

7.1.3 EPIDEMIOLOGICAL FACTORS
NATIONAL ORAL EPIDEMIOLOGICAL SURVEY - 1965

In 1965 an oral epidemiological survey and morbidity studies were carried out in Fiji by Wong, under the auspices of the WHO. The areas surveyed are shown (Figure 12).

PURPOSE AND OBJECTS OF THE SURVEY WERE:

- . To determine the type and severity of dental diseases and oral conditions in Fiji;
- . To assess the effectiveness of the existing oral health programs;
- . To assist in the planning of future programs;
- . To serve as a base line data for future surveys.

PERIODONTAL STATUS

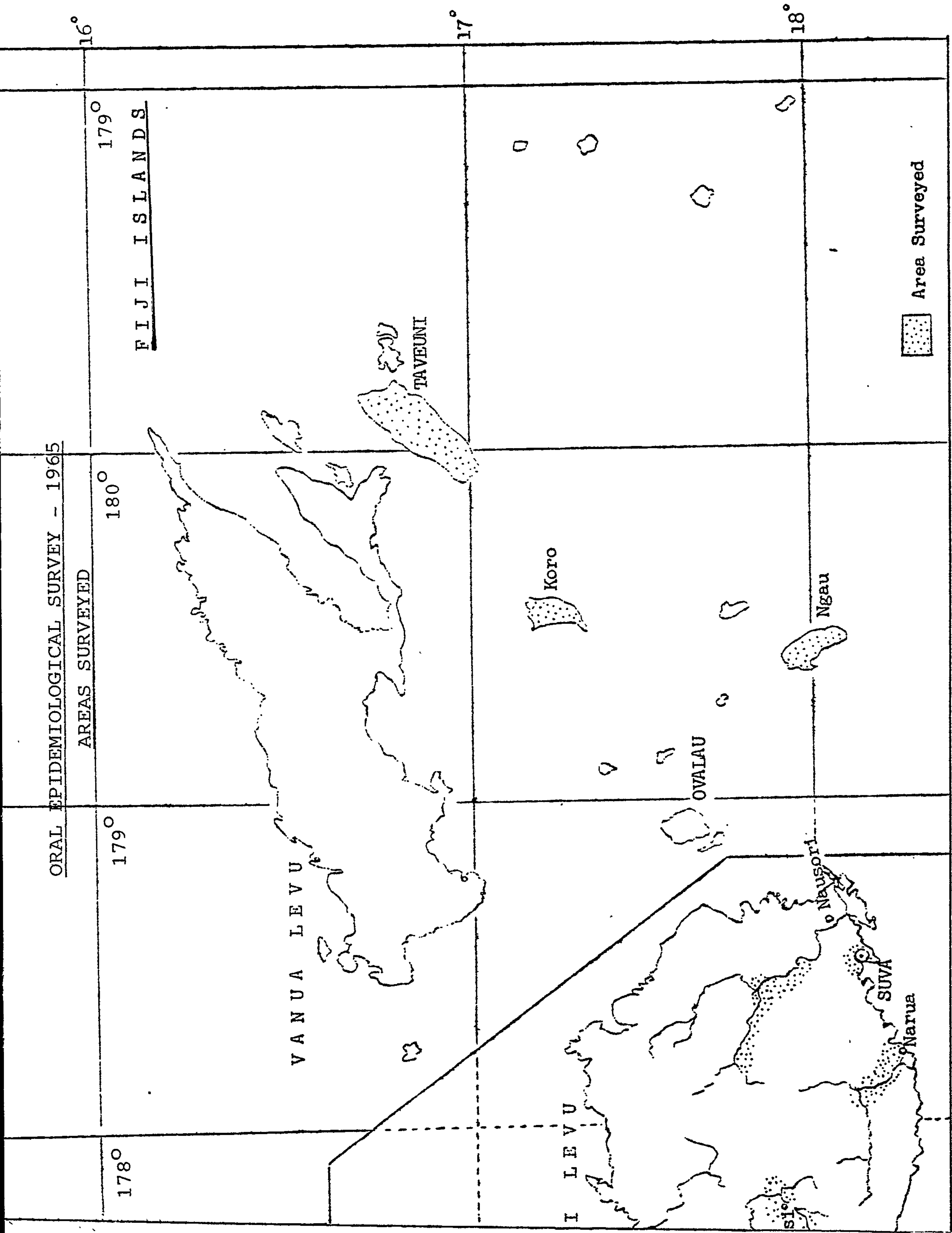
Gingival Condition

- . % of people affected increased with age.
- . 63.2% (58.6% Indians, 68.1% Fijians and 67.2% others) were affected (Table 16).
- . Severity - 36.7% had zero unit of inflammed gingiva.

Periodontal Pockets

- . 40% examined between 20-54 years had pockets greater than 3mm (Table 17).
- . 5% had pockets greater than 6mm.

133.
FIGURE 12



Calculus

- . The presence of calculus increased with age and was widespread even in children 5-6 years old.
- . By the age of 44-54 years almost everyone had calculus.
- . Indians (60.5%) had lower percentage than Fijians (68.0%).

Materia Alba

- . Oral hygiene was best in school children from 9-19 years of age.
- . Materia alba was more prevalent in pre-school children in the first 2-3 years of primary school and in adults.
- . Only 46% of those examined had materia alba found on the labial surface of their incisors.

These data on the gingival inflammation, on the prevalence of periodontal pockets and on the presence of calculus are indicative of the threat of periodontal disease to tooth survival (Knutson-1972).

Periodontal disease is more insidious than dental caries and is a major cause of tooth mortality in adults. However, it can be prevented and controlled by effective oral hygiene programs and oral prophylaxis. Early diagnosis and interception of periodontal disease should minimise complications and loss of teeth.

TABLE 16

% OF PERSONS WITH INFLAMMATION OF GINGIVA (FIJI-1965)
BY AGE AND ETHNIC GROUP

AGE (YEARS)	FIJIAN	INDIAN	OTHER	ALL RACES
3-4	7.2	13.0	0	9.4
5-6	42.8	33.6	20.0	36.0
7-8	59.7	47.0	58.3	52.0
9-10	56.6	41.3	50.0	47.4
11-12	54.2	49.2	54.5	51.4
13-14	60.2	57.5	54.5	58.7
15-19	64.7	65.5	54.5	64.8
20-24	78.0	72.6	70.6	75.0
25-29	87.2	75.7	78.6	80.0
30-34	85.4	78.2	93.3	82.6
35-44	83.7	76.5	88.0	81.2
45-54	89.0	82.7	82.6	86.4
ALL AGES	68.1	58.6	67.2	63.2

SOURCE: Wong, K.K.-1965.

TABLE 17

% OF PERSONS WITH PERIODONTAL POCKETS (FIJI-1965)
BY AGE GROUPS

AGE (YEARS)	% WITH POCKETS GREATER THAN 3mm	% WITH POCKETS - GREATER THAN 6mm
5-6	0.3	-
7-8	1.2	-
9-10	2.4	0.2
11-12	5.4	-
13-14	6.0	-
15-19	11.2	-
20-24	23.7	0.8
25-29	39.2	2.1
30-34	41.1	4.2
35-44	48.6	7.8
45-54	60.9	16.3
AGE 5-54	20.0	2.2
AGE 20-24	40.2	5.2

SOURCE: Wong, K.K.-1965

DENTAL CARIES STATUSPrimary Dentition

- . Children between 3-4 years of age had an average of 2.9 decayed primary teeth. This rate increased to 4.2 decayed teeth per child at 5-6 years (Figure 13). This was the peak average decayed and filled rate (average d f rate) for all races. Teeth with fillings inserted were so negligible that Wong (1965) claims that it is only fair to assume that d f rates was actually a decayed rate.
- . Comparing the 2 major races, the average d f rate of the Fijians (1.6 per child) was significantly lower than the Indians (2.4 per child) (Table 17).
- . About 30% of primary teeth were decayed. 80% of children had 1 or more decayed or filled teeth (Figure 13). 23% of children had teeth that were indicated for extraction. 18.6% of children required 1-2 extractions for each person.
- . The restoration of primary teeth was a major problem.

