = shallow pocketing of 4 or 5mm; 4 = deep pocketing of 6mm or more; the latter being considered the highest score.

In addition to its epidemiological role, the CPITN has been recommended with minor modifications for the screening and determination of treatment needs in individual patients in clinical practice. In this capacity, the CPITN has been promulgated under a number of different guises including the Simplified Periodontal Examination (SPE), Periodontal Screening and Recording (PSR) and the Primary Essential Periodontal Examination (PEPE) (Holmgren 1994).

In less than a decade, the CPITN has become an established index and has generated considerable data to identify, in populations, periodontal conditions for which specific interventions might be considered. Overall the CPITN system is seen as more than fulfilled the initial hopes invested in it (Pilot, Miyazaki 1994). It has provided a simple yet effective method for measuring and monitoring the magnitude, prevalence and severity of potential diseases throughout the world.

4.3 ASSESSMENT OF MALOCCLUSION

There is at present no universally accepted method for the measurement of dentofacial anomalies that are of public health significance and require treatment (WHO 1987). Nevertheless, dentists
in a number of countries have to provide orthodontic advice to parents and children. Similarly, public health authorities may be required to estimate the prevalence of dentofacial anomalies so that orthodontic treatment can be made available for those who need and desire it.

As for malocclusion, the best known classification is that of Angle which dates from the nineteenth century (Burt, Eklund 1992). There are numerous methods of recording the prevalence and degree of malocclusion of the teeth and different skeletal patterns of the individual. These include the Malalignment Index which assesses rotation and tooth displacement, the Occlusal Feature Index which records crowding and cuspal interdigititation with the vertical and horizontal overbite, the Treatment Priority Index which assesses treatment needs and the Occlusal Index (Striffler, Burt, Young 1983). However, these indices are more appropriate in clinical orthodontic or morphological research than in public health surveys (Slack 1981).

Recent research findings have indicated that the main benefit of orthodontic treatment to the patient may be in improved dental aesthetics and psychosocial well-being (Estioko et al 1994). Consequently, recent development in assessment of orthodontic treatment need involve criteria intended to measure aesthetic impairment and psychosocial need. The Index of Orthodontic Treatment Need (IOTN) assesses both dental health need and dental aesthetics (Lunn et al 1993). The aesthetic component rates the person's dental attractiveness using the Standardised Continuum of Aesthetic Need (SCAN), a ten-point scale, from 0.5 (attractive) to 5 (unattractive). (Estioko et al 1994). The Dental Aesthetic Index (DAI), another recently developed orthodontic index, specifically measures dental aesthetics (Cons et al 1986).

The World Health Organization, in its continuing effort to provide simplified and standardised methods of recording oral diseases, recommended a three category assessment of no anomalies, slight or more serious (WHO 1987). Slight is defined as tilted or rotated teeth or mild overcrowding, whilst the more serious anomalies is confined to the four anterior incisors which may include one or more of the following:

* maxillary overjet of 9mm or more
* mandibular overjet, anterior crossbite equal to or greater than a full tooth depth
* open bite
* midline shift estimated to be more than 4mm
* crowding or spacing estimated to be more than 4mm
4.4 ASSESSMENT OF NEEDS FOR DENTAL PROSTHESIS

The absence of teeth constitutes a functional handicap or disfigurement thus an assessment should be made of persons who are considered by the examining dentist to require dental prosthesis (WHO 1962). However, since there are no widely used indices for recording the need for various types of dental prosthesis, only information about the wearing of dentures (full or partial) is recorded for the basic oral health assessment (WHO 1977).

4.5 ASSESSMENT OF OTHER CONDITIONS

4.5.1 Lesions of Oral Mucosa and Bone

A screening examination of the oral mucosa and the hard and soft tissues in and around the mouth will reveal any abnormality which will need to be recorded during the survey. Conditions of the oral mucosa, to which examiners should be alert during examinations include acute necrotising ulcerative gingivitis, acute necrotising ulcerative stomatitis, suspected oral cancer, oral lichen planus, leukoplakia of oral mucosa and candidiasis.

Disorders involving the bone include radicular cyst, osteoma, osteitis, osteomyelitis, ameloblastoma or other odontogenic tumour.

4.5.2 Fluorosis

Presence of fluorosis should be recorded during the survey. Moderate to severe cases of fluorosis will be easy to detect whilst the questionable forms can be difficult to distinguish from the idiopathic opacities of the enamel. The earliest signs of dental fluorosis can be seen as thin white lines running across the entire enamel surface which can be clearly discerned after drying the tooth surface. In slightly more affected teeth, the white lines appear broader and more pronounced and the merging of some of the lines will result in the formation of small, irregular, cloudy or paper-white areas scattered over the enamel surface. With increasing severity, the irregular opaque areas merge until the entire tooth surface appears chalky white. In more severe stages of dental fluorosis the tooth surface, which is entirely opaque, exhibits focal loss of the outermost enamel, referred to as pits which may vary in diameter and are scattered over the surface, although most frequently they occur along the incisal / occlusal half of the tooth.
5. DENTAL ATTITUDES AND BEHAVIOUR IN RELATION TO THE UTILISATION OF DENTAL SERVICES

There are many ways of understanding why people act as they do. Physiology, anatomy and biochemistry all make different contributions to an overall understanding of the individual. A physiologist may consider a person as a biological machine whilst a biochemist may consider him as a series of molecular interactions.

Similarly, psychology provides another way of viewing the person, a viewpoint which is more relevant on some occasions than others. When operating on a patient under general anaesthetic, psychology may seem to have little relevance, but when it comes to understanding why the patient come to visit the dentist in the first place, or when considering future care, the psychological perspective can be very useful.

5.1 DEFINITIONS

5.1.1 Dental Health Attitudes

Attitudes are defined as preferences, likes and dislikes, values, feelings and on a higher level, conscience or philosophy (Stoll 1977).

An attitude is an organised predisposition to think, feel, perceive and behave toward a referent or cognitive objective (Littlejohn 1992). It is an enduring structure of beliefs that predisposes the individual to behave either positively or negatively.

Health attitudes are the reactions of the individual to the learning he has acquired. It is the state of mental and emotional readiness to accept what is known to be good and to reject what is injurious. Attitudes form the basis of behaviour.

Individual attitudes are acquired. They develop as a result of living in a certain environment. Attitudes may develop slowly through the process of education or they may come suddenly as the
result of an intense experience. In regards to health practice, attitudes are acquired early in life. Teachers and parents have the most influence in developing the desired attitudes.

5.1.2 Dental Health Behaviour

Behaviour is defined as a series of choices among possible actions. Health behaviours are defined as those behaviours an individual engages in to prevent diseases, discover asymptomatic diseases, or treat specific diseases (e.g. taking medication) (Geboy 1985). The patient's health behaviour is a function of the action of a variety of factors including beliefs and attitudes, environmental enabling factors and self-management or self-control capability.

Psychologists tend to place more emphasis on how people behave than on their beliefs, attitudes and feelings (Kent 1984). In many instances investigators do not enquire about subjective feelings but prefer to monitor what people actually do rather than what they think.

Investigators have observed the difficulty in predicting how people will behave from knowledge of their beliefs and attitudes. This has been found to be true in dentistry where one cannot predict the patients' behaviour from knowledge of their attitudes. Most people agree that they should take care of their teeth and gums by regular brushing and regular attendance at the dentist. In 1982, Todd and his colleagues reported that 91% of a nationwide sample of people in Great Britain agreed that regular visits to the dentist are important in keeping their teeth healthy, yet 43% only went to the dentist when they had some trouble with their teeth (Todd et al 1982). Many visits are made only when symptoms appear and for extractions. With such a large discrepancy between what people say that they ought to do and what they actually do, it seems that there is a complex relationship between attitudes and behaviour.

5.2 ATTITUDE vs BEHAVIOUR

There are several reasons why attitudes do not correspond particularly well to behaviour. One possibility is that, when asked or surveyed, people simply respond in accord with 'collective wisdom'. They may recognise that twice-yearly visits are recommended and feel bound to give the 'right' answer to the interviewer. They may have no intention of following the advice themselves.

Another possibility is that there are other constraints which prevent them from acting on this
recommendation. For instance, many dentists work only during the day, so people who are paid on an hourly basis may not only have to pay any dental charges but also forfeit earnings. A patient may also have to find someone to look after young children.

It also seems possible that the discrepancy between attitudes and behaviour may be understood in terms of additional intervening beliefs. For instance, those people who consider themselves to be particularly vulnerable to health problems, or who believe that the consequences of disease are serious, may make preventive visits to the dentist in order to minimise the possibility of problems.

5.3 ASSESSING FACTORS IN UTILISATION OF DENTAL SERVICES

In assessing the utilisation of dental services, an important consideration seems to be what knowledge underlies the beliefs, attitudes and information that govern people's self-diagnoses, or assessments of their own health. Although, for example, the formal bit of information that one should visit the dentist regularly is well known, some segments of the population subscribe to it more extensively than others. If this information were still more widely disseminated through an education campaign aimed at the poorer and less educated segments of the population, greater utilisation of dental services might follow.

However, it is clear that an education campaign will not by itself bring about maximal utilisation of dental services, for there is a considerable discrepancy between knowledge and actual practice. This discrepancy varies from one segment of the population to another, and a major principle of its variation seems to be one of economic differences. Some people, then, lack the means necessary to put their knowledge into practice. In a community the proportion of people absolutely unable to pay for dental care will no doubt be small, but the proportion whose income is such that they are reluctant to allocate money for maximal use of dental services will be certainly greater.

Other factors that may contribute to the gap between knowledge and practice include the fear of the dentist and of the pain anticipated in dental care. Part of this may be the result of a popular
stereotype, while part may be the result of pain or fright that actually could have been avoided. If the fear derives from people's anticipation of pain that really cannot be avoided if the teeth are to be treated, increased utilisation of services will depend on educating people by emphasising the consequences of not getting dental care.

There is also little doubt that social, economic and cultural factors are of major significance in understanding the utilisation of dental services. Researchers have observed that although most health status disparities may be the result of relative social and material deprivation, an additional contributory factor is the increased rate of non-utilisation of dental services by members of different cultural, ethnic and disadvantaged groups (Johnston 1993). Research findings also indicated that health care utilisation is influenced by certain factors such as current health status, availability of services, accessibility of services, affordability of services, acceptability of services and value placed on health and health services. It has also been established that variations in dental health status in a country can be attributed to the inequitable distribution of material resources and socio-economic opportunities. Johnston (1993) observed that in New Zealand, the Maoris' unemployment, low earnings capacity, poorer educational attainment, low home ownership, over-representation in penal institution and higher rates of physical and mental ill health are inter-related and are the product of major social, economic and cultural disparities.

Other factors such as being too busy, lacking the time, being too far away from the dentist, all refer to the extent to which seeing the dentist is inconvenient to the way the patient's everyday life is organised. These factors may be considered more important to the working man than for the housewife, and may in fact explain some of the differences that exist between the dental habits of men and women. Such factors may also be considered important to the wage earner, to whom literally, every hour spent in travel, or in waiting and consultation, costs money, than for the professional worker, who often has greater flexibility in working and earning time.

All these factors can be combined into a whole, from the point of view of the patient, by considering the utilisation of dental services to stem from an over-all assessment, or definition, of the situation. 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."
Finally, the avoidance of the utilisation of dental services, is a complex product of the education
involved in self-diagnosis, of the income level involved in weighing costs, of the dental health and
past dental experience involved in anticipating pain, and of the social experience involved in
assessing inconvenience.

On the other hand, Kent (1983) explored the problems which dentists encounter in their treatment
of patients. He observed that the problems most frequently encountered are those related to the
dentist-patient relationship. Sometimes this involved treatment decisions (e.g., the "know-all
patient") while at other times patients tended to be rude or inconsiderate. The second most
frequent difficulty observed was patient anxiety. Tense or agitated patients were not only difficult
to treat but could disrupt scheduling or induced uncomfortable feelings in the dentists themselves.
Patient's failure to take adequate preventive care was another important difficulty observed. Some
dentists considered this as a result of lack of information but others believed that it was because
many patients were unmotivated and unconcerned about the state of their oral hygiene.

Generally many psychologists, known as behaviourists, place more emphasis on what people do
rather than what they think or believe (Kent 1984). Often this is an appropriate viewpoint to take.
It has been postulated that individuals would adopt preventive dental health behaviours if they felt
susceptible to diseases, that the disease was severe and would have some social consequences, and
that the benefits of preventive actions would outweigh the costs of behaviours (Reisine, Litt
1993). It seems that patient's utilisation of professional dental care, for example, cannot be easily
predicted from their attitudes and beliefs. In other areas of dental care, such as relief of pain,
patient's expectations and feelings are very important.
6. REVIEWS OF NATIONAL ORAL HEALTH SURVEYS

6.1 1988 NATIONAL ORAL SURVEY IN NEW ZEALAND

The 1976 National Survey of Adult Oral Health in New Zealand showed a high rate of tooth loss amongst adults. During the survey it was typical to observe throughout the country the high state of edentulousness amongst the 35-44 year age group (Cutress et al 1976).

In response to the 1976 survey result, a National Dental Health Workshop was held in 1978 to review the state of oral health in the community and to establish guidelines for the future development of oral health care services. The principal recommendation of the workshop was to set an objective "the achievement of a standard of oral health for all which leads to a functional natural dentition for life." In addition, the workshop also recommended periodic monitoring of oral health to assess progress towards achieving their objective. Thus by 1984, planning had commenced for a national survey in 1988. The principal aims of the 1988 national survey were to document the changes in oral health that had occurred since the previous surveys, measure progress towards achieving their objectives, and provide information that would help in planning future oral health care services.

New Zealand was ready for the national survey when it was approached by the World Health Organization to participate in the International Collaborative Study of Oral Health Outcomes (ICS II). The specific objectives of the New Zealand section of the ICS II study were to:

i. assess, for specific age groups, oral health and oral disease and to document any changes since previous surveys;

ii. examine the sociodemographic characteristics, oral health beliefs, attitudes, knowledge and self care practices of the general public and to document any changes since the previous surveys;

iii. describe the oral health care system and the sociodemographic and behavioural factors relevant to oral health and the oral health care system;
iv. identify the factors that best explain the variations in oral health, the use of the oral health care system, and the quality of care;

v. assess the relative effects of sociodemographic and personal factors on oral health status; and

vi. provide policy makers with information that can be used to improve oral health and the efficiency of the oral health care system.

6.1.2 Methodology

The model used in the survey to guide questionnaire design, sampling, data collection and data analysis was based on Blum's model of the determinants of health status. Blum's model states that four major factors determine an individual's health status which include environment, lifestyle, the health care system and human biology. The model postulates that the socioenvironmental context of the society, the oral health care system, and the personal characteristics of the individual influence oral health status and consumer satisfaction directly. They also influence it indirectly through the individual's oral health behaviour including personal oral hygiene practices and dental service utilisation.

The survey examined the relationships between the environment, lifestyle and the health care system. Human biology was not directly included in the study because of the difficulty of measuring it explicitly.

The survey involved the collection of basic descriptive information on oral health and the factors that influence it. The oral survey was designed to assess the oral health status of the selected age groups. The oral examination method and criteria used were a modification of the basic methods developed for oral health surveys by the World Health Organization (WHO 1987). The contribution of oral health beliefs and practices to oral health outcomes were also investigated. The social variables used in the survey included sociodemographic variables, enabling factors such as cost of oral health care, travelling time to, and waiting time for, an appointment. In addition,
variables covering aspects of oral health behaviour, dental utilisation, perceived oral health status and consumer satisfaction were included.

6.1.2.1 Samples
The samples were drawn nationally. The adult population surveyed included people in private dwellings and the child population was selected from 12 and 13 year olds Form II students from the North and South Islands.

A stratified cluster design was used for the adult population and the sampling frame used consisted of combinations of census meshblocks called primary sampling units (PSU). The frame of PSUs was divided into 94 strata on the basis of geographic region, age, ethnicity, family type, education and employment status. Two PSUs from each urban stratum and one from each rural stratum were than randomly selected. All adults aged 20-24, 35-44 and 65-74 were eligible for interview and dental examination. The sampling process was intended to provide samples of 500 20-24 year olds, 1000 35-44 year olds and 750 65-74 year olds.

The child population samples were selected by stratified, multistage random sampling of Form II students. Fifty schools were selected from the universe of schools and within each school, one or two classes were selected with equal probability of inclusion. The selected classes contained 1480 students and of these, 1074 were randomly selected with equal probability of selection.

6.1.2.2 Staff Training
There were 30 teams of two experienced interviewers during the survey. For accuracy of data collection, a thorough and detailed field team training schedule was implemented. The training seminars conducted in 5 urban centres through out the country consisted of a scripted set of training notes, overhead slides, a demonstration interview, practice interviews, an observed oral examination and a question and answer session. Supervisors were given additional training.

Following explanation and discussion of criteria, attention was concentrated on the examination of a wide variety of subjects with differing oral health status. Diagnostic differences between
examiners were discussed and resolved. The training seminar concluded with a calibration exercise in which each subject was examined by at least two dentists (examiners).

### 6.1.2.3 Interview and Examination

For the adult population, a letter describing the survey and asking for participation was delivered to all selected dwellings a few days before the survey started. The interviewers then visited the selected dwellings to complete the screening questionnaire identifying eligible adults. Upon completion of the interview, the interviewer then made an appointment to return with the dentist to complete the oral examination. The examinations were carried out in the homes using a straight-backed domestic chair. The light source was fibre optic on which a plastic disposable mirror was fitted. A plastic autoclavable CPITN probe and a standard sharp sickle explorer were used. Gloves were worn.

For the school children, one or two dental examiners, a Health Department dental manager and the school dental nurse participated in data collection at the schools.

### 6.1.2.4 Data Analysis

Cleaning and basic analysis of the oral health data was undertaken by the World Health Organization Oral Health Unit. Cleaning, weighting and basic analysis of the social survey data was carried out by the Centre for Health Administration Studies of the University of Chicago.

### 6.1.3 Benefit

The most dramatic finding from this survey was the improvement of oral health in all age groups as compared to the results of previous surveys. It was observed how the New Zealand population had gone from having one of the highest levels of dental disease in the developed world in the early 1970s to a very low disease level in children and marked reductions in tooth loss in all but the oldest adult group. These noticeable changes occurring in oral health have implications for the future of dental providers and dental services.

The data from the survey provided policy makers with information that can be used to improve
oral health by designing and implementing dental programs and planning for the appropriate workforce that will meet the existing need of the population.

6.2 1987-88 NATIONAL ORAL HEALTH SURVEY IN AUSTRALIA

Australian dentistry has gone through many challenges and much changes in the past few decades (Spencer et al 1993). There had been a marked decrease in dental caries in children, reduced tooth loss, altered emphases in the education of dental personnel, reduction in the output of dental facilities, concerns over foreign dental graduates entering Australia, emerging philosophies of minimum intervention in clinical care coupled with an increasingly scientific approach to clinical prevention.

The lack of information about the rapidly changing oral health status and treatment needs of the Australian community had been a serious limitation to the assessment of current dental services and dental education, planning of dental care programs and the estimation of dental workforce requirements (Barnard 1993). The need for a comprehensive national oral health survey had been recognised for many years by the Australian Dental Association, the Australian Dental Services Advisory Council and by the National Health and Medical Research Council.

6.2.1 Objective

In 1985 the National Health and Medical Research Council (NHMRC) recommended that a national oral health survey should be conducted by the Commonwealth Department of Health with the cooperation and collaboration of the States and Territories. The NHMRC recognised the importance of a national oral health survey particularly for planning purposes with regards to dental workforce needs, dental under-graduate and continuing education, and dental services.

6.2.2 Methodology

The protocol developed for the survey was based on methodology presented by the World Health
Organization in the publications Oral Health Surveys: Basic methods (2nd edn 1977); A guide to oral health and epidemiological investigations (1979); Oral Health Surveys: Basic methods (3rd edn 1986). In addition, the recommendation by the World Health Organization (WHO) and the Federation Dentaire Internationale (FDI) was followed with regard to the CPITN for the assessment of periodontal conditions.

6.2.2.1 Sample
A random sample of collectors districts (CD) was prepared by the Australian Bureau of Statistics (Canberra office) for each state. The samples were stratified by capital city, metropolitan statistical divisions, and extra-metropolitan localities. Within each CD, the first eight households were selected using a random starting point on a map grid and following a pre-determined skip interval and pre-determined route from the initial household.

6.2.2.2 Staff
Professional interviewers were used, except in Queensland and part of New South Wales where school dental therapists were used. The interviewers located sample households, administered questionnaires and gained cooperation of householders for the clinical examination. Volunteer dentist examiners and recorders were used in all States at no direct costs. Health department dentists or private dentists acted as local area coordinators. Private dental practitioners and the volunteer government dentists provided recorders in most areas or used students from dental, dental hygiene and dental therapist schools.