Permanent Dentition

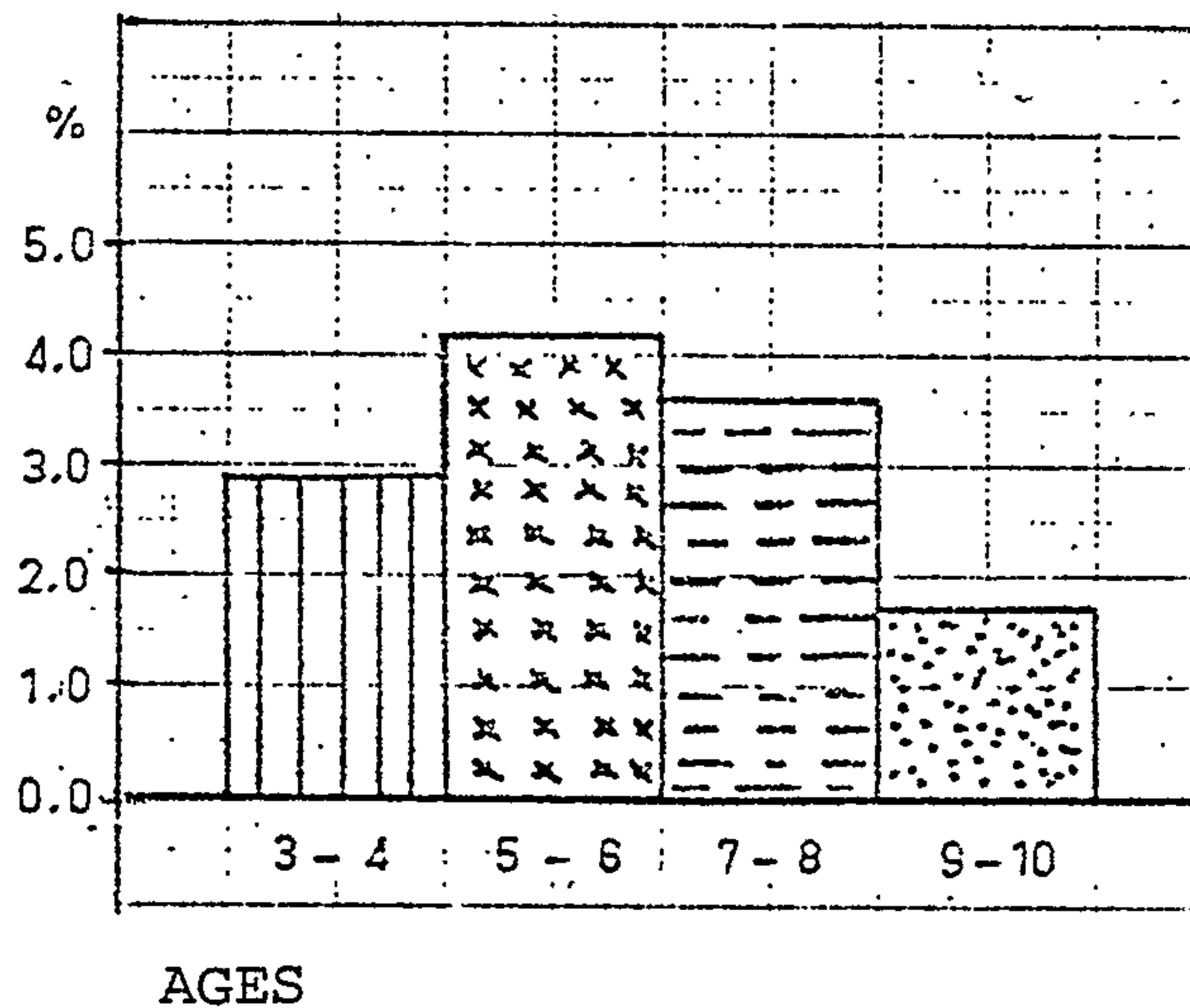
- . The average DMFT (Decayed, Missing and Filled Teeth) groups was 4.9, which is considered to be moderate (Fijian 5.6., Indians 4.2 - Table 19).
- . The % of persons with 1 or more DMFT for 7-54 years was 74.7%.
- . With regards to missing teeth 52% had not lost a single tooth and only 7.4% of those examined had 10 or more teeth missing.

- . However, the dental care index of permanent teeth of the 7-14 year age group was 15. The amount of dental care received by children was considered to be quite low (Wong-1965).
- . Persons with carious permanent teeth indicated for extractions were few. Only 18% of the examinees had 1-2 unsavable permanent teeth.
- . Persons at the age of 12 years with 1 or more DMFT was 58.9% (Fijians 63.7%, Indians 56.4% and others 36.4%). Dental status as shown by DMF for all races at the age of 12 years was 1.6 (Fijians 1.9, Indians 1.4 and others 1.2) (Table 18).

Knutson (1972) considers that the, 'incidence of dental caries in the permanent teeth of Fiji Islanders was less than moderate - it was low; resulting in an accumulation of less than 3 DMF teeth in children aged 13 - 14 years'. Figures show that towns had higher caries than villages and smaller isolated islands. There appears to be a great need for preventive and restorative care to avoid extractions and premature loss of teeth with associated problems.

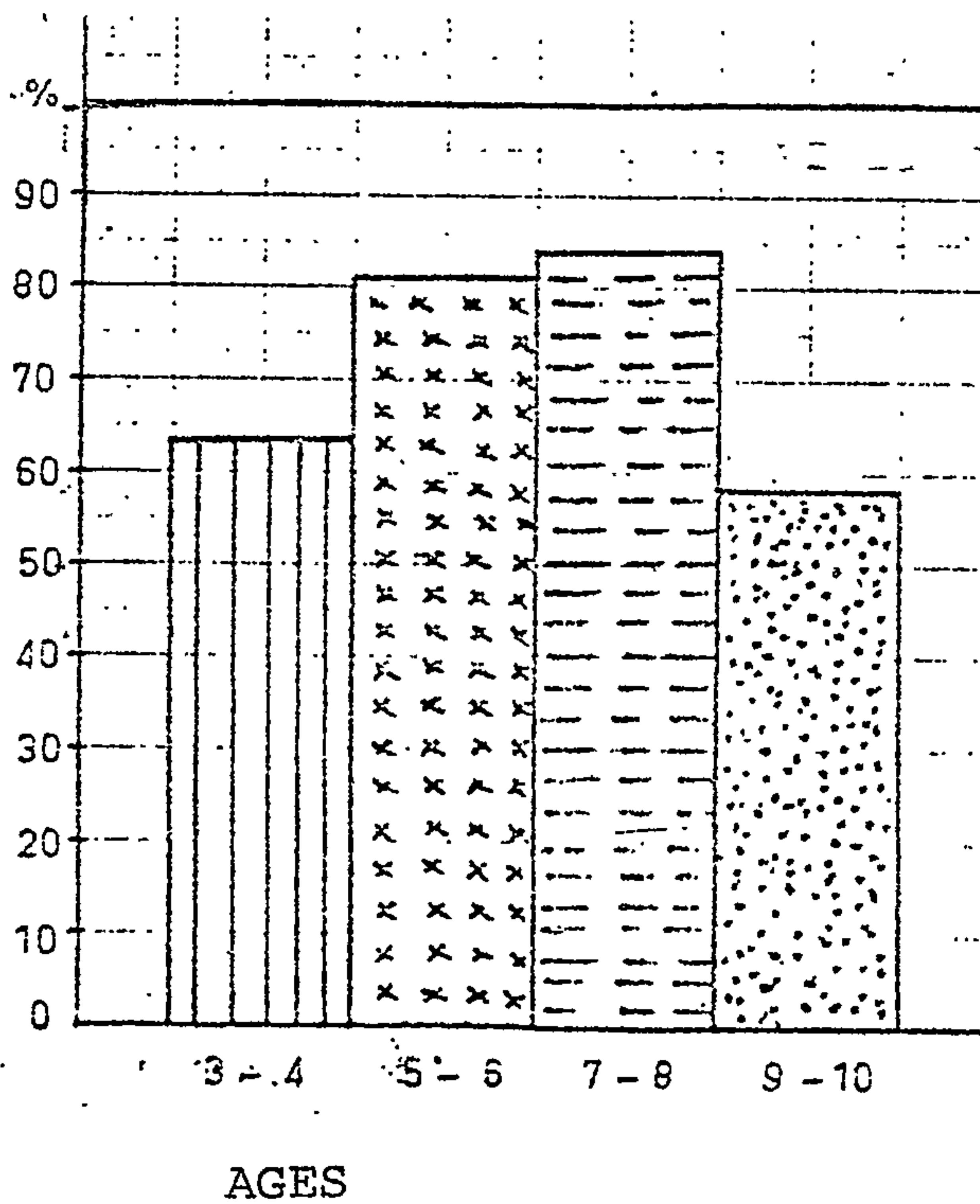
FIGURE 13
DENTAL CARIES STATUS - FIJI 1965
PRIMARY DENTITION

Average
dft.



Average df teeth per person

children



Persons with 1 or more df teeth

TABLE 18
CARIES STATUS IN PRIMARY DENTITION (FIJI-1965)
AGE - ETHNIC GROUP DISTRIBUTION

MEAN NUMBER OF DECAYED AND FILLED (df) TEETH

AGE (YEARS)	FIJIAN	INDIAN	OTHER	ALL RACES
3-4	2.8	3.0	3.0	2.9
5-6	3.7	4.7	3.9	4.2
7-8	2.5	4.3	4.8	3.6
9-10	1.2	2.0	1.1	1.7
11-12	0.1	0.4	0.1	0.3
13-14	0.03	0.1	0.1	0.05
ALL AGES	1.6	2.4	2.1	2.0

SOURCE: Wong, K.K.-1965

TABLE 19

DENTAL CARIES STATUS IN PERMANENT DENTITION (FIJI-1965)
AGE AND ETHNIC GROUP DISTRIBUTION

MEAN NUMBER OF DECAYED, MISSING AND FILLED (DMF) TEETH

AGE (YEARS)	FIJIAN	INDIAN	OTHER	ALL RACES
7-8	0.6	0.5	0.3	0.5
9-10	1.0	0.9	0.6	0.9
11-12	1.9	1.4	1.2	1.6
13-14	2.8	2.3	2.1	2.5
15-19	4.8	3.5	3.8	4.0
20-24	7.2	5.9	6.9	6.5
25-29	8.1	8.6	6.8	8.2
30-34	7.6	7.8	10.4	7.9
35-44	8.7	8.8	10.7	8.9
45-54	11.2	10.5	12.5	11.1
ALL AGES	5.6	4.2	6.6	4.9

SOURCE: Wong, K.K.-1965

HANDICAPPING DENTOFACIAL ANOMALIES

The problem of malocclusion was not a serious one, with the Fijians who usually have well developed jaws, however, it was prevalent in children of Indian descent (Figure 14).

- . Treatment requirements of dentofacial anomalies was 9.8% with the Fijians and 29.2% with the Indians.
- . Maxillary overjet (15.6%) in association with deep overbite (8.9%) accounted for majority of anomalies seen.
- . The next common anomalies were crowding (5.6% and overbite 4.2%).
- . About 21% of the children required treatment.