6.2.2.3 Clinical Examinations
A standardisation course for representatives from States and Territories was held for 4 days at the University of Sydney in June, 1986. It was not possible to gather the volunteer dentists for any detailed standardisation, however, each examiner attended one or more orientation sessions covering the use of WHO indices and definitions used, procedures required for home examinations, portable equipment / instruments, survey forms and protocol. Examinations in the evening were generally satisfactory as more persons in households were likely to be home.
6.2.2.4 Data Analysis

Data validation, entry and tabulation was carried out by the then Commonwealth Department of Community Services and Health. States were provided with data tabulations for their state, by capital city / extra-metropolitan, by sex, by age groups. States were responsible for their own state survey report.

6.2.3 Benefits

From the 1987-88 National Oral Health Survey, Australia acquired benchmark oral health data for inter- and intra-State comparisons and evaluation of future national trends. For the first time, national data for adults were available for inclusion in the WHO Global Oral Data Bank. In addition, the survey provided some indication of the outcome of past treatment provided for the different age cohorts, and of the oral health needs that is to be expected in the future. Hence it was envisaged that the data from the survey could be used for the planning of dental workforce, dental under-graduate and continuing education, and dental services.

6.3 1985 NATIONAL SURVEY OF ORAL HEALTH OF UNITED STATES ADULTS

The National Institute of Dental Research (NIDR) invested a great deal of time, effort, and money in the planning and execution of the 1985 Survey of Oral Health of Adults in the United States of America.

The purpose of the survey was to gather the most current information on the oral health status of adults and older Americans. These data were to guide the planning and provision of dental health services, and the development of research strategies for the future. Another purpose of the survey was to establish a baseline for dental health and disease in the country that would permit comparisons with future national surveys and monitoring trends in the dental health of the adult and aged population.
During the survey, dentists examined 21000 adults between 18 and 103 years of age, a sample representing approximately 100 million Americans between the ages of 18 and 65, and approximately 4 million Americans 65 years and older. The survey was structured to be representative of working adults and senior citizens with adequate representation of sex, race and socioeconomic groups. Data were collected from adults and senior citizens at community centres. Segments of the population that were not represented included individuals in the military service, college students, the unemployed, housewives, elderly who do not attend senior citizen centres, mining and agricultural workers, and home-service workers. Despite criticisms from within the dental profession on how the sample was selected for the survey, it was considered by the NIDR that the inclusion of those not represented would not have significantly altered the overall outcome of the study.

From the survey, they were able to acquire for the first time a national record of the prevalence of root surface caries and the rate of treatment of such lesions. The survey also utilised a precise and comprehensive methodology for the assessment of periodontal diseases, which established a new baseline for the prevalence and severity of periodontal diseases. The previous surveys used the Russel periodontal index or the Ramfjord periodontal disease index, both of which pooled gingivitis, a highly prevalent but somewhat innocuous lesion, with periodontitis, a much less prevalent but more serious disease, and thereby made interpretation of the resulting data exceedingly difficult. In marked contrast, the 1985 survey for the first time provided an assessment of periodontal attachment loss, a measure of the prevalence and severity of periodontitis and a separate measurement of gingivitis. The presence of supra- and subgingival calculus was also recorded. The selection of such methodology was dictated by the desire to establish a population profile of periodontal disease that would be based on the essential clinical features of periodontal health and diseases. The results would highlight the magnitude of periodontal problems, treatment needs and manpower requirements. The data acquired from the survey would be used for analytical epidemiological research.

Despite the limitations inherent in the sample, design and execution of the survey, the NIDR felt that they were able to acquire adequate data to describe the dental health status of the mainstream adult American population in 1985. The results suggested that significant progress had been made in areas where comparisons with earlier studies could be made. In addition, baseline data was established against which future national surveys would be compared.
7. PROPOSED PROTOCOL FOR ORAL HEALTH SURVEYS IN FIJI

7.1 INTRODUCTION

In 1995, the National Oral Health Committee of the Ministry of Health recommended, as one of the objectives in their five-year plan, to undertake regular surveys of oral health. The committee recognised the need to establish and develop basic epidemiologic data on oral health on which to base future prevention and promotive dental programs.

Data pertaining to the nature and extent of oral health conditions is required in order to plan the type of services which will best meet the needs of the population having regard, of course, to the resources available in Fiji. In addition, up to date data is needed to conduct the existing programs efficiently and effectively. Therefore, it is essential to have regular surveys so that any changes in the pattern of oral health can be disclosed and the effectiveness of current and prospective dental programs can be monitored.

The World Health Organization recommends five-yearly national oral health surveys to monitor changes in the pattern of oral diseases; to assess the effectiveness of existing services; and to define the magnitude of the oral diseases in the community. In Fiji, however, the last national oral health survey was conducted in 1985/86 which indicates the lack of up to date data on the current oral health status, hence limiting the assessment of the existing dental services and the planning of cost-effective dental programs to meet the specific need of the country.

In the light of the recommendation of the World Health Organization and that of the National Oral Health Committee, this protocol is a plan proposed for the next national oral health survey which is to be carried out in Fiji in 1998.
7.2 OBJECTIVES

The ultimate purpose of a national oral health survey is to improve the effectiveness and efficiency of the dental services in Fiji by providing policy-makers with detailed, reliable and valid data on the oral health status of the country. Within this general framework the 1998 oral health survey will aim to:

i. Determine the type, extent and severity of dental diseases and conditions prevailing in Fiji

ii. Determine dental treatment needs

iii. Determine public attitudes and behavioural patterns related to the utilisation of existing dental services and other variables such as educational background and income level

iv. Provide data to assist in the assessment of the effectiveness of existing dental services

v. Provide data to assist in the planning of dental services and programs.
7.3 **ADMINISTRATIVE ARRANGEMENTS**

The 1998 national oral health survey is to be carried out in all the administrative divisions of the country, namely the Central/Eastern, Western, and Northern Divisions.

Previously, the oral health surveys had been jointly financed and supported with technical assistance by the government and the World Health Organization. Even though this survey will be funded by the government, administrative protocol dictates that submissions of request for funds and assistance should be made well in advance.

A national oral health survey committee should be established to plan and coordinate all activities of the survey and to ensure its proper execution. The committee will have to approve the proposed protocol of the survey. In addition, they will coordinate the financial arrangements, selection of survey sample and be responsible for the processing of data and the preparation of the final report of the survey.

It is proposed that the committee should include the following:

* The Assistant Director of Dental Services, Ministry of Health Headquarters
* The Statistical Officer, Ministry of Health
* Government Statistical Officer, Bureau of Statistics
* WHO Statistician, Suva Office
* Senior Dental Officer, Public Health Unit, Dental Division

The Principal Dental Officers in each division will be responsible for the conduct of the survey in their respective divisions in accordance with the guidelines and methodology approved by the planning committee. These officers are going to be the key personnel from their division. They will have to attend a standardisation training program organised by the committee along with two examiners and two recorders whom they will have to delegate from their division.

A representative of the committee should be available to visit each division for a short period during the initiation of the field work to provide on the spot assistance. It is proposed that the field work of the survey in all the divisions should be undertaken at approximately the same time.
7.4 PROPOSED TIMING FOR THE SURVEY

The committee for the 1998 National Oral Health Survey is to be established and activated early in 1997 (preferably no later than the first week of February 1997). They are to proceed with the planning and preparation for the survey. Initially, they will need to approve the survey protocol. Furthermore, arrangements for funding to cover the administration and field survey cost are to be submitted for approval from the government. Estimates for the required funding will be based on the approved protocol. The committee can also seek financial and technical assistance from the World Health Organization which had always been very supportive during the previous surveys. In addition, the preparation for the survey will also include the process of sample selection in which the committee will have to work closely with the Bureau of Statistics. All those selected in the sample are to be informed in advance about the forthcoming survey.

The training and standardisation of examiners and recorders is to be scheduled for two weeks in January 1998 (5 - 16 January 1998). This will coincide with the second semester break of the Fiji School of Medicine and the committee is to make prior arrangement with the Dental Course Coordinator for the conducting of the calibration training at the school.

Although the implementation of the fieldwork of the survey is the responsibility of the Principal Dental Officers in each divisions, it is proposed that the fieldwork is to be conducted and completed in February and March of 1998.

At the completion of the fieldwork, the Principal Dental Officers are to collect and check that the data in all the survey forms from their respective divisions are properly recorded. They are to ensure that these completed forms are to reach the committee no later than the first week of May 1998.

Processing of data by the committee is to be completed and the report compiled by the end of 1998.
7.5 CALIBRATION TRAINING COURSE FOR EXAMINERS AND RECORDERS

A calibration training course for all survey personnel is to be organised by the committee. This will include all the examiners and recorders who will be responsible for the field work during the survey.

The objectives of the training course are to:

i. ensure uniform interpretations, understanding and application of the criteria for assessing the various dental diseases and conditions that are to be recorded during the survey

ii. ensure that each examiner can examine to a consistent standard and that variations between different examiners are minimised

iii. train examiners and recorders in the survey procedures to be followed in undertaking the survey

The training is to be conducted at the Fiji School of Medicine. In order to achieve optimal comparability between all the examiners, ample time is to be allocated for the training. It is proposed that the training is to be scheduled for two weeks, that is, from 5th - 16th of January, 1998. During the first week of the training, the survey protocol is to be studied meticulously until a common understanding is attained. In addition the survey form is to be explained and the instructions for its use to be thoroughly discussed. During these sessions, any ambiguous points and confusions are to be clarified. After these theoretical sessions, the examiners are to examine one anothers oral cavity to familiarise themselves with the criteria to be used in the survey and the use of the survey forms.

During the second week of the training, one day is to be devoted to clinical assessments of patients in the dental clinic according to the established criteria of the survey. The examiners will assess the same group of about 20 patients and any differences in the results are to be discussed and the
protocol is to be used as a reference to settle points being discussed. This will ensure a common approach to the interpretation of specific clinical conditions. Practically, it may not be possible to get a group of 20 patients from the clinic who will agree to be examined by all the examiners. Hence, to overcome this situation, prior arrangement is to be made for a group of volunteers from the military or from hospital workers to be examined in the clinic.