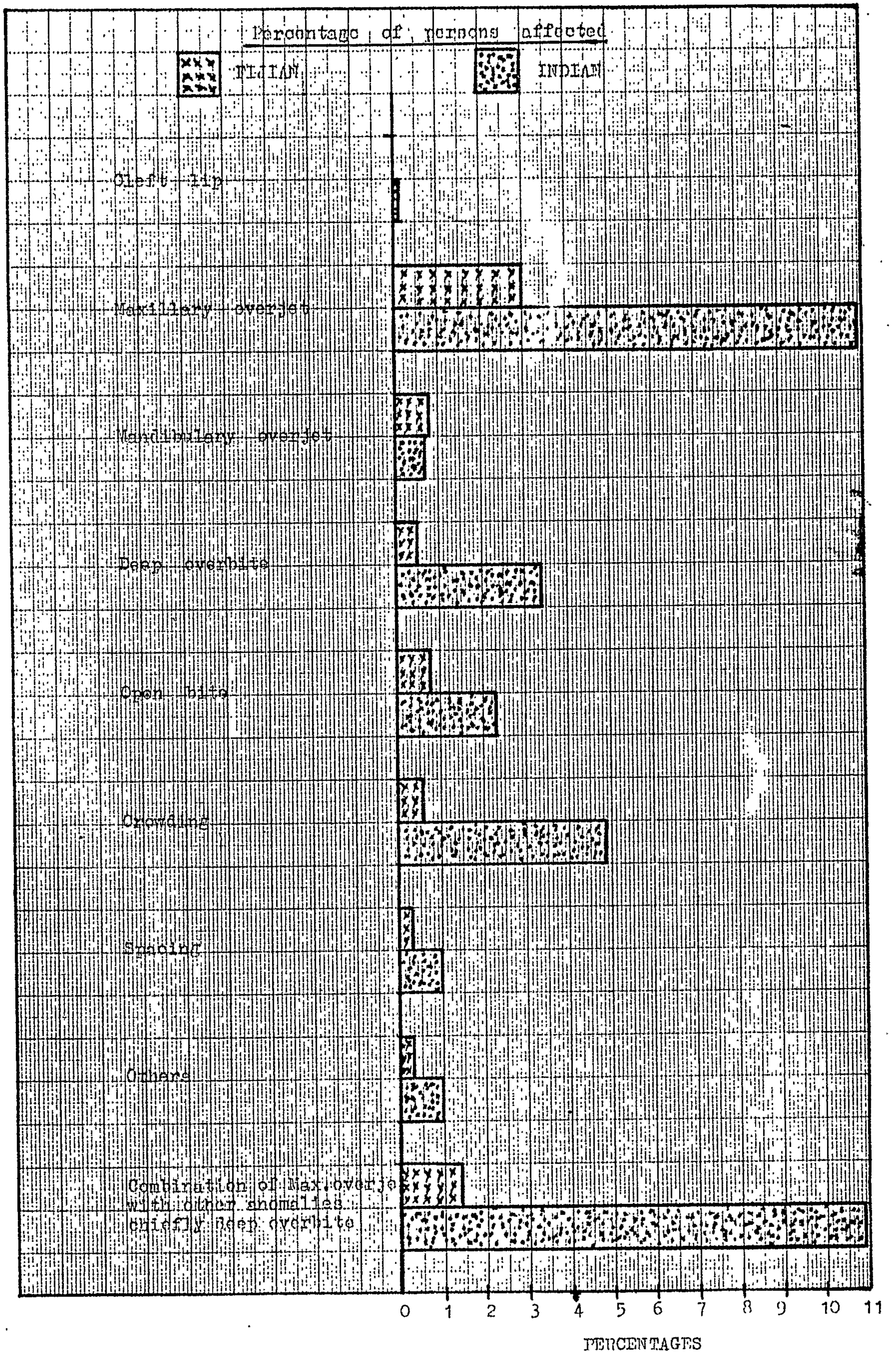
Wong claims that this, 'should not constitute an immediate problem'.

PROSTHODONTIC STATUS

- . The need for prostheses was very small - only 4% of people between 20-54 years of age required full dentures either upper or lower or both jaws.
 - . The number wearing full dentures was negligible. The people had little demand for prostheses. This fact should be helpful in planning future programs.
 - . Prosthodontic needs beyond 54 years was not assessed in this survey.
-

FIGURE 14

HANDICAPPING DENTOFACIAL ANOMALIES - FIJI (1965)



ORAL EPIDEMIOLOGICAL SURVEY - 1978

During 1978 WHO methods were used by Speake, Singh and Ligani to estimate caries rates, periodontal disease status and treatment requirements among 1,005 children 6, 8, 10, 12, and 14 years of age in 6 urban centres in Fiji. Although it was realised by the authors that a full national survey would be the most desirable course, it was felt that a more restricted version concentrating on the high risk group would be within the financial resources available (Speake, Singh & Ligani-1980).

THE OBJECTIVES OF THIS SURVEY WERE TO:

- . Estimate the prevalence of dental caries and periodontal disease among school children;
- . Identify centres which might be in particular need of preventive programs;
- . Assess the effectiveness of a national tooth-brushing scheme;
- . Assess the effectiveness of restorative school dental service;
- . Estimate treatment needs.

PERIODONTAL STATUSSoft Deposits

- . 85-90% of subjects were affected by soft deposits.
- . There was small, but a consistent trend for fewer Indian than Fijian children to be affected.

Calculus

- . Deposits of calculus increased steadily with age.
- . At 6 years of age only 3.5% of children were affected.
- . At 14 years of age over $\frac{1}{2}$ the children were affected.
- . Lower % of Indians than Fijians were affected.

Intense Gingivitis

- . This was not a common finding. It appeared to peak at 12 years of age with 7.85% of children being affected.
- . Less Indian children were affected than Fijians.

Advanced Periodontal Disease

- . Only 1 case was recorded.

Treatment Requirements

- . The % of children requiring no treatment for periodontal disease tended to decline with age.
 - . By 14 years about 55% of children needed both prophylaxis and oral hygiene instruction.
-

CARIES STATUSPrimary DentitionTooth Mortality

- . At 6 years of age 1.5 primary teeth were prematurely missing because of caries and by the age of 8 years this figure had risen to 2 teeth per child.
- . Caries in the primary dentition was striking; over 90% of children had experienced decay.
- . Very few primary teeth were filled.

Treatment Requirements

- . At 6 years of age only 11.4% of children did not need treatment for caries in primary teeth whilst, 48% required 1 surface filling, 16% needed 3 surface fillings and 0.5% required filling involving more than 3 surfaces;
- . 29% required extraction because of caries.
- . A similar pattern of treatment was apparent for 8 year olds.

Permanent DentitionTooth Mortality

- . The average number of teeth extracted because of caries was less than 0.1 up to 8 years, and this increased steadily with age so that by 14 years, on the average, 0.4 teeth per child were missing;
- . The % of children affected with caries rose from 21% at 6 years to over 80% at 14 years;

- . After 6 years of age, in the non-fluoridated towns, caries rates were consistently higher among Fijian than Indian children and by 14 years of age the mean DMFT for Fijians (6.3) was almost double that of Indians (3.3);
- . The overall ratio of $\frac{F}{DMF}$ for all age group combined was in the region of 0.13;
- . The caries index rose from 0.3 DMFT at 6 years to 4.0 DMFT at 14 years.

Treatment Requirements

- . The need for treatment in permanent dentition increased with age and by 14 years only 1 in 5 children did not require 1 or more fillings;
 - . The majority of restorations required involved 1 surface ranging from 18% of children at 6 years of age to 71% at 14 years;
 - . Only 2.5% of children at 6 years of age required 2 surface filling and this increased to 31% by 14 years;
 - . At 6 years of age only 1% of children needed 3 surface fillings and by 14 years of age this had increased to 4.5% of children.
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LONGITUDINAL COMPARISON BETWEEN 1965 AND 1978 SURVEYS

The methods of periodontal assessment has changed significantly between 1965 and 1978 surveys, therefore it is difficult to make longitudinal comparisons of the periodontal status. However, despite some modifications the method of caries assessment and the DMFT index have not changed significantly, therefore longitudinal comparison is possible. This comparison has been made by Speake, Singh and Ligani by plotting comparable age specific DMFT rates for Suva in 1966; the non-fluoridated urban rate in 1978 and the Suva rates in 1978 (Figure 20).

This survey shows that whilst the non-fluoridated urban centres in Fiji in 1978 were in moderate category, children in Suva remained in low caries category (with the exception of 14 year olds).

The most obvious cause of differences revealed in disease levels between Indian and Fijian children in this survey is the difference in ages at which the deciduous teeth are shed and permanent teeth erupt. Fijians tend to shed their deciduous teeth and acquire permanent teeth at an earlier age than Indians and for this reasons they are at greater risk of developing caries. Similar trend was pointed out by Baume (1968) in French Polynesia.

Where periodontal disease is concerned, Fijians show small, but consistently higher levels than Indians in the ages surveyed. They have more soft deposits, more calculus and more gingival inflammation.

Perhaps another reason for the difference in disease levels lies in economic and social factors. Although there has been accelerating urban drift amongst Fijians in recent years, they remain a predominantly rural people as the most recent census (1976) shows. Those in the towns have therefore had less time to adapt to the potential dietary traps of urban living (Speake, Singh and Ligani-1980).

However, in view of the ethnic difference manifest in the urban areas and developments which have taken place in rural areas since the 1965 survey, it would now seem highly desirable to undertake a rural survey to complement the 1978 survey and to see whether rural caries rates in particular have changed. The reasons for very low ratio of fillings to decayed, missing or filled teeth in all of the centres included in the 1978 survey should be very carefully assessed and serious consideration be given to urgently remedy this shortcoming.

It appears from this survey that the curative and restorative services currently available are not keeping up with the need for conservation and prevention and therefore permanent teeth have to be extracted for reasons of infection and pain from 8 years onwards. It appears that in order to get services to school children adequate transportation is urgently required. In the current economic climate, finance for personnel, equipment, materials, premises and transport pose a formidable barrier to the optimum delivery of dental care (Speake, Singh and Ligani-1980).

7.1.4 POLITICAL FACTORS

Government everywhere is adopting the attitude that if it is to pay an increasingly high proportion of the cost of health care then it must have a greater voice in the manner in which health care is designed and delivered. Because the costs of health care are escalating rapidly, government is seeking to contain them and so the breadth, objectives and perhaps the quality of health services are being eroded and confined to narrow limits (Newbury-1980).

GOVERNMENT'S OBJECTIVES ON HEALTH

In Fiji there are 2 major political parties, namely the Alliance led by the present Prime Minister Ratu Sir Kamisese Mara and the National Federation Party. Since independence (October 1970) the Alliance Party has been the Government of the country. The Government's broad objectives on Health as stated in the 7th Development Plan (DP7) (1976-1980) is:

- . The broad objectives will be to promote the physical, mental and social well-being of the nation, to protect Fiji's young and old from illness and disease; to provide adequate clinical facilities and staff to satisfy the medical and dental needs of both rural and urban populations; and to promote a better standard of living through lower birth rates.
- . Policy emphasis will be redirected. The adequacy of clinical services must be maintained but a slight shift of emphasis towards the preventive services will probably be seen as preventive medicine and family planning, which are more labor intensive, grow relative to curative medicine, whose emphasis is more on buildings, equipment and drugs, as the services to the rural people are strengthened.

ORAL HEALTH POLICIES (DP7)

Regarding the oral health policies and programs the plan states:

- . The major policy will be to prevent scattered communities, in particular their children, from suffering tooth decay and to ensure they get a fair share of dental services, especially school preventive services. The number of mobile school dental clinics will be increased to cover a wider number of schools. Fluoridation of water supplies will also be carried out to help prevent decay in young children's teeth. Consideration will be given to extending dental services to new forms of treatment including low-cost denture services for the poorer sections of the community.
- . One of the biggest difficulties regarding the overall standard of dental services is knowing whether the basic needs continue to be met. The Government recognizes that a shortage of dentists exists. The number of dentists and therapists will be increased and where necessary expatriate dentists will be recruited. Dental statistics will be developed during the Plan period so as to gauge more accurately the availability and quality of dental services in Fiji.

ORAL HEALTH POLICIES (DP8)

8th Development Plan (DP8) (1981-1985) makes the following policy statement on Dental Services:

- . Government efforts in providing dental services in the country during DP8 will be preventive in nature, as the main focus of activity will be extension of the service to schools and areas where dental services are scarce. Free treatment for school

children only and active health education will continue to be provided during the DP8 period.

- . Dental services face a staffing shortage, largely because of past policy whereby doctors were also trained in the basics of dentistry and were expected to fulfil this additional role. Expansion of the dental service has been negligible due to limited numbers of dental graduates and the lack of working space for dental personnel in the outlying stations. These problems are being slowly overcome through increasing recruitment of ancillary dental staff. It is these staff who provide much of the dental care available outside the principal clinics. Many of the ancillary staff work independently in rural areas, and without them, patients would have to travel great distances for dental treatment. To upgrade the quality of service in rural areas, it is a policy of Government during DP8 that dental personnel be attached to certain rural health centres as part of the rural health team.
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7.1.5 DEMOGRAPHIC FACTORS

Fiji is a country of various ethnic groups, of varied religion, beliefs, cultures and traditions, all living in a unique harmonious unity under an avowed policy of multi-racialism and personal freedom which existed for more than a hundred years since the cessation of tribal wars and the signing of the Deed of Cession (to Great Britain) on 10th October, 1874.

It is becoming increasingly difficult to identify the ethnic origin of some of the young people at first sight, the result of the various races living together for several decades.

FIJIANS

The indigenous Fijians are racially classed as Melanesians, but they have a considerable admixture of Polynesian blood particularly those in the Eastern Division (Figure 3). At the time the first Europeans arrived in Fiji, this Polynesian influence was greater in the Lau Islands (nearest to Tonga) and in the windward sides of the largest islands; while those people in the interiors of the large islands were more purely Melanesian (Fiji Today-1980).

The Chieftan families of Fiji, which still have great influence, trace their descent from Polynesian intrusion that occurred, according to their reckoning, about 11 or 12 generations ago. The social system that developed was a communal one and a large proportion of the people still live in villages, fully sharing the obligations and rewards of a community, inevitably under modern economic pressures, life even for the Fijians is being modified, with more of them working for wages and living far away from their native villages.

The indigenous Fijians are the second largest ethnic group, comprising 44.2% of the population.

INDIANS

The largest group are Indians, descendants of indentured labourers brought to Fiji by the British Government (1879-1916) to work in the sugarcane plantations, and comprise 49.8% of the population (Census-1976):

The indenture system was abandoned in 1916 (Fiji Today-1980). By 1916, 60,000 Indians had worked in Fiji and 40,000 elected to remain as free settlers. Although before and after 1916 free Indian settlers went to Fiji, the bulk of the present Fiji-Indian population is descended from these people. Today the Indians are farmers mainly associated with the sugar industry, business or professional men, public servants, clerical workers or wage earners.

EUROPEANS

Some Europeans came first to Fiji in the early 19th century in search of sandalwood. They were followed by missionaries who wished to convert the heathen to Christianity and by settlers who wanted land and to trade. (Fiji Today-1980). The Europeans now number 0.8% of the population (Census-1976).

CHINESE

The Chinese were late comers to Fiji although they now form a community of over 0.8% of population (Census-1976), mostly working as shopkeepers, merchants, tradesmen. The first census to record Chinese was in 1911 when there were just over 300.

Generally, Chinese, Europeans and Indians predominate in the urban areas and Fijians in the rural areas.

OTHER RACES

Other Pacific Islanders comprise, 1.2% of the population.

TOTAL POPULATION

In 1976 Fiji had a population of 588,068 (Table 20). Largest population centre is Suva, with 66,018 followed by Lautoka 25,095.

Over 65% of the population is under 25 years of age (Report on the Census of the Population 1976). There has been a marked increase in urbanisation in recent years.

SCHOOL POPULATION

There are some 130,000 primary school children (Table 21), and it is estimated that this number will increase to 138,000 by 1990 (Table 22). According to the Ministry of Education (personal communications-1981) this estimate is likely to increase further on 2 main events:

- . Unexpected improvement in the retention rates at school;
 - . Increase in the number of 5 years olds at class 1 level. (At present most children in class 1 are 6 years of age).
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TABLE 20TOTAL NUMBERS OF MALES AND FEMALES (FIJI-1976)

COMPONENT POPULATION	MALES	FEMALES	PERSONS
Chinese and Part-Chinese	2,503	2,149	4,652
European	2,605	2,324	4,929
Fijian	131,413	128,519	259,932
Indian	147,194	145,702	292,896
Part-European	5,358	4,918	10,276
Rotuman	3,666	3,625	7,291
Other Pacific Islanders	3,474	3,348	6,822
All Others	737	533	1,270
TOTAL	296,950	291,118	588,068

SOURCE: Report on the Census of the
Population-1976.

TABLE 21
PRIMARY SCHOOLS AND ENROLMENT-FIJI
 (AS AT DECEMBER 1979)

<u>ADMINISTRATIVE DIVISION</u>	<u>No. OF PRIMARY SCHOOLS</u>	<u>No. OF CHILDREN</u>
<u>WESTERN DIVISION</u>		
Nadroga/Navosa	57	9,929
Lautoka/Yasawa	74	21,134
Ba/Tavua	58	15,049
Ra	40	5,996
<u>Total</u>	<u>229</u>	<u>52,108</u>
<u>CENTRAL DIVISION</u>		
Nausori	101	17,859
Suva	70	25,376
<u>Total</u>	<u>171</u>	<u>43,235</u>
<u>EASTERN DIVISION</u>		
Eastern	107	10,111
<u>Total</u>	<u>107</u>	<u>10,111</u>
<u>NORTHERN DIVISION</u>		
Macuata/Bua	82	16,588
Cakaudrove	59	7,256
<u>Total</u>	<u>141</u>	<u>23,844</u>
<u>NATIONAL TOTAL</u>	<u>648</u>	<u>129,298</u>

SOURCE: Ministry of Education - Personal Communications-1981.

TABLE 22

ESTIMATED PRIMARY SCHOOL ENROLMENT, 1982-1990 - FIJI

Year	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Form I	Form II	Total Class 1 to Form II
1982	17000	16400	16300	16100	16100	16000	14900	14200	127000
1983	17100	16400	16400	16300	16100	15900	14900	14100	127200
1984	17200	16600	16400	16400	16300	15900	15000	14100	127900
1985	17800	16700	16600	16400	16400	16200	14900	14200	129200
1986	18200	17300	16700	16600	16400	16300	15200	14300	131000
1987	18200	17700	17300	16700	16600	16300	15400	14500	132700
1988	18300	17800	17000	17300	16700	16500	15400	14600	134300
1989	18500	18000	17800	17700	17300	16600	15600	14700	136200
1990	18600	18100	18000	17800	17700	17200	15700	14900	138000

158.

NOTE: . Rolls for Classes 7 and 8 of Primary Schools and Forms I and II of Secondary Schools are included in the figures for Forms I and II above. (Forms I and II are equivalent to classes 7 and 8 in Primary Schools).

. Estimated Number 1982-1990:

- Based on the 1976 Census (ZWARTS)
- Assumes gradual improvement of present retention rates.

SOURCE: Ministry of Education - Personal Communications-1981.

7.1.6 SOCIO-ECONOMIC FACTORS

The people of Fiji are generally an extremely polite people - politeness that can cause misunderstanding. They do not wish to disappoint others and, therefore, will in many cases say they understand an idea even when they do not. Very often one will see no reaction, even to a painful dental procedure, as people do not generally believe in public showing of emotion. For most people their first introduction to an oral health clinic is most likely to take place during an emergency visit for a toothache.