To further enhance the consistency of their examination abilities, field trials are to be conducted at nearby settlements or villages. Survey teams of two (2) examiners with their recorders are to assess convenience samples at allocated field locations. In addition, duplicate examinations are to be conducted to determine inter-examiner and intra-examiner differences. Any confusion from cases encountered during these trials should be discussed thoroughly. If the findings from the trial examination contain major discrepancies, patients should be recalled in order that differences in diagnoses can be reviewed by the examiners and resolved through group discussions. It is essential that the examiners should be able to examine with reasonable consistency, using the standards set for the survey. On the other hand, if the examiners are not consistent in their examination then variations in disease prevalence or severity may be missed or wrongly interpreted. The recorders must also undergo the training especially in the filling up of record forms. A good recorder is a good complement to the examiner, as he can alert an examiner of any deviation of diagnosis or misuse of codes by the latter.

At the end of the calibration training, the committee are to have a discussion with the Principal Dental Officers and dentists about the organisation of the fieldwork to ensure that there is uniformity in the implementation of the survey. As supervisors, the Principal dental Officers are to prepare the survey schedules for their respective divisions and to inform the selected samples of the exact time the survey team will be visiting them. In addition they are to secure transports for the fieldwork and ensure that there is sufficient sets of instruments and supplies, and that infection control is to be maintained throughout the survey. Furthermore, the Principal Dental Officers and / or dentists should routinely check all the survey forms for accuracy and completeness before leaving a location.
7.6 SELECTION OF POPULATION SAMPLES

The assistance of the Bureau of Statistics is to be sought for the process of selecting the sample that is to be used for the survey.

7.6.1 Sample Size

It is neither feasible nor necessary to survey the entire population for it will only be costly and time consuming. Observations are to be made on a sample with the purpose of generalising from them to the entire study population. The accuracy of survey results depends on the likelihood of the selected sample being representative of the population as a whole.

A representative sample is a precise miniaturised representation of the proportion of elements of the population. However, if the sample is biased (not representative), the generalisation will be invalid and lead to incorrect conclusions or inferences about the population.

In any survey, there is no optimum sample size. Also, one cannot say what percentage of the population should be sampled. The optimum number in the sample, however, is one which is adequate for making correct inferences from the sample to the population. In practice, the sample size will depend on the precision of estimates of main characteristics being studied and the available resources for the survey such as time, finance and personnel.

Records of the 1965 and 1985/86 national oral health surveys in Fiji revealed that the sample sizes used were 5478 and 4326 respectively. Hence for comparative purposes, the proposed sample size for the 1998 survey is to be about 4500 of those aged 5 to 55 years and over.

The age groups to be used in the survey are: 5-6; 7-8; 9-10; 11-12; 13-14; 15-19; 20-24; 25-29; 30-34; 35-44; 45-54; 55 years and over.

The sample size of 4500 and the age groupings are selected so that the data from this survey can be used for comparative studies with those of the previous surveys.
### Table 1: Population Distribution of Urban and Rural Areas by Ethnic Groups

*Source: 1986 Bureau of Statistics Census Report*

<table>
<thead>
<tr>
<th>ETHNIC GROUP</th>
<th>FIJIAN</th>
<th>%</th>
<th>INDIAN</th>
<th>%</th>
<th>OTHERS</th>
<th>%</th>
<th>TOTAL</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>URBAN</td>
<td>107 780</td>
<td>15.1</td>
<td>144 533</td>
<td>20.2</td>
<td>24 712</td>
<td>3.5</td>
<td>277 025</td>
<td>38.8</td>
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<td></td>
<td>(678)</td>
<td></td>
<td>(909)</td>
<td></td>
<td>(156)</td>
<td></td>
<td>(1743)</td>
<td></td>
</tr>
<tr>
<td>RURAL</td>
<td>221 525</td>
<td>31.0</td>
<td>204 171</td>
<td>28.5</td>
<td>12 654</td>
<td>1.7</td>
<td>438 350</td>
<td>61.2</td>
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<td></td>
<td>(1393)</td>
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<td>(1284)</td>
<td></td>
<td>(80)</td>
<td></td>
<td>(2757)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>329 305</td>
<td>46.1</td>
<td>348 704</td>
<td>48.7</td>
<td>37 366</td>
<td>5.2</td>
<td>715 375</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>(2071)</td>
<td></td>
<td>(2193)</td>
<td></td>
<td>(235)</td>
<td></td>
<td>(4500)</td>
<td></td>
</tr>
</tbody>
</table>

*(In brackets are the approximate urban and rural sample sizes by ethnic groups)*

### Table 2: Population Distribution of Urban and Rural by Divisions

*Source: 1986 Bureau of Statistics Census Report*

<table>
<thead>
<tr>
<th></th>
<th>URBAN</th>
<th>RURAL</th>
<th>TOTAL</th>
<th>% of POP.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRAL/EASTERN</td>
<td>177 972</td>
<td>124 900</td>
<td>302 872</td>
<td>42.4</td>
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<tr>
<td>WESTERN</td>
<td>79 644</td>
<td>203 705</td>
<td>283 349</td>
<td>39.6</td>
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<tr>
<td>NORTHERN</td>
<td>19 409</td>
<td>109 745</td>
<td>129 154</td>
<td>18.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>277 025</td>
<td>438 350</td>
<td>715 375</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*(In brackets are the approximate urban and rural sample sizes by divisions)*
Table 3:  Population Distribution by Age and Sex  

*Source: 1986 Bureau of Statistics Census Report*

<table>
<thead>
<tr>
<th>AGE GROUP</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
<th>% of POP.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6</td>
<td>20 460</td>
<td>19 517</td>
<td>39 977</td>
<td>295</td>
</tr>
<tr>
<td>7-8</td>
<td>18 689</td>
<td>17 720</td>
<td>36 409</td>
<td>267</td>
</tr>
<tr>
<td>9-10</td>
<td>17 007</td>
<td>16 265</td>
<td>33 272</td>
<td>245</td>
</tr>
<tr>
<td>11-12</td>
<td>16 519</td>
<td>15 653</td>
<td>32 172</td>
<td>237</td>
</tr>
<tr>
<td>13-14</td>
<td>15 523</td>
<td>14 814</td>
<td>30 337</td>
<td>223</td>
</tr>
<tr>
<td>15-19</td>
<td>37 070</td>
<td>36 546</td>
<td>73 616</td>
<td>541</td>
</tr>
<tr>
<td>20-24</td>
<td>36 731</td>
<td>36 997</td>
<td>73 728</td>
<td>542</td>
</tr>
<tr>
<td>25-29</td>
<td>31 988</td>
<td>31 456</td>
<td>63 444</td>
<td>466</td>
</tr>
<tr>
<td>30-34</td>
<td>25 337</td>
<td>25 371</td>
<td>50 708</td>
<td>373</td>
</tr>
<tr>
<td>35-44</td>
<td>38 605</td>
<td>37 881</td>
<td>76 486</td>
<td>563</td>
</tr>
<tr>
<td>45-54</td>
<td>25 953</td>
<td>25 513</td>
<td>51 466</td>
<td>379</td>
</tr>
<tr>
<td>55+</td>
<td>25 397</td>
<td>24 704</td>
<td>50 101</td>
<td>369</td>
</tr>
<tr>
<td>TOTAL</td>
<td>309 279</td>
<td>302 437</td>
<td>611 716</td>
<td>4500</td>
</tr>
</tbody>
</table>

*(In brackets are the approximate male and female sample sizes by age groups)*

The World Health Organization recommends a sample size of 25-50 for a single cell after subdivision by ethnic group, location, age, gender or any other factor. Given the sample size of 4500 for this survey, there would be approximately 1900 from the Central/Eastern division, 1800 from the Western division and 800 from the Northern division. This would give for 5 year age groups approximately 190 : 180 : 80 for each respective divisions. (Note: these age groups could be aggregated to 10 year groups)

For rural / urban, the samples (by 5 year age groups) would be 110 / 80 for the Central /Eastern, 50 / 130 for the Western and 10 / 70 for the Northern division. For comparison of 5 year age
group samples between urban and rural, only the Central / Eastern and the Western divisions would have adequate sample sizes where as the Northern division's urban sample size of 10 won't be adequate. Both gender and major ethnic groups are approximately 50% of the samples to give a satisfactory sample size by age groups within divisions, that is, 95 / 95 : 90 / 90 : 40 / 40 for the Central / Eastern, Western and Northern divisions respectively.

For national figures, there will be adequate sample size for comparisons of age groups by divisions, gender, ethnic groups and location or by any variable where distribution of its components are 10-20% at minimum, for example by age group by gender and by division; by age groups by divisions and by ethnic groups; by age groups by gender and by ethnic groups; or by age groups by locality by ethnic groups and by gender.

7.6.2 Sample Selection

The sample is to be confined to persons living in their usual place of residence in private dwellings, thus excluding those in hospitals, prisons, boarding houses and in military or police barracks.

In addition to the differences in age and gender, the other characteristics that are to be observed in the survey are the ethnic background of the subjects (Fijian / Indian / Others) and the locality of their respective residences such as urban, settlements or villages.

The most recent population census list is to be used as a sampling frame. For the population census, the country is divided into units called the Enumeration Areas (EA) which consist of an average of 150 households per area. In addition to the Enumeration Areas, there also exist the national administrative boundaries of cities, towns, settlements and villages.

As in the previous surveys, the Enumeration Areas will be used for the urban areas whilst settlements and village boundaries will be used for the rural areas. Thus, these Enumeration Areas, settlements and villages will act as clusters of households for sample selections.
The proposed 4500 participants for the survey will have to be selected from 45 clusters, that is of about 100 participants from each cluster. These 45 clusters are to be selected systematically with a probability proportionate to size. This means that the populations of each Enumeration Areas in the urban areas, settlements and villages are to be listed in order of population sizes and numbered consecutively. A series of 45 numbers is chosen systematically. The urban localities, settlements or villages where the numbers fall will then be the clusters to be sampled for the survey.

According to the last population census of 1986, the country was divided into 1218 clusters of Enumeration Areas, settlements and villages (Personal Communication with the Bureau of Statistics). Therefore a sample of 45 clusters is to be systematically selected from the 1218 clusters in the country. Hence, in selecting the sample, every 1218 / 45th or 27th cluster from the list of Enumeration Areas, settlements and villages will be selected. Hence, starting at a random number between 1 and 27, the 45 clusters needed as samples for the survey are then systematically selected.

From the selected clusters, 20 households are to be selected from each of the urban areas and settlements and 20 households from each of the villages. As most villages are very small and may consist of less than 20 households, it may be necessary for a cluster to be made up to 20 by inclusion of a nearby village. The households to be sampled from each cluster will be chosen by randomly selecting a household as a starting point and than proceeding to survey every nth household, until the required number of 20 or 10 has been selected. The selected households will have to be informed by letter of the survey and invited to participate.

The official prenotification letters are to be personally delivered to each selected households a day or two before the survey. The survey can also be publicised through radio broadcasts, TV and the press. However, with expected financial constraints, health personnel of areas covered in the survey can be approached to contact the selected households in their respective areas.
7.7 INSTRUMENTS AND ACCESSORIES

Instruments and accessories of the survey will have to include the following:

i. Fibre optic or other appropriate light

ii. Plane mouth mirrors

iii. Dental probes

iv. 621 Periodontal probes

v. Container for sterilising with sterilising solution

vi. Autoclaved gauze packs

vii. Disposable paper towels

viii. Gloves

The interviews and examinations are to be conducted in households at their respective homesteads. For the examination, the subjects can be seated on a straight chair to which a portable head rest can be clamped, or a straight chair with a tall back on which the subject's head can rest would be sufficient.
7.8 IDENTIFICATION OF SUBJECTS

In the survey, the demographic/behavioural/oral health assessment forms (on pages 77-79) should be clearly identified for each subject. The following instructions should be closely adhered to while completing the forms during the survey:

i. Division (Box 1):

The codes to be used for each division are:

- Code 1 - Central / Eastern
- Code 2 - Western
- Code 3 - Northern

ii. Examiner Number (Box 2):

Within each division each examiner will be allocated a number from 1-9. (When combined with the Division Code this would give examiner numbers which could be 11 to 39).

iii. Registration Number (Boxes 3-5):

Each examination is to be numbered. Examinations carried out by different examiners may carry the same number, but an individual examiner should not duplicate numbers within the group which he/she examined. Numbers will range from 001 to 999 per examiner and when combined with Division Code and Examiner Numbers will give a unique identifying number for each person.

iv. Date of Examination (Boxes 6-8):

The month and year of each examination is to be included on the form. For months with a single digit (January to September), only the second box (box 7) is to be used and a 0 to be placed in the first box (box 6). The third box (box 8) is for the last digit of the year.
v. **Duplicate Examination (Boxes 9-10):**

Use (-) in each box if examination is not duplicate. If duplicate examination is carried out, these boxes must contain the identification for the duplicate examiner i.e. Division code followed by examiner number. Note the original Division/Examiner/Registration number for the patient (Boxes 1-5) will remain the same.

vi. **Name:**

The family name and given name of the subject being examined is to be included on the assessment form to assist in the organisation of the examinations and assessment records. However, names will not be included in the processing of the records; some people may need reassuring on this point.
7.9 PERSONAL AND DEMOGRAPHIC INFORMATION

Information concerning subjects in the survey should include gender, age in years, ethnic group and area of residence.

i. Gender (Box 11)

The code to be used are:

Code  1 - Male
      2 - Female

The appropriate code to be entered in box 11.

ii. Age (Box 12 - 13)

For the survey, the age recorded is to be the age in years at last birthday. If a child is less than age 10 years, only the second box (box 13) is to be used and a zero (0) in the first box (box 12).

iii. Race (Box 14)

The code to be used:

Code  1 - Fijians
      2 - Indians
      3 - Others

The appropriate code to be entered in box 14.

iv. Area of Residence (Box 15)

The code to be used:

Code  1 - Urban
      2 - Villages
      3 - Settlements

The appropriate code to be entered in box 15.
v. **Educational Background (Box 16)**

The highest level of education attained by the subject is to be entered using the following codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Primary</td>
</tr>
<tr>
<td>2</td>
<td>Secondary</td>
</tr>
<tr>
<td>3</td>
<td>Tertiary</td>
</tr>
</tbody>
</table>

The appropriate code to be entered in box 16.

vi. **Family Income (Box 17)**

The total annual family income of the subject to be recorded using the following codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Income Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; $5,000</td>
</tr>
<tr>
<td>2</td>
<td>$5,001 - $10,000</td>
</tr>
<tr>
<td>3</td>
<td>$10,001 - $20,000</td>
</tr>
<tr>
<td>4</td>
<td>$20,001 - $30,000</td>
</tr>
<tr>
<td>5</td>
<td>&gt; $30,000</td>
</tr>
<tr>
<td>8</td>
<td>Do not know</td>
</tr>
</tbody>
</table>

The appropriate code to be entered in box 17.
7.10 BEHAVIOURAL ASSESSMENT

Information for the behavioural assessment of the subjects towards dentistry in the survey is to include the following:

i. The period of time since the last dental visit (Box 18):
   Code  1 - Less than twelve months
   2 - 12 months or more to 2 years
   3 - 2 years or more
   4 - Never
   8 - Do not know

ii. The number of visits in the previous 12 months (Box 19):
   Code  0 - None
   1 - Once
   2 - Twice
   3 - Three times
   4 - More than three times
   8 - Do not know

If the answer to this question is Code 0 than answer next question otherwise proceed to Box 21.
iii. Major reason for not obtaining dental care within the last 12 months (Box 20):

Code  
1 - Nothing wrong  
2 - Afraid of dentist  
3 - Can't afford  
4 - Was too busy  
5 - No service available  
6 - Do not have any teeth  
7 - Other (*Specify..........................*)  
8 - Do not know  

iv. Venue for last dental visit (Box 21):

Code  
1 - Private Dental Practice  
2 - Public Hospital or other government dental facilities  
3 - School Dental Service  
8 - Do not know  
9 - Never had dental visit  

v. Major reason for last dental visit (Box 22):

Code  
1 - Check-up  
2 - Gum problem  
3 - Toothache  
4 - Bad breath  
5 - Unable to eat properly with no/few remaining teeth  
6 - Unsightly crooked/overcrowded teeth  
7 - Other problems  
8 - Do not know  
9 - Never had dental visit
vi. Treatment received at last visit (Boxes 23 - 27):

Code  
1 - Dental examination
2 - Teeth cleaned or polished
3 - Tooth extraction
4 - Dental filling
5 - Gum treatment
6 - Dentures construction, repaired or adjusted
7 - Orthodontic treatment
8 - Other treatment or do not know (*Specify*)
9 - Never had dental visit

Entering of relevant codes is to commence with the left-hand boxes and proceed to the right. Dash(es) is to be placed in unfilled boxes.

vii Patient's perception of need for dental treatment: the following codes are to be used to record the treatment which the subject thinks he/she requires (Boxes 28-32):

Code  
0 - None
1 - Tooth extraction
2 - Dental filling
3 - New or replacement of dentures
4 - Gum treatment
5 - Braces to straighten teeth
6 - Other treatment (*Specify*)
8 - Do not know

Entering of the relevant codes is to commence with the left-hand box than proceed to the right. Dash(es) should be placed in unfilled boxes.
viii. Form of payment of dental treatment (Box 33):

Code  
1 - Self-paid  
2 - Paid by parents/guardians  
3 - Exempted  
4 - Other form of payment (*Specify*)  
8 - Do not know  
9 - No previous visit  

ix. Subject's opinion of dental fees (Box 34):

Code  
1 - Cheap  
2 - Reasonable/affordable  
3 - Cost too much  
8 - Do not know  

x. Number of times teeth were brushed the previous day (Box 35):

Code  
0 - Never  
1 - One  
2 - Two  
3 - Three  
4 - More than three  
8 - Do not know  

xi. Use of fluoride toothpaste (Box 36):

Code  
0 - Never  
1 - Yes  
2 - No  
8 - Do not know  

xii. When faced with a dental problem, the subject seeks dental treatment (Box 37):

Code  
1 - Immediately  
2 - Few days later  
3 - When pain becomes unbearable
7.11 ORAL HEALTH ASSESSMENT AND TREATMENT NEEDS

In the survey the following conditions are to be recorded and assessed according to their respective treatment needs. The conditions are:

i. Malocclusion
ii. Periodontal Status
iii. Dentition Status
iv. Denture Status
v. Other Conditions

These conditions are to be recorded onto the oral health assessment form on page 79.

7.11.1 Malocclusion (Boxes 38-39)

The presence or absence of malocclusion (box 38) and the treatment needs (box 39) are to be recorded. Two levels of anomaly are to be distinguished and the following codes should be used:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No anomaly or malocclusion</td>
</tr>
<tr>
<td>1</td>
<td>Slight anomalies, such as one or more rotated or tilted teeth or slight crowding or spacing that disturb the regular alignment of the teeth</td>
</tr>
<tr>
<td>2</td>
<td>More severe anomalies, that is, if in the judgement of the examiner, one or more of the following criteria is met: * it has a significant and unacceptable effect on facial appearance * it causes a significant reduction in masticatory function or results in significant impairment of speech * it constitute an occlusion predisposing to tissue destruction in the form of periodontal disease or caries</td>
</tr>
</tbody>
</table>

Insert the appropriate code in box 38.
Gross defects such as cleft lip, cleft palate and pathological or surgical injury should be recorded separately under "Other Clinical Conditions" (box 115) as the prevalence of these conditions is usually very low.

The following codes are to be used to describe treatment needs (box 39).

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Treatment not necessary</td>
</tr>
<tr>
<td>1</td>
<td>Treatment is necessary</td>
</tr>
<tr>
<td>2</td>
<td>Presently undergoing treatment</td>
</tr>
</tbody>
</table>

Insert the appropriate code in box 39. Note: in the absence of study models and radiographs, the assessment of malocclusion and treatment needs will be considered as being tentative only.

7.11.2 Denture Status (Boxes 40-44)

Denture status will be recorded in respect of people wearing and/or needing full dentures and partial dentures. The recording is to be made for each jaw.

The codes to be used concerning wearing of dentures (boxes 40, 42) are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not wearing a denture</td>
</tr>
<tr>
<td>1</td>
<td>Wearing a partial denture</td>
</tr>
<tr>
<td>2</td>
<td>Wearing a full denture</td>
</tr>
</tbody>
</table>

Insert the appropriate code in box 40 for the upper jaw and in box 42 for the lower jaw. Recording is to be made for each jaw on the need for dentures (boxes 41,43) according to the following codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No denture needed</td>
</tr>
<tr>
<td>1</td>
<td>Need for partial denture</td>
</tr>
<tr>
<td>2</td>
<td>Need for full denture</td>
</tr>
<tr>
<td>3</td>
<td>Need for denture maintenance</td>
</tr>
</tbody>
</table>

Code 1 is to be used in cases where they may need a bridge. Maintenance of denture will include repair, reline or adjustment. Insert the appropriate code in box 41 for the upper jaw and in box 43 for the lower jaw.
Edentulousness (box 44) the state of complete edentulousness (of both upper and lower jaws) is to be recorded according to the following codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not edentulous</td>
</tr>
<tr>
<td>1</td>
<td>Edentulous</td>
</tr>
</tbody>
</table>

Insert the appropriate code in box 44.