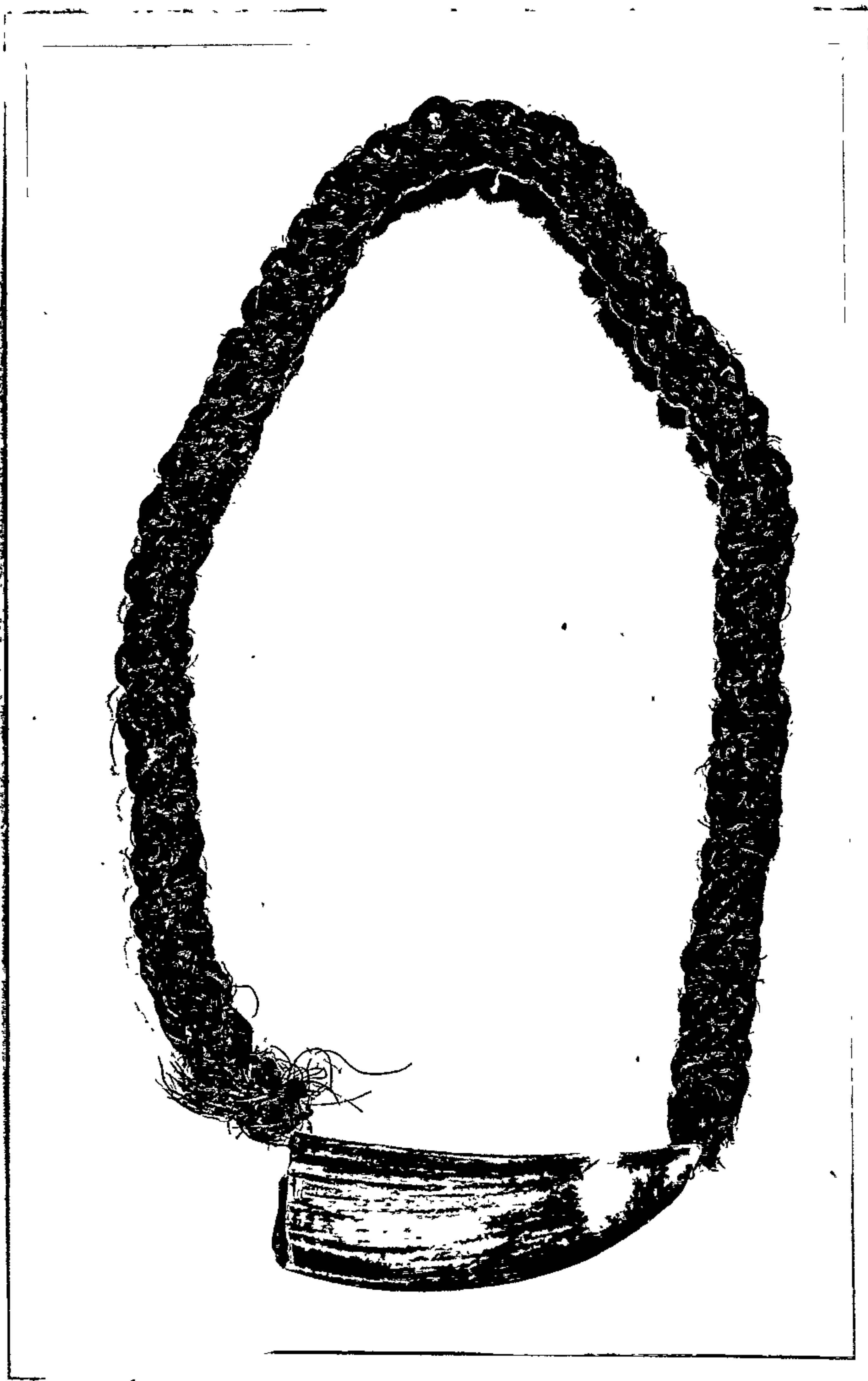
THE TABUA

The Tabua (meaning sacred) or whale's tooth is significant only in Fiji (Figure 15). They are polished with oil and attached to plaited handles of sinnet. Tabua continues to have a great significance for the Fijians and they are presented ceremonially to distinguished guests and are exchanged at betrothals, weddings, births and deaths and when personal or communal contacts or agreements are entered into. The tabua is highly valued not in currency but in tradition and to be presented with a tabua is a great honour.

INDIAN TRADITION

Among people of Indian decent there is a tradition to bring sweets, soft drinks and biscuits for children when their parents and or other older members of the family go shopping. They also have a long standing custom that when one family visits another to give gifts of sweets, soft drinks and or biscuits to young children. This action is likely to promote the use of sweets and soft drinks among young children; thereby leading to an increase in prevalence of dental caries in primary dentition and 6 year permanent molars. The idea of

FIGURE 15



The Tabua - Whale's Tooth

Has intrinsic value for the Fijians.

giving gifts to children may be retained, but fresh fruits (eg. apples, oranges, bananas) nuts and other nutritious foods should be substituted for caries promoting foods (i.e. sweets, biscuits and soft drinks). This could be achieved through active oral health education program.

The majority of people of Indian descent live in settlement estates near towns and therefore children have access to sweets, biscuits, soft drinks and other refined sugar products. Conversely, Fijians do not have these customs and majority of them live in a village environment where sweet sticky foods and soft drinks are not so readily available.

Most people of Indian descent follow the custom of washing their face and brushing their teeth with chewed twigs or brushes before breakfast. This may explain why Indian children have better oral hygiene.

FRIENDLY PEOPLE

Wong (1965) claims that 'Fiji has been looked upon as the cultural centre of the South Pacific Islands'. He found that the problem of response which constituted the main obstacle during the Singapore dental survey did not exist in Fiji. He comments as follows:

The work of World Health Organisation in this part of the world is appreciated, recognised and accepted. Investigations and surveys are carried out periodically with cooperation and support from these people and consequently the dental survey was looked upon as commonplace. Basically the inhabitants of these South Pacific Islands are hospitable and friendly in nature.

THE EFFECTS OF CHANGES IN CULTURAL PATTERN

The social and cultural background of a country should be used to best advantage in the design and provision of oral health services. It appears inevitable that in search of economic development, independence and outward pressures the social customs, attitudes, habits and cultural patterns of people will change in a way which is likely to lead to deterioration in the oral health of the community. This trend is already visible in French Polynesia and the Cook Islands (SPC-Dental Health Report-1978). Experience in these countries indicates that dental caries incidence can be expected to rise in a country as dietary patterns change to include more refined carbohydrate foods.

7.1.7 THE MANPOWER FACTORS

The need for a manpower policy is both immediate and continuing. Manpower, physical facilities and technical knowledge are 3 basic resources in a health service. Acquisition and efficient use of resources, including manpower must be deliberately planned.

THE DENTAL PROFESSION

In South Pacific countries private practice exists in Fiji and French Polynesia (Speake-1980). In Fiji during 1972 private dental practice consisted of 6 general practitioners, who had graduated from Australia or New Zealand. Their practices were concentrated in the urban areas (Suva-5 and Nadi-1). The rural population, apart from occasional tours by Government dental officers, were not served adequately. The dental officers trained at the Fiji School of Medicine were confined to employment within the Public Service and there were only 2 university graduates in the Service.

The Courtesy Title Doctor

In 1975, the author made a submission to the Minister of Health to confer the courtesy title 'Doctor' on all Dental Surgeons. This was later approved by the Government and all Dental Surgeons, including the graduates of Fiji School of Medicine are now entitled to use the courtesy title 'Doctor'.

Right of Private Practice

About this time submissions were made to the Government by the Fiji Medical and Dental Associations to permit graduates of Fiji School of Medicine to enter private practice. The Government after serious considerations approved that medical and dental officers, who

had graduated from the Fiji School of Medicine, be allowed to enter private practice after 6 years of service with the Government (Fiji's 7th Development Plan-1975).

At present, several dental officers, who are graduates of the Fiji School of Medicine are in private practice. Towns such as Ba, Labasa, Lautoka and Nausori, which did not have a private dental practitioner service in 1972; now have such a service. 1 private practitioner specialises in orthodontic work. There were 13 dentists in private practice in 1980 (Fiji's 8th Development Plan-1981-1985).

Concomitantly with these developments there has been emigration of most of the Dental Surgeons who had qualified in Australia or New Zealand, a loss which Fiji can ill-afford. At present there are 2 university trained dental officers in the Fiji Public Service and 6 in private practice.

Fiji Dental Association

The Fiji Dental Association is the voice of the Dental Profession in the country. The Association has established a Code of Ethics to regulate the conduct of their members and their relationship with patients. The Association is affiliated to the South Pacific Dental Secretariat (formed in 1973) of the Federation Dentaire Internationale (SPDS FDI). The author was a foundation member and the first Secretary/Treasurer (1973-1976) of the Secretariat.

He was also responsible for organising a joint meeting of the Fiji Dental Conference and the First Meeting of the South Pacific Dental Secretariat in June 1976 in Suva, Fiji.

DENTAL OFFICERS

Development of Oral Health Services

Organised dental services and training of Dental Officers in Fiji developed originally as an offshoot of an already established Native Medical Practitioner Service. The history of training and utilisation of Native Medical Practitioners can be traced back to 1886 (Fiji Annual Report-1972).

This paved the way for the development of allied services - although nearly half a century was to elapse before the recognition of the increasing incidence of oral diseases among the Fiji Islanders led to the initiation of a Native Dental Practitioner Scheme in 1945. Over a period of time this title has been progressively changed to Assistant Dental Practitioner (1951); Assistant Dental Officer (1956); and finally Dental Officer (1964) (Fiji School of Medicine Handbook-1981).

In 1943 the Government Dental Services came into existence with the appointment of a local dental officer who had graduated from Otago University (NZ). At the end of 1946 the first Native Dental Practitioner received his certificate from the Fiji School of Medicine. In 1953 an Australian dentist was appointed as Senior Dental Officer to organise and direct the activities of the newly established Dental Division of Medical Department. Under his leadership the Assistant Dental Officer (later Dental Officer) training was re-organised and made a 3 year course with the deletion of Prosthodontics from the curriculum. In 1972 the Dental Officer Course was completely revised and extended to 4 years with the inclusion of prosthodontics and in 1974 an expansion in the teaching of pedodontics, periodontics, preventive and public health dentistry was introduced by the author. Duties of dental officers were clearly defined in 1972 and minor amendments made in following years (Table 23).

TABLE 23JOB SPECIFICATION OF DENTAL OFFICER - FIJI - 1976CLINICAL:

- . The diagnosis, detection and treatment of abnormal conditions of the teeth; the supporting tissues, and soft tissues of the mouth.
- . Where a condition requires treatment by a Specialist or Medical Practitioner, the dentist advises the patient and/or arranges the consequent referral.
- . Where a patient has suffered any physical illness or disability which renders subsequent dental treatment a risk to the patient or his health the dentist is responsible for obtaining a clearance from a qualified medical practitioner;
- . For any premedication required (before he, or a dental therapist may commence treatment).

NON-CLINICAL:

- . Public relations work necessary to promote the work of the school oral health service and the good oral health of the community.
- . The maintenance service and good care of property, building, mobile clinics, furniture, equipment and instruments placed in his/her care.
- . The planning and administration of school oral health service within the district.
- . Organisation of program in oral health education.
- . Inspect the treatment provided by Dental Therapist and provide constructive criticism, advice and encouragement when indicated.
- . Organisation of continuing education of all staff through tutorials/discussion.
- . Continuing evaluation of oral health care program in the district.