### 7.11.3 Periodontal Status (Boxes 45-50)

The periodontal assessment in the survey will adopt the Community Periodontal Index of Treatment Needs (CPITN) which is recommended by the World Health Organization in its publication "Oral Health Surveys" (1986).

**Indicators:**

- Three indicators of periodontal status which will be used in the survey are:
  - i. presence or absence of gingival bleeding
  - ii. supra- or subgingival calculus
  - iii. periodontal pockets which is subdivided into shallow (4-5mm) and deep (6mm or more)

A specially designed WHO light-weight probe with a 0.5mm ball tip is to be used, bearing a black band between 3.5 and 5.5mm from the ball tip.

**Sextants:**

The mouth is to be divided into sextants defined by teeth numbers 17-14, 13-23, 24-27, 37-34, 33-43, and 44-47. A sextant is to be examined only if there are two or more teeth present and not indicated for extraction. When only one tooth remains in a sextant, it should be included in the adjacent sextant.
Index Teeth:

For adults, aged 20 years and over, the following index teeth to be examined are:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>16</td>
<td>11</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>47</td>
<td>46</td>
<td>31</td>
<td>36</td>
<td>37</td>
</tr>
</tbody>
</table>

The two molars in each posterior sextant are paired for recording, and if one is missing, there is no replacement. If no index tooth/teeth is/are present in a sextant qualifying for examination, all the remaining teeth in that sextant are to be examined.

For young people, up to the age of 19 years, only six teeth: 16, 11, 26, 36, 31 and 46 are to be examined. This is to avoid classifying the deepened crevices associated with eruption as periodontal pockets. For the same reason, when examining children under the age of 15, recording of periodontal pockets is not to be attempted but only bleeding and calculus is to be considered. If no index tooth is present in a sextant qualifying for examination, single fully erupted incisors or premolars may substitute.

Sensing Gingival Pockets:

An index tooth should be probed to determine pocket depth and to detect calculus and bleeding response. The probe should be used as a 'sensing' instrument to determine pocket depth and to detect sub-gingival calculus. The sensing force used should be no more than 20 grams. A practical test for establishing this force is to place the probe point under the thumb nail and press until blanching occurs. For sensing sub-gingival calculus, the lightest possible force which will allow movement of the probe's ball point along the tooth surface should be used.

When inserting the probe, the ball point should follow the anatomic configuration of the surface of the tooth root. Pain to the patient during probing will be indicative of the use of too much force.
The tip of the probe should be gently inserted into the gingival pocket and the depth of insertion read against the colour coding. At least 6 points on each tooth should be examined: mesio-buccal, mid-buccal, disto-buccal, and the corresponding lingual sites.

**Examination and Recording:**

The incisor and either the first molars (up to 19 years) or the pairs of first and second molars (above 19 years) should be sensed and the highest score for the sextant recorded in the appropriate box. (Boxes 45-50)

Codes to be used (in descending order of severity) are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Periodontal pocket ≥ 6mm (black area of probe not visible)</td>
</tr>
<tr>
<td>3</td>
<td>Pocket of 4 or 5mm (gingival margin situated on black area of probe)</td>
</tr>
<tr>
<td>2</td>
<td>Calculus felt during probing but all black area of probe is visible</td>
</tr>
<tr>
<td>1</td>
<td>Bleeding observed directly or by using mouth mirror after sensing</td>
</tr>
<tr>
<td>0</td>
<td>Healthy</td>
</tr>
</tbody>
</table>

If non-index teeth are examined, the highest score found in the sextant is to be recorded in the appropriate box. If there are not at least two teeth remaining in a sextant, which are not indicated for extraction, the sextant should be cancelled by entering code 5 in the appropriate box.

7.11.4 **Dentition Status and Treatment of Teeth**

**Method of Assessment:**

The examination of dental caries is to be conducted with a plane mouth mirror and a sharp explorer.
The examination is to be done systematically in that the examiner should proceed in an orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. The examiner is to commence the examination on the upper right quadrant upon the call of 18 by the recorder. He / she should then proceed to call condition first and treatment second, following the recorder's call of each individual tooth, continuing to 28, proceeding to 38 and ending at number 48. The constancy of examination procedure and recording is important for the efficient and accurate detection and recording of clinical information.

A tooth is to be considered present in the mouth when any part of it is visible. If a permanent and a deciduous tooth occupy the same space, than only the status of the permanent tooth is to be recorded. Supernumerary teeth are not to be considered during the survey.

**Coding of Dentition Status:** (Boxes 51-66 and 83-98)

Permanent teeth will be coded numerically whilst the deciduous teeth will be coded alphabetically. Both the permanent and deciduous teeth are to be recorded on the same examination form and the only distinction between these teeth is the use of alphabetical or numerical codings. An entry should be made in every box on the chart.
Codes for the dentition status are as follows:

<table>
<thead>
<tr>
<th>Condition / Status</th>
<th>Permanent Tooth Code</th>
<th>Deciduous Tooth Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound</td>
<td>0</td>
<td>A</td>
</tr>
<tr>
<td>Decayed</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>Filled with decay</td>
<td>2</td>
<td>C</td>
</tr>
<tr>
<td>Filled, no decay</td>
<td>3</td>
<td>D</td>
</tr>
<tr>
<td>Missing tooth due to caries</td>
<td>4</td>
<td>E</td>
</tr>
<tr>
<td>Permanent tooth missing for other reasons</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Sealant</td>
<td>6</td>
<td>F</td>
</tr>
<tr>
<td>Unerupted tooth</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Excluded tooth</td>
<td>9</td>
<td>-</td>
</tr>
</tbody>
</table>

Criteria for codings are:

i. **Sound Tooth** (codes A or 0):
A tooth is to be recorded as sound if it shows no evidence of treatment or untreated clinical caries. This score will also apply in the case of defects not accountable as caries such as white or chalky spots, and stained pits or fissures in the enamel that will catch the explorer point but do not have a detectably softened floor.

ii. **Decayed Tooth** (codes B or 1):
Caries is to be recorded as present when a lesion in a pit or fissure, or on a smooth surface has a detectably softened floor, undermined enamel or softened wall. On approximal surfaces, the explorer point must enter a lesion with certainty. If there is any doubt, than caries is not to be recorded as present.

This code is also applicable in cases of tooth with arrested caries, root caries, temporary fillings or where a filling has been totally or partially lost.
iii. *Filled Tooth With Decay* (codes C or 2):
A tooth is to be classified as filled with decay if one or more surfaces had been filled *and* another area is decayed or where there is recurrent caries round a restoration.

iv. *Filled Tooth With No Decay* (codes D or 3):
This classification is to be used for teeth that had been filled and are not carious, that is, no sign of clinical caries on any other surfaces of the tooth and no sign of recurrent caries.

v. *Missing Tooth due to Caries* (codes E or 4):
A permanent tooth is to be classified as missing only if it had been extracted because of dental caries. For deciduous teeth, this category will only include those that are missing due to caries and is only applicable for those at an age when normal exfoliation would not be a sufficient explanation for absence. Thus, an exfoliated deciduous tooth is not to be coded E even though it may have been grossly carious at the time of exfoliation.

vi. *Permanent Teeth Missing for Other Reasons* (code 5):
This code is used for permanent teeth judged to be absent congenitally, or extracted for orthodontic reasons or because of trauma. This code is also used for permanent teeth that are judged to have been extracted because of periodontal disease or where cause of tooth loss is not known.

vii. *Sealants* (codes F or 6):
The presence of a sealant should be recorded by using codes F or 6. This will only include sealants which are intact and in acceptable condition. If a tooth with a sealant is carious or has a filling than the recording of caries or filling will take precedence over the recording of the sealant.

viii. *Unerupted Tooth* (code 8):
This classification is restricted to permanent teeth and used only for a tooth space with a congenitally missing tooth and an unerupted permanent tooth but without a deciduous tooth.
ix. **Excluded Teeth (code 9):**

This code will include teeth which could not be properly examined probably due to an orthodontic band or a fixed orthodontic appliance.

**Treatment Requirements of Individual Teeth:**

Immediately after caries status of a tooth is recorded, and before proceeding to the next tooth space, the type of treatment required, if any, should be recorded (boxes 67-82 and 99-114) If no treatment is required, score "0" in the appropriate box.

The codes to be used for treatment needs are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No treatment needed</td>
</tr>
<tr>
<td>1</td>
<td>Sealant</td>
</tr>
<tr>
<td>2</td>
<td>One surface filling</td>
</tr>
<tr>
<td>3</td>
<td>Two or more surface fillings</td>
</tr>
<tr>
<td>4</td>
<td>Pulp care</td>
</tr>
<tr>
<td>5</td>
<td>Extraction</td>
</tr>
<tr>
<td>6</td>
<td>Need for other care (Specify... )</td>
</tr>
</tbody>
</table>

Treatment needs should be assessed in respect of all teeth and the criteria for coding are as follows:

i. **No Treatment Needed (code 0):**

This code is only applied if the tooth is sound and does not require any form of treatment, that is, in the form of filling or extraction.

ii. **Sealant (code 1):**

If in the clinical judgement of the examiner the tooth requires preventive treatment by the use of sealants, *code 1* should be inserted in the appropriate box. However, if the tooth requires both restoration and the use of a sealant, than the need for restoration should take precedence and the tooth should be recorded as having a treatment need of *code 2 or 3.*
iii. **Restorations** (codes 2 or 3):

Depending on how many surfaces that will need to be restored, one of these codes should be used to designate the treatment required because of caries, replacement of unsatisfactory fillings or repair damage due to trauma.

- **Code 2** One-surface filling
- **Code 3** Two or more surface filling (including crowns)

The filling is considered unsatisfactory if one or more of the following conditions exist:

* A deficient margin to an existing restoration that is likely to permit leakage into dentine. The decision as to whether or not a margin is deficient should be based on the examiner's clinical judgement.

* An overhanging margin of an existing restoration of a dimension that causes obvious local irritation to the gingiva and cannot be removed by recontouring the restoration.

* Fracture of an existing restoration.

iv. **Pulp Care** (code 4):

This code is used to indicate a tooth that probably needs pulp treatment prior to tooth restoration because of deep and extensive caries or because of tooth mutilation or trauma. This includes treatment of pulpitis, pulp capping and other endodontic treatment.

A probe should never be inserted into the depth of a cavity to confirm the presence of a suspected pulp exposure.

The need for pulp treatment should take precedence over the need for filling when determining which code to use to describe a tooth which is carious and is expected to need endodontic treatment.
v. **Tooth Extraction (code 5):**

A tooth is recorded as code 5 when:

* caries has so destroyed the crown that it cannot be restored.
* only the root(s) remains
* periodontal disease has progressed so far that the tooth is loose or functionless and, in the clinical judgement of the examiner, cannot be restored to a firm and functional state by periodontal therapy
* a tooth need to be extracted to make way for a prosthesis
* extraction is required for orthodontic or cosmetic reasons, or because of impaction

vi. **Need For Other Care (code 6):**

This category is used to indicate any other treatment of teeth not specifically covered by codes 1-5. For example, the need for crown or bridge abutment, the removal of gross overhangs and recontouring of restoration, excessive attrition, abrasion or erosion of tooth.

7.11.5 **Other Clinical Conditions**

This section provides for the recording of clinical conditions of tooth, bone or soft tissue not previously recorded on the form.

Examples of these conditions include:

- Fluorosis
- Opacities and other enamel disorders
- Suspected oral cancer
- Oral lichen planus
- Leukoplakia of oral mucosa
- Odontogenic fibroma
- Odontogenic tumour
- Salivary duct calculus
- Abnormality of the temporo-mandibular joint
- Cleft lip and/or cleft palate
Presence and the treatment of these conditions are to be recorded in box 115. There is provision in the assessment form to specify which particular condition(s) is/are present.

It is recognised that diagnosis of some of the above conditions would require radiographs and more detailed examination which will not be possible under the conditions of the survey.

The codes to be used for recording these conditions are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Absent</td>
</tr>
<tr>
<td>1</td>
<td>Present - no treatment needed</td>
</tr>
<tr>
<td>2</td>
<td>Present - treatment needed</td>
</tr>
</tbody>
</table>

(Specify conditions.................................................)
### NATIONAL ORAL HEALTH SURVEY IN FIJI - 1998

<table>
<thead>
<tr>
<th>1</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Examiner Number</td>
</tr>
<tr>
<td>3</td>
<td>Registration Number</td>
</tr>
<tr>
<td>4</td>
<td>Month</td>
</tr>
<tr>
<td>5</td>
<td>Year</td>
</tr>
<tr>
<td>9</td>
<td>Duplicate Examiner</td>
</tr>
</tbody>
</table>

#### PERSONAL and DEMOGRAPHIC INFORMATION

<table>
<thead>
<tr>
<th>11</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Age in years</td>
</tr>
<tr>
<td>13</td>
<td>Race</td>
</tr>
<tr>
<td>14</td>
<td>Area of Residence</td>
</tr>
<tr>
<td>15</td>
<td>Educational Background</td>
</tr>
<tr>
<td>16</td>
<td>Family Annual Income</td>
</tr>
</tbody>
</table>

1 = M  
2 = F  
1 = Fijian  
2 = Indian  
3 = Others  
1 = Urban  
2 = Villages  
3 = Settlements  
1 = None  
2 = Primary  
3 = Secondary  
4 = Tertiary  
1 = <$5000  
2 = $5001-$10000  
3 = $10001-$20000  
4 = $20001-$30000  
5 = $30000  
8 = Do not know

#### PART 1: BEHAVIOURAL QUESTIONNAIRE

1. When was the last time you visit the dentist / dental therapists about your teeth, dentures or gum?

- 1 = Less than twelve months
- 2 = 12 months or more to 2 years
- 3 = 2 years or more
- 4 = Never
- 8 = Do not know

2. How many times did you visit the dentist / dental therapist about your teeth, dentures or gums in the last 12 months?

- 0 = None
- 1 = Once
- 2 = Twice
- 3 = Three times
- 4 = More than three times
- 8 = Do not know

3. If you did not visit the dentists/dental therapists in the last 12 months, what was the main reason for not doing so?

- 1 = Nothing wrong
- 2 = Afraid of dentists
- 3 = Can't afford
- 4 = Was too busy
- 5 = No services available
- 6 = Do not have any teeth
- 7 = Other (Specify:)
- 8 = Do not know

4. Where do you go to for your last dental visit?

- 1 = Private Dental Practitioner
- 2 = Public Hospitals / Government Dental Facilities
- 3 = School Dental Service
- 8 = Do not know

5. What was the major reason of your last dental visit?

- 1 = Check up
- 2 = Gum problem
- 3 = Toothache
- 4 = Bad breath
- 5 = Unable to eat properly with only few/no remaining teeth
- 6 = Unsightly crooked/crowded teeth
- 7 = Other problems (Specify:)
- 8 = Do not know
- 9 = Never had dental visit

---

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6. What treatments did you receive during your last visit?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dental Examination</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Teeth cleaned / polished</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tooth extracted</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dental filling</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gum treatment</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>Denture(s) construction / fitted / repaired</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>Orthodontic treatment</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Other treatment or do not know (Specify...........)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Never had dental visit</td>
<td></td>
</tr>
</tbody>
</table>

7. What dental treatments do you think you require?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
<td>28</td>
</tr>
<tr>
<td>1</td>
<td>Tooth extraction</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dental filling</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>New / replacement of dentures</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Gum treatment</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Orthodontic treatment</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Other treatment (Specify..............)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Do not know</td>
<td></td>
</tr>
</tbody>
</table>

8. Who pays for your dental treatment?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Self-paid</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>Parents / Guardians</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Exempted</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Other (Specify...............</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Do not know</td>
<td></td>
</tr>
</tbody>
</table>

9. What do you think of the dental fee?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cheap</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Reasonable / Affordable</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cost too much</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>Do not know</td>
<td></td>
</tr>
</tbody>
</table>

10. How many times did you brush your teeth yesterday?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Never</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>Once</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Twice</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Three times</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>More than three times</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Do not know</td>
<td></td>
</tr>
</tbody>
</table>

11. Do you use fluoridated toothpaste?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Never</td>
<td>36</td>
</tr>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Do not know</td>
<td></td>
</tr>
</tbody>
</table>

12. How soon do you seek dental treatment when you are faced with a dental problem?

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Immediately</td>
<td>37</td>
</tr>
<tr>
<td>2</td>
<td>Few days later</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>When pain becomes unbearable</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Do not know</td>
<td></td>
</tr>
</tbody>
</table>
PART 2: ORAL HEALTH ASSESSMENT

**Malocclusion**

<table>
<thead>
<tr>
<th>Status</th>
<th>Treatment Needs</th>
<th>Status</th>
<th>Treatment Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td></td>
<td>39</td>
<td></td>
</tr>
</tbody>
</table>

**Denature Status**

<table>
<thead>
<tr>
<th>Wearing</th>
<th>Needing</th>
<th>Edentulous</th>
</tr>
</thead>
<tbody>
<tr>
<td>U 40</td>
<td>U 41</td>
<td>U 44</td>
</tr>
<tr>
<td>L 42</td>
<td>L 43</td>
<td>L 44</td>
</tr>
</tbody>
</table>

0 = No anomaly 0 = No treatment needed 1 = Slight 1 = Treatment necessary 2 = More severe 2 = Under treatment 0 = None 0 = None 1 = Partial 1 = Partial 2 = Full 2 = Full 3 = Maintenance 3 = Maintenance

**Periodontal Status**

<table>
<thead>
<tr>
<th>R</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>U 45</td>
<td>47</td>
</tr>
<tr>
<td>L 48</td>
<td>50</td>
</tr>
</tbody>
</table>

0 = Healthy 2 = Calculus 4 = Pocket 6mm or more 1 = Bleeding observed 3 = Pocket 4 or 5mm 5 = Sextant cancelled

**Dentition Status and Treatment of Teeth**

**Upper:**

**Dentition Status**

<table>
<thead>
<tr>
<th>R</th>
<th>55</th>
<th>54</th>
<th>53</th>
<th>52</th>
<th>51</th>
<th>61</th>
<th>62</th>
<th>63</th>
<th>64</th>
<th>65</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>17</td>
<td>16</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>

**Treatment**

<table>
<thead>
<tr>
<th>51</th>
</tr>
</thead>
</table>

67

**Lower:**

**Dentition Status**

<table>
<thead>
<tr>
<th>R</th>
<th>85</th>
<th>84</th>
<th>83</th>
<th>82</th>
<th>81</th>
<th>71</th>
<th>72</th>
<th>73</th>
<th>74</th>
<th>75</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>47</td>
<td>46</td>
<td>45</td>
<td>44</td>
<td>43</td>
<td>42</td>
<td>41</td>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
</tr>
</tbody>
</table>

**Treatment**

| 83 |

99

**Dentition Status**

<table>
<thead>
<tr>
<th>Status</th>
<th>Deciduous</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>Decayed</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>Filled, with decay</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>Filled, no decay</td>
<td>D</td>
<td>3</td>
</tr>
<tr>
<td>Missing due to caries</td>
<td>E</td>
<td>4</td>
</tr>
<tr>
<td>Missing due to other reasons</td>
<td>F</td>
<td>5</td>
</tr>
<tr>
<td>Sealant</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Unerupted teeth</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Excluded teeth</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

**Treatment Needs**

0 = None 1 = Sealant 2 = One surface filling 3 = Two or more surface fillings 4 = Pulp care 5 = Extraction 6 = Need for other care (Specify: ..........................)

**Other Clinical Conditions**

| 115 |
0 = Absent 1 = Present - Treatment not necessary 2 = Present - Treatment needed (Specify condition: ..........................)

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8. DISCUSSION

As populations around the world become more and more interested in health problems of all types and search for appropriate solutions, ever larger proportions of valuable national resources are being spent on health. There is a great awareness that the ability of people to utilise health resources is almost limitless and yet there is a limit to the resources that can be devoted to health. The limited resources, infinite needs and competing demands, indicate that systematic planning, careful monitoring and critical evaluation are required. Therefore the need to plan and develop programs that are directed to overcoming the specific health problems in the most efficient and effective manner is critically important. Furthermore, it is especially important to evaluate health programs as to whether they are achieving their intended purposes within the allowable costs. The planning and evaluating process must be on a continuing basis to effectively guide the decisions on management and resource allocations. In dentistry, the need for planning to achieve appropriate utilisation of scarce resources is particularly important.

Logical planning for an effective dental service should be based on factual information pertaining to existing and predictable future needs, and also on the factors which affect the demand for dental care. In all the countries, there is a continuing need for numerical data on disease distribution to determine priorities for the dental services and to direct dental health planners to plan programs that will be appropriate to the need of the community. It has been established that in developing countries, the lack of basic data on the frequency and distribution of different diseases makes it difficult to effect rational allocation of the limited resources available for disease prevention and patient care.