Training Facilities

The Fiji School of Medicine (FSM)

The principal function of the School is the training of students selected by their respective governments in the South Pacific region, to a standard acceptable for registration in Medicine and Dentistry for work in the South and Central Pacific. Diplomas in Medicine and Surgery (DSM) and in Dental Surgery (DSD) are issued to successful candidates (Fiji School of Medicine Handbook-1981). Prior to 1926 the school trained medical personnel from Fiji only, but in that year the school was enlarged and began to accept students from other Pacific Island Territories (Fiji Annual Report-1972).

The Fiji School of Medicine is under the control of the Fiji Government and is directed by the Principal and overall policy is decided by Advisory and Academic Boards. The School is financed by the Fiji Government to whom fees (F\$2,000 per student for a year) are paid by each country with students at the school (FSM-Handbook-1981).

Various auxiliary and ancillary courses are also offered at the School, these include Physiotherapy, Laboratory Technology, Radiography, Hygiene, Dietetics, Dental Therapy, Dental Technology, Pharmacy Technology, Medical Assistant, Junior Dental Assistant (FSM Handbook-1981). In this school professional as well as their supportive (auxiliary) personnel are trained under one administration. A Seminar held in New Delhi in 1967 (WHO-1968) recommended that:

when dental schools are established provision should be made to have auxiliary departments because of: economy and teamwork of various category.

Barmes (1969) argues that each nation should have a national oral health plan which integrates production of manpower with delivery of services. The author, in the light of his experiences and observations in Australia, Fiji and New Zealand strongly supports the WHO recommendation and feels that if auxiliaries are to work as a team with the professionals, then their training should also reflect this spirit and mood. Wong (1965), commented that:

----- despite the makeshift appearance of the Dental Department of Fiji School of Medicine, it has, nevertheless, produced many fine clinicians -----.

He recommended that:

urgent assistance should be offered to the Dental Department in the form of equipment and teaching staff to strengthen the existing faculty with a view to expanding it into a fully fledged Dental School in the foreseeable future.

Teaching Staff

The author agrees with this recommendation and points out that very little can be done to improve the standards and status of the School without adequate qualified staff, teaching equipment and materials. Unfortunately very little progress in this direction has been made since the above recommendation was made over 15 years ago. At present there are only 2 full-time teaching staff members, both graduates of this school, who have done further studies at the University of Otago in Conservative Dentistry and Periodontology respectively. It is pleasing to note that in 1981 WHO has provided a Senior Tutor in Dentistry*. Graduates of the School are eligible to study for Diploma in Public Health Dentistry at the Universities of Otago and Sydney.

*Principal FSM-1981 (Personal Communications).

Recognising the need for formal postgraduate training for dental officers in other oral health disciplines, the author made a submission in 1975 to the Dean of the Dental Faculty at the University of Otago to establish Diploma courses of 1 year duration in other dental disciplines. The author was pleased when in 1976 courses leading to Diploma in Clinical Dentistry (e.g. Prosthodontics, Conservative Dentistry, Periodontics and Oral Surgery) were established at Otago. The first student from Fiji completed his Diploma in Clinical Dentistry, just before the author left Fiji for Australia in January 1977.

This innovation has gone part of the way to providing teachers in different disciplines for the School as all senior staff at the Suva Dental Centre are required to teach dental and auxiliary students. The Dental Centre at Suva is a treatment as well as a teaching unit of the School. This puts a very heavy strain on the available resources at the Centre. Therefore, it is strongly stressed that a new and well equipped Dental Centre should be given priority in planning of health services.

Objective of Undergraduate Curriculum

The objective of undergraduate dental education has been defined in many different ways, but there is general agreement that an essential objective is to provide students with the knowledge, skills and attitudes that they require to become competent general practitioners of dentistry. Traditionally, in most western countries the emphasis has been on the education of a private practitioner. In Australia and New Zealand the majority of dentists are in private practice, however, in the countries of the South Pacific region all the dentists (except Fiji and French Polynesia) are in public service.

Modification of Dental Course

In the light of these considerations the curriculum of the dental officer course was modified and adapted by the author (Table 24) to meet more accurately the oral health needs of Fiji (and to some extent the other Pacific Islands). The curriculum was kept flexible to allow for periodic review based on current and likely future needs and demands of the community and also the resources of the Public Service. The Course is patient oriented. As periodontal disease is common in Fiji; the students start learning and practicing preventive and prophylactic periodontics and preventive dentistry in the latter half of 2nd year of the course. Caries control in children is also given strong emphasis. Students learn more about team dentistry and nutrition than in most University courses. Practical preventive dentistry is carried out in clinics and schools. Crown and Bridge prosthodontics is not taught as there is little need for it. As there is no central laboratory for servicing and maintenance of equipment, students are given enough practical training to enable them to do routine repairs, servicing and maintenance. An oral health care service can be in jeopardy, if the equipment are not properly serviced and maintained, particularly in rural areas.

Reciprocity with Other Countries

Undergraduate and some postgraduate dental education in Fiji is financed by the taxpayer in anticipation that the resulting dentists will provide the required oral health services for the country. Therefore, the basic need for reciprocity with other countries does not arise. Of course, if the qualification was also acceptable overseas this would be beneficial but, nevertheless, this cannot be accepted as the major argument to control the design and the content of dental undergraduate course in Fiji.

TABLE 24DIPLOMA IN DENTAL SURGERY - FIJISUBJECTS TAUGHT - 1976

1ST YEAR	2ND YEAR
. Chemistry . Physics . Biology . Psychology . English . Mathematics	. Oral and Dental Anatomy . Histology and Embryology (with MED. II) . Physiology (with MED. II) . Biochemistry . Oral Histology and Embryology . Dental Technology . Preventive Periodontics I
3RD YEAR	4TH YEAR
. Conservative Dentistry . General Pathology and Microbiology (with MED. III) . Oral and Dental Pathology . Pharmacology and Dental Therapeutics . Exodontics and local Analgesics . Preventive Periodontics . Prosthodontics . Radiology	. Public Health and Preventive Dentistry . Periodontics . Dental Material Science . Oral Surgery . Prosthodontics . Clinical Dentistry . Pedodontics . General Medicine and Surgery

DENTAL AUXILIARIES

The report by an International Mission on Medical Education in Fiji (1971) states that:

We have considered whether school dental nurses should be trained in Fiji, similar to those trained for many years past in New Zealand. We have doubts about the wisdom of this, but we think that there may, in a few years, be a strong case for training dental auxiliaries with a wider range of skills than a dental hygienist. Such training would best be introduced after professional dental education in Fiji is based on a course leading to a degree.

Pattern of Oral Diseases

The pattern of oral diseases as previously discussed under epidemiological factors revealed that children between the ages of 3-4 years had an average of 3 df teeth. This increased to 4 df teeth at the age of 5 years. This represented the peak period of decay of deciduous teeth. Wong (1964) found that the amount of dental care received by children was low-only about 30% of primary teeth were filled. It appears from these findings that the restoration of deciduous teeth remained a major problem in pre-school and primary school children. This has subsequently been confirmed by Speake, Singh and Ligani (1980).

Another factor that was evident from the survey was that calculus was widespread even in children of 5-6 years of age. There was direct correlation between the presence of calculus and gingival condition. By the middle age of 44-54 years almost everyone had calculus. Materia alba was more prevalent in pre-school children and with children in the first 2 or 3 years of primary school and with adults. These figures indicated

the threat of periodontal diseases to tooth survival. Since gingivitis is a reversible periodontal condition, the removal of the causative factors through effective oral hygiene and oral prophylaxis could form an adequate and effective control.

Dental Therapist

The manpower existing up to 1972 were only a few dental hygienists. These hygienists spent the bulk of their time performing non-operating duties, normally carried out by dental assistants. A very small percentage of the hygienists' clinical time was spent in performing scaling and polishing of teeth and providing much needed oral health education. Wong made the following comments:

--- It would be sound public dental health planning for Fiji, if chairside assistants could be trained and introduced into the framework of the dental service thus releasing the dental hygienists for full clinical duties.

It appeared to the author that there was a need for new approach in the training and utilisation of oral health personnel. Davies (1980) argues that there is a need to train auxiliaries in accordance with the country's oral health needs.

The author feels that developing countries should refrain from adopting patterns that are foreign to their culture and should evolve principles in keeping with their needs and demands. In view of these considerations the author decided that Fiji needed a versatile operating auxiliary trained to deal in areas where the need was greatest. In broad terms; these needy areas were seen to be preventive dentistry, oral health education, simple restorative dentistry and exodontics on children and preventive and prophylactic treatment of periodontal diseases in children and adults. This gave birth to 1 category, multi-purpose operating auxiliary - the dental therapist (Narayan-1974). It was also felt that the use of an effective operating auxiliary in dentistry would reduce, or at least help to minimise the escalating cost of oral health care.

Another important feature of the proposed auxiliary was that he/she would be a viable unit in any normal clinical situation, and for this reason he/she would need to have a sufficiently wide range of clinical and non clinical duties to make this possible. It was realized that in New Zealand a small number of supervising dental officers and dental nurses inspectors with a large number of school dental nurses were able to cope adequately with the oral health needs of primary and pre-school children.

It was also considered that dentistry in Fiji did not need a variety of operating auxiliaries trained to different levels, but instead a single, versatile, all-purpose auxiliary with a broad based 3 year training, (3rd year - field and clinical training) equipped with fundamental clinical skills and a sound knowledge of basic principles. With this type of background he/she could then readily adapt to a multitude of clinical situations and also with on-the-job training and continuing education in the form of short, participation seminars and discussions would have the opportunity to develop into a valuable and efficient member of the oral health team. In order to enhance the status and career prospects of dental therapists, a 3 year training period was accepted as dental hygienists were trained for 2 years. The broader scope of training and duties of the dental therapist is expected to provide job enrichment (Narayan-1979). A job is enriched when it demands more of individual's talents and capabilities.

An important underlying principle of the concept was that the dental therapists would never represent another level of dentistry nor would he/she become a second rate dentist, but rather he/she was to work in close association with a dental officer at all times, increasing his/her capacity to provide quality oral and dental care to a far greater number of children and adults (preventive and prophylactic periodontics only) at a minimum cost. The dental therapist would be capable of carrying out the tasks without direct supervision, thus

releasing the dental officer physically from one clinical area to attend to other more involved procedures and administrative duties (Narayan-1972, 1974).

The dental hygienist course was therefore, abolished and the dental therapist course was initiated in 1973. The best features of dental hygienist and dental therapy curricula (Table 25) were combined to form a common core for the training of this new operating auxiliary (dental therapist) to deal with dental caries and periodontal problems in Fiji. Their duties were clearly defined and specified (Table 26). Initially all dental hygienists were given the opportunity to do 1 year conversion course to enable them to become dental therapists.

Boyles (1980) also argues that a single type of auxiliary could be produced to meet the need:

--- suggest that there is a need for a flexible type of ancillary worker, suitably trained in both operative and preventive techniques, whose role could be adapted to the changing pattern of oral disease. This would avoid unnecessary duplication, and with careful consideration of the method of utilisation of these ancillary workers, a major part of routine dental care could be provided in a more economic manner. Indeed it has been estimated that more than 80 per cent of the operative and preventive treatment needs for dental caries and periodontal disease in large groups of 15-year olds could be provided by ancillary workers.

With the reduction in caries incidence in children, it seems likely that any restorative work needed will be of a simple nature and that even greater emphasis will be needed on the maintenance of periodontal health. It would seem reasonable to suggest that a single type of ancillary could be produced to meet those needs.

TABLE 25CERTIFICATE IN DENTAL THERAPY - FIJISUBJECTS TAUGHT - 19761ST YEAR - PRE-CLINICAL

- . Introduction to Oral Health
- . Human Biology
- . Hygiene and Ethics
- . Introductory Preventive Periodontics
- . Principles of Pathology and Microbiology
- . Operative Technique
- . Clinical Dentistry (3rd term)
- . Preventive Dentistry I

2ND YEAR - CLINICAL

- . First Aid (St. John's Ambulance)
- . Basic Dental Pathology
- . Exodontics and local Analgesics
- . Clinical Dentistry, includes:
 - Preventive Periodontics
 - Radiography
 - Nutrition
 - Elementary Orthodontics
 - Pedodontics
- . Preventive Dentistry II
- . Equipment Maintenance and Servicing

3RD YEAR - FIELD AND CLINICAL TRAINING

- . Seminars
- . Discussions
- . Tours to rural areas
- . Clinical Dentistry - Primary Schools
- . Oral health education

TABLE 26DENTAL THERAPIST - FIJILIST OF DUTIESCLINICAL

Clinic management, including records, and setting out of own instruments for operations.

Clinical dentistry - the following operations are included:

- . Irrigation of the mouth and removal of sutures.
- . Pre- and post-operative instructions.
- . Removal of dental calculus - scaling and polishing.
- . Cleaning and polishing of teeth and restorations.
- . Topical application of solutions.
- . Insertion and removal of surgical packs e.g. in treatment of dry socket.
- . For children up to the age of 15 years:
 - Cavity preparation and filling in amalgam, cement, silicate and composite material of deciduous and permanent teeth;
 - Extraction of deciduous teeth with forceps (but not elevators);
 - Administration of local analgesics, including mandibular block.
- . Intra-oral radiography for usual dental examination.
- . Impressions for study models when required.
- . Pulp capping and pulpotomy if required.
- . Oral Health Education - individual, school and community. .

NON-CLINICAL

- . Promotion of the work of the school oral health service.
- . Care of property, building, mobile clinic/s and equipment.

Junior Dental Assistant

In order to have a non-operating auxiliary to take over non-clinical duties from the dental hygienists, a junior dental assistant course was initiated in 1974.

When the mobile dental clinics were first introduced in Fiji the dental officers agreed to drive these clinics to and from schools. However, in 1970 (about 2 years prior to the author assuming the position of chief dental officer) the dental officers refused to accept the directive that driving of mobile clinics was part of their normal duty. They requested that drivers be provided to do this job, but the Government refused to accede to their request, and as a result of this dispute the mobile clinics were lying idle when the author assumed the position of chief dental officer. After consideration of the problem and series of discussions, he informed the Ministry of Health, and the dental officers, that because of his new oral health strategy the Government need not provide drivers for the mobile clinics and the dental officers would not be required to drive the mobile clinics.

The duties of the junior dental assistants were designed and specified to include servicing and maintenance of instruments and equipment and driving of mobile dental clinics and trailers to and from schools (Table 27). To facilitate this objective it was decided to recruit selected male students (preferably with driving licence) from districts where the need was greatest. These students would return as junior dental assistants to their districts after receiving formal training at the Fiji School of Medicine.

This move has several advantages:

- . The junior dental assistants would be able to maintain and service equipment and instruments. Maintenance and servicing of equipment was largely a neglected field prior to this. However, with the escalating costs of replacing these items it was important that proper maintenance care be provided.
- . The junior dental assistants would drive the mobile dental clinics which were lying idle for several years because of dispute between dental officers (A writ was served by the dental officers on the Government) and the Government.
- . The junior dental assistants would live in their own homes and serve in the district from which they were recruited, thus obviating the need for the Government to provide official quarters (and thus saving funds) which was customary for public servants; who were transferred from one district to another, (except Suva).
- . The junior dental assistants would be familiar with the district and would therefore be in a position to maintain a close and continued link between the school, community and dental centre.
- . The dispute between the Ministry of Health and the dental officers concerning the driving of mobile dental clinics was settled amicably to the satisfaction of both, with neither party losing face.

TABLE 27JUNIOR DENTAL ASSISTANT - FIJILIST OF DUTIESCLINICAL

- . Reception of patients, registration and history taking.
- . Normal procedures associated with chair-side assisting and clinic management e.g. mixing of filling materials, setting out instruments for operations.
- . Cleaning and sterilising of operating instruments.
- . Maintenance and repair of dental equipment and instruments.
- . Preparation of the Clinic (Static/Mobile) for reception of patients.
- . Setting up of trolley, tray, and bracket table for operations.
- . First Aid procedures e.g. for fainting during extractions.
- . Toothbrush instructions and dietary advice.
- . Developing X-ray films.

NON-CLINICAL

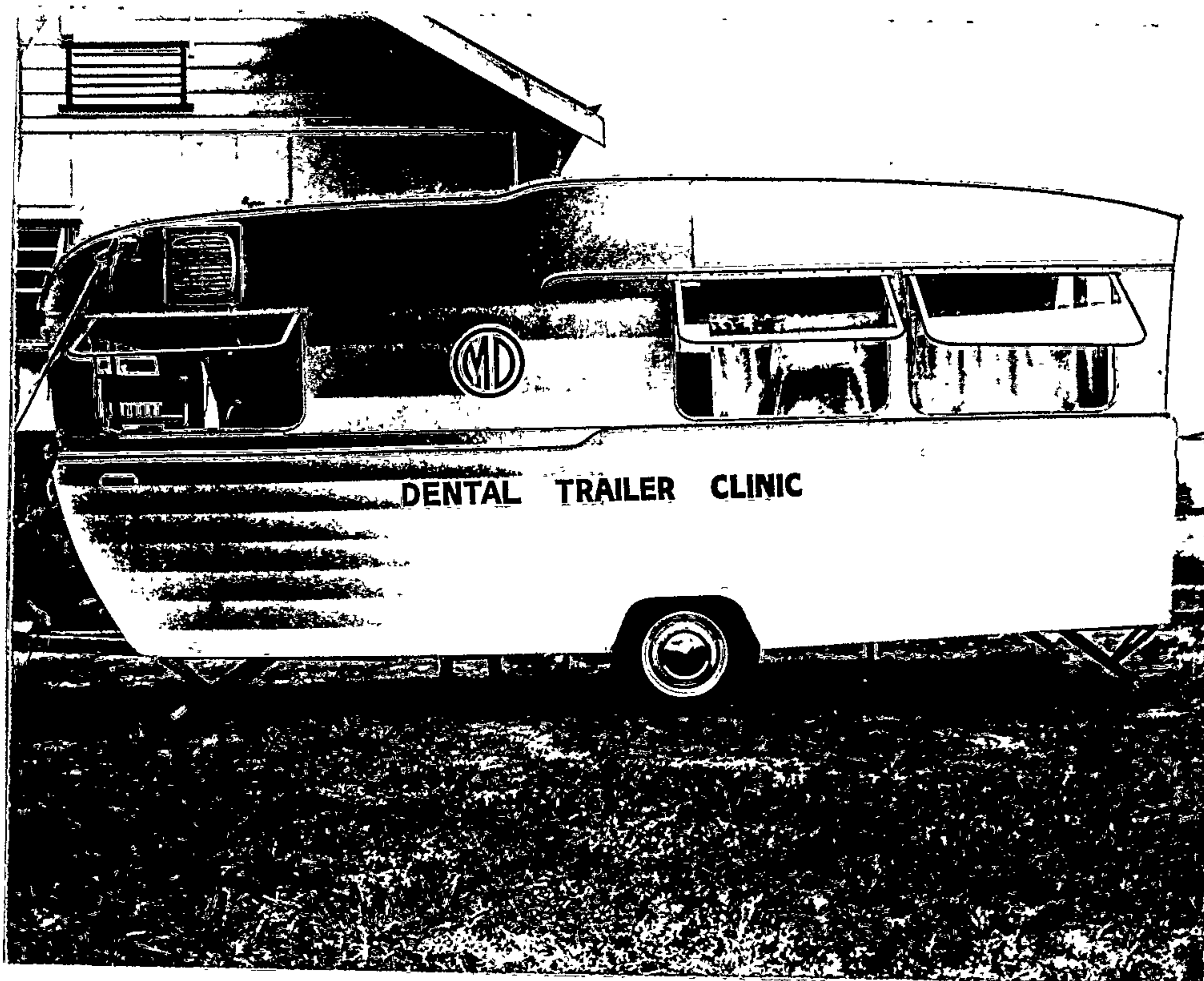
- . Driving of mobile clinics and trailers from static clinics to schools and return.
- . The maintenance, service, and good care of static/mobile clinics, furniture, equipment and instruments.
- . Prepare requisitions for stores periodically as required.

FIGURE 16



School children getting ready for
Oral Examination in a Mobile Clinic

FIGURE 17



2 Types of Mobile Dental Clinic used
in Fiji

TABLE 28THE ORAL HEALTH TEAM - FIJI - 1976

<u>PROFESSIONAL</u>	
<u>Dental Officer (Dr.)</u> (Operator-Professional) 4 years training	Leader, Planner, Health Educator and Clinician Males/Females.
<u>SUPPORTIVE PERSONNEL</u>	
<u>Dental Therapist</u> (Operator Auxiliary) 3 years training	Operative auxiliaries and Health Teachers working in the TEAM of a Dental Officer in Schools, Clinics and Health Centres. Males/Females.
<u>Junior Dental Assistant</u> (Non-operator-auxiliary) 2 years training	Assistant Dental Officer, and Dental Therapist by performing non-operative clinical and other duties, including driving of mobile dental clinics to and from schools. Males/Females.

These assistants are trained for 2 years (1st year-formal training, 2nd year-field training) at the Fiji School of Medicine. With the establishment of training courses for dental therapists and junior dental assistants more manpower became available for the oral health team, leading to expansion in the school oral health clinics (both mobile and static - Figure 16 and 17) in the various Districts. The static clinics are located in respective Health Centres/Hospitals to provide integrated health service to the community. Members of oral health team in Fiji are shown on table 28.

Manpower Ratio

The operator (Dentist/Dental Therapist) population ratio forms a crude guide to manpower requirements of a school oral health service. However, there can be no universally applicable manpower ratio (Tables 3 and 4) as this depends on many variable factors including: disease levels, manpower structures (team approach), and program goals (WHO-1980).

A number of factors must be borne in mind when assessing the number of dental officers and dental therapists required to provide adequate oral health care for children. Overall planning must take into account many factors that would influence the ratio, including prevalence and incidence of oral and dental diseases demands and needs, fluoridation, non-fluoridation, ethnic groups, socioeconomic factors. Manpower planning therefore, can never be precise.

The operator (dental therapist) to child patient ratios in the Fiji Government Service at present is approximately 1:7,000 (Speake-1980). If dental personnel in both public and private sectors are included on the one hand and the whole population on the other, the overall dental personnel to population ratio is approximately 1:7889 (FDP.8-1980).

currently, there are 38 dental officers, 36 dental therapists and 50 junior dental assistants in the Fiji School Oral Health Service (Permanent Secretary for Health-1981*). From this it appears that the ratio of professional to operating auxiliary is unsatisfactory when compared to New Zealand. In New Zealand the diversion of only a small number of dentists and a large number of operating auxiliaries (school dental nurses) to the school dental service has permitted a large increase in the availability of oral health care to children from 2½-13 years of age. The New Zealand program has a management staff of 45 supervising dental officers and dental nurse inspectors (Hollis-1980). The school dental clinics are presently staffed by some 1,178 school dental nurses (Hollis-1980). This gives a ratio of approximately 1 supervising staff to 26 school dental nurses.

Taking into account that dental caries prevalence in Fiji is about less than half of New Zealand rate and other problems (periodontal, handicapping dento-facial anomalies) are of manageable proportions it is felt that an initial working ratio of 1 operator to 5,000 children should be the medium term goal of the Fiji school dental service. There are some 130,000 children in primary schools (Table 20). The estimated primary school enrolment in 1990 is 138,000 (Table 21). Once this ratio is reached the whole situation would need to be reviewed in the light of oral disease levels, needs, demands and intake of 1st year (class 1) primary school pupils.

The number is decreasing due to a strong family planning campaign (Tables 21 and 22). As the salary of dental officers is more than twice that of dental therapists (Table 29) it would certainly be a wise and economical move by the Government to intensify the training of operating auxiliaries. Facilities at the

*Personal Communication.

Fiji School of Medicine permit a maximum intake of 10 student dental therapists and this number should be admitted each year to the course and the situation reviewed at the end of 5 years (1985-end of Fiji's 8th Development Plan).

If the program utilise operating auxiliaries within the school oral health team (Table 28) for the provision of routine dental care for school children under the age of 15 years can be successfully established and executed at the national level in Fiji and the provision of treatment needs for other groups (adolescents, young adults and adults) can be adequately met by private dental practitioners, then there is very likelihood that in the next decade or so, far reaching changes in the needs, demands and provision of oral health services will begin to make their presence felt throughout the nation.

TABLE 29COMPARATIVE SALARY LEVELS OF ORAL HEALTH PERSONNELFIJI - 1981

<u>SALARY LEVELS (F\$)</u>			<u>POSITION</u>
D.E.O.7	\$ 2,452 - 3,956		Junior Dental Assistant
D.E.O.6	4,032 - 5,250		Dental Therapist
D.E.O.5	5,447 - 6,950		Dental Instructor
D.E.O.4	6,453 - 9,492		Dental Officer
D.E.O.3	10,001 - 11,527		Senior Dental Officer
D.E.O.2	11,908 - 13,306		Principal Dental Officer
D.E.O.1	14,959 - 15,594		Chief Dental Officer
M.D.O.5	14,959 - 16,230		Assistant Director Dental Services

SOURCE: Ministry of Health, Fiji-1981

7.2 DEVELOPMENT AND IMPLEMENTATION OF SCHOOL ORAL HEALTH SERVICE

The first school oral health service in Fiji was established in Suva in 1957. It arose out of an intuitive assessment of the oral health situation that existed in Fiji at that time - increasing caries prevalence, early loss of teeth due to caries, and neglect of the need for oral health care particularly in children.

Although it was obvious from the start that most pressing demand would be for treatment to relieve pain and to eliminate gross oral sepsis, oral health promotion and disease prevention were to be characteristic features of the new program. The long term goal was to promote positive oral health for all children by giving priority to the needs of primary school children, by providing dental care routinely rather than waiting for crisis situations, and by selecting a school program where prevention and oral health education could be introduced with the assistance of teachers.

IMPLEMENTATION

The author graduated from the Fiji School of Medicine as an assistant dental officer in 1956, and was assigned (with another assistant dental officer and an assistant dental hygienist) to the newly established school dental service in Suva in early 1957. The school oral health team travelled to schools by private transport.

The treatment was carried out in rooms allocated in schools by headteachers. Extractions, fillings, scaling and polishing and dressings were provided free of charge to as many primary school children as possible. Pedal drilling machines were used in most

schools and this made the task slow and difficult for the team. However, long term value of preventive measures was not lost sight of and this gave birth to the campaign for daily toothbrushing (after lunch) and oral health education in primary schools. One of the immediate objectives of the service was to reduce tooth mortality rate by restoring teeth.

At this stage shortage of manpower, however, was one of greatest hindrances for a nationwide school dental service. Recruitment of expatriate staff was difficult and the output of assistant dental officers (later dental officers - after 3 years training) from the Fiji School of Medicine was meagre (approximately 2-4 each year). For this reason the school dental service mostly provided extractions and some restorative service to meet the existing demands.

During 1956, a booklet 'Good Teeth', was produced by the service as an oral health education measure aimed at children, parents and teachers. The booklet was printed in 3 main languages of the country, namely English, Fijian and Hindi and distributed to schools.

Gradually a few more mobile dental clinics were added to the service and today all major urban centres have the services of a mobile clinic (Figures 16 and 17).

SERVICES PROVIDED

The oral health care provided (to children up to 15 years of age) is as follows:

- . Oral examination;
- . Scaling and Polishing of teeth;
- . Removal of caries and placement of dressings;

- . Cavity preparation and placement of silver amalgam, silicate or composite resin restorations in deciduous and permanent teeth;
- . Polishing of teeth and restorations;
- . Administration of local anaesthetics by infiltration and mandibular nerve block techniques;
- . Pulp capping and root canal therapy; *
- . Extraction of deciduous and permanent teeth;
- . Individual patient counselling on toothbrushing techniques, diet and oral hygiene measures;
- . Group (classroom) oral health education;
- . X-rays as required;
- . Periodontal treatment;
- . Referral of patients as required.

The treatment and preventive programs are integrated and take place during school hours. This has 1 advantage, that younger children are independent of being escorted to the clinic by parents; who would normally find difficulty in attending the clinic during working hours.

Parental consent is not normally sought for school children, who come directly from classroom under the supervision of teachers for oral examination and treatment. The treatment is offered to all schools whether government, denominational or private. Most parents do not have any objection to the oral health care of their children by the school dental service.

* Root canal therapy is provided for selected patients by dental officers.

THE IMPORTANCE OF SCHOOL ORAL HEALTH SERVICE

Given the well deserved support of the Fiji Government the school oral health service would play a vital role in promoting good oral health, preventing oral diseases and restoring existing decayed teeth. It is stressed that 'a healthy nation is a wealthy nation', therefore children should be considered by the Government as being a high priority group in the community because of:

- . High incidence of oral diseases in children;
 - . Dental caries is irreversible - it can be repaired, but not cured in the sense that most diseases can be cured;
 - . The effects of oral health neglect are carried through life;
 - . Childhood is an opportune time for forming favourable attitudes and habits towards oral health;
 - . Prevention should ideally begin in childhood before oral diseases have chance to manifest;
 - . Experience shows that largely because of parental apathy and neglect the majority of children do not receive regular oral health care and the school oral health service is reducing this problem.
 - . School oral health services are an integral part of total health program.
-

7.3 IMPLEMENTATION OF PREVENTIVE PROGRAMS

It is essential that a comprehensive oral health care program include proven anti-cariogenic measures and that they be the most effective in cost and in the utilization of professional personnel.

A child's oral health does not begin and end with attention to the teeth, especially in the case of a growing child. The role of prevention and oral health education is important and, despite the burden under which the oral health team may strive, there is much soundly based information that can be used in advising the children and parents. To achieve success in the field requires an acceptance that the problem is one of behaviour influenced by social and commercial pressures.

The following preventive programs have been designed and implemented as part of an integrated preventive, oral health education and treatment programs.

TOOTHBRUSHING IN PRIMARY SCHOOLS

There are some 648 primary (Roll-130,000*-Table 20) and some 134 secondary (Roll-35,000*) schools in Fiji (Ministry of Education-1981). The present rate of increase in the intake of 1st year children (mostly at the age of 6 years) in the primary