The basic oral health survey is an essential and effective planning tool. It can provide a sound basis for estimation of the present status and future needs for oral health care of a population. They also produce reliable baseline data for development and planning of national or regional
oral health programs. The prevalence and severity of dental diseases and their changes over time are best established by periodic oral health surveys.

The World Health Organization’s adoption in 1979 of ‘Health for all by the year 2000’ as a worldwide target promoted the formulation of specific oral health goals by the International Dental Federation in 1981. The goals were adopted by countries as a focus for program planning and implementation and as a means of measuring progress (Green 1983). An important and integral component of conducting programs to reach specific objectives is the evaluation or monitoring of progress along the way. Such monitoring provides information about success or failure of the program in time to make adjustments in the approach or resources being used and to plan for the consequences of either success or failure.

An objective of oral health surveys is to provide a complete picture of the oral health status of the population being surveyed. The survey will indicate the prevalence of specific oral diseases and conditions which will subsequently determine the existing need of the population. In 1979, Cuttress and his colleagues reported that the most important and immediate benefit of the 1976 national survey of adult oral health carried out in New Zealand was the establishment of a data base. The data enabled the dental health planners to objectively discuss the nation’s existing oral condition, recognise deficiencies in the provision of services, and identify priorities (Cuttress et al 1979). Through the effective planning and informed decisions on program planning based on the valid data of the 1976 survey, a dramatic improvement in oral health in all age groups was reported in the 1988 study of oral health outcomes (ICS II) in New Zealand (Hunter et al 1992).

The 1987-88 national oral health survey in Australia was carried out after the need for a comprehensive national oral health survey had been recognised for many years. Barnard (1993) reported that the lack of information about rapidly changing oral health status and treatment needs of the Australian community had been a serious limitation to the assessment of existing dental services and dental education, planning of dental care programs, and the
estimation of dental workforce requirements. The data acquired from the survey determined the existing oral health status and treatment needs for Australia. Information on the needs for oral health care required by planners was quantified through the 1987-88 national oral health survey (Barnard 1993). It was envisaged that the Commonwealth and State authorities would utilise the data for planning and future evaluation for the most effective dental services.

Harald (1987) reported that in the United States of America, the 1985 national survey by the National Institute of Dental Research was able to establish a baseline against which future national surveys could be compared.

Information available through surveys are very useful when procuring resources, building a supportive constituency and educating decision makers. Furthermore, there will be a great reduction in the unnecessary wastage of the scarce resources as the valid data from the survey will guide the planners into supporting the program that will be most cost-effective to meet the needs of the population. In 1986, the Columbus (Ohio) Health Department conducted an oral health survey to acquire data needed for program planning, marketing (including resource procurement), constituency building, and educating the dental profession and public (Siegal et al 1988). The data were effectively used to support successful grant requests that led to the implementation of a school-based dental sealant program. The local government expanded the health department's dental budget to continue the sealant program beyond the grant period.

In 1979, Downer and his colleague reported that while the restorative dental services are relatively well developed in the United Kingdom, there was inequality in the distribution of facilities and manpower and barriers to the receipt of care for many in the community. A survey, which examined how inequalities in the distribution of facilities and manpower influenced the oral health status of groups of children in four districts constituting a health administrative area, provided data to improve planning of the services in the area. The data acquired from the survey facilitated a rational selection of objectives and assisted proper ordering of priorities (Downer et al 1979). It also established the bench-mark against which
periodic evaluation of the outcome of programs would be carried out and objectives reassessed during the continuous planning process.

In 1987, Razak and Jafaar in Malaysia, observed that the availability and accessibility of care may not necessarily ensure utilisation of the system. All too often the planning and administration of many services are governed merely by what the planners and administrators conceive to be required by the community (Razak, Jafaar 1987). While the planners and administrators place high emphasis on the structural and administrative aspect of dental care delivery, the community have more to say about whether they ever utilise the service than planners are willing to consider. Thus, for the planning of any dental service to be effective, it should be based on detailed information not only of the type and extent of dental needs but also of the factors which affect demand for dental care. Therefore relevant data are necessary to avoid establishing elaborate dental services or programs which are inappropriate to the need and demand of the community.

Data acquired from a national survey should be able to identify regional variations in the disease prevalence and hence can be used for comparing the prevalence of specific oral diseases and conditions between different countries and also between various communities in the same country. In this way, respective countries or communities within same country, can help or learn from each other on how best to plan their programs. The World Health Organization in implementing the International Collaborative Studies (ICS I), aimed to test the feasibility of applying specific system components or combinations of components which are associated with favourable outcomes and efficiency, in environments other than those for which the system’s features were originally planned (Arnjot et al 1985). While acknowledging that no country’s delivery system could be completely transferrable to another country or community, it was advocated that effective and efficient system components could be identified in other countries or communities which might provide useful approaches for the solution of many of the same oral health problems.
It has been established that evaluation is an integral part of program management and is said to be the mirror-image of planning. The process of evaluation will determine, when a plan is in progress, whether the objectives are being achieved. The evaluation assesses the extent of the dental service’s or program’s contribution to the improvement of the oral health of the community and that the program is playing its appropriate role and is progressing at the planned rate. In doing that, evaluation can demonstrate the worth of the service to the community and indicate to the planners if there is any needed adjustment. In a period of 15 years (1973-1988), a series of about five oral health surveys were conducted in New Zealand. Two of the surveys were carried out in conjunction with the World Health Organization’s International Collaborative Studies (ICS I&II). Data from all the surveys were comparable for the survey designs and the indices used were basically similar to each other. The information acquired from these periodic surveys guided the planners in identifying the disadvantaged groups in the communities and the deficiencies in the provision of services. The data positively contributed to the informed decisions made in the development of appropriate programs targeted to meet the identified need. From the 1976 national oral survey, the great need to reduce tooth loss in adulthood was identified and was envisaged to be achieved by the reduction of the need for restorations in children and adolescents. The provision of oral health care programs and incentives to retain natural teeth for the adult population was targeted. Hence, the New Zealand population had gone from having one of the highest levels of dental disease in the developed world in the early 1970s to a very low disease level in 1988 (Hunter et al 1992). The overall DMFT index of children fell steadily from 10.7 in 1973 to 2.4 in 1988 and the caries-free children increased from less than 3% in 1973 to almost 30% in 1988.

The data from a national survey will only be of use to the planners if it is in a usable form. Spencer (1985) reported that the infrequent use of data in planning can be attributed to three factors. First, there is little general awareness of how such data might be used to improve the delivery of services. Second, the data which are collected are not made accessible to potential users, in an appropriate form, and without undue delay. Third, the skills necessary to
manipulate and interpret such data are not readily available within the dental service community. Therefore, effort should be directed to improve the performance of the dental profession in these areas to avoid unnecessary wastage of time, financial and manpower resources, in the gathering of irrelevant data or data that cannot be presented into a usable form.

It will be possible for Fiji, like New Zealand, to experience the positive effect of planning dental services and developing dental programs based on valid data acquired from regular national oral health surveys. The oral health surveys should be based on an appropriately developed protocol with an internationally acceptable format. The proposed protocol for the national oral health surveys in Fiji developed in this thesis is simple and is based on internationally acceptable indices for the recording of dental diseases and conditions which are prevailing in the country. The proposed protocol will provide information not only on the extent of the treatment needs but also of the factors which affect the demand for dental care. Therefore, the adoption of the proposed protocol for all the national oral health surveys in Fiji, will ensure that the methods and criteria for examination and recording of the dental diseases and conditions will be constant. Subsequently, the data acquired will be comparable and readily used by the dental health planners as a basis for future plans and for the evaluation and monitoring of existing dental services and programs. As was successfully demonstrated in New Zealand, the dental health planners in Fiji will be able to make informed decisions on identifying disadvantaged groups in the communities, prioritising the needs of the population and developing cost-effective programs that will meet the specific needs of the population.
9. RECOMMENDATION

A country with minimal resources like Fiji, would benefit from the establishment of an efficient and regular dental monitoring system. An important component of the monitoring system is the periodic oral health survey at intervals of approximately five years as recommended by the World Health Organization. The system is important, not only for the proper evaluation of existing programs, but also to provide guidelines for future development. Hence, the monitoring system will subsequently lead to a cycle of modifications, replanning, and re-evaluation.

With a view to the appropriate planning and development of dental services and programs, and their subsequent evaluation and monitoring based on valid data, the Dental Division of the Republic of Fiji should recommend that:

1. Regular national oral health surveys be conducted to determine the prevalence of specific oral diseases and conditions that are prevailing in the country and to establish the level of the need of the population.

2. The surveys assess the different ethnic and socioeconomic groups, specified age cohorts, divisions and locality of residence to determine the oral health status and their specific needs.

3. The surveys assess the behaviours that may affect the utilisation of the available dental services and contribute to the oral health status in relation to economic level, education and ethnic background.

4. Implementation of the surveys should be based on an appropriately developed protocol. The protocol proposed in this thesis is recommended for national oral health surveys in Fiji.
5. A national committee should be established to assume responsibility for the over-all planning and coordination of the national oral health surveys. The committee should consist of the following:
   * Assistant Director of Dental Services, Medical Headquarters
   * Medical Statistician, Medical Headquarters
   * World Health Organization Statistician, Suva
   * Government Statistician, Bureau of Statistics
   * Senior Dental Officer, Dental Division

6. Indices to be used should be simple and be constant in all subsequent oral health surveys for evaluation and monitoring purposes. In addition, the indices should be internationally recognised so that the data could be compared with those from other countries.

7. Data from the surveys should be properly documented and analysed.

8. Data from the surveys should be presented in a usable form to the Senior Management Officers' Committee and the National Oral Health Committee of the Ministry of Health. Furthermore, it should be made accessible to the dental officers at all the administrative levels of the dental division and all the personnel associated with the provision of the dental services in the country.

9. Future plans and development should be based on valid data to avoid embarking on inappropriate or inefficient dental programs which will result in the wastage of meagre resources.

10. Periodic evaluation should address the effectiveness, efficiency, appropriateness and adequacy of the dental services and programs being implemented.

11. Epidemiological studies within the dental curriculum at the Fiji School of Medicine should receive proper emphasis to ensure that the future dental workforce is well equipped with the knowledge of how to plan and implement an oral health survey, and how to effectively utilise the data acquired.
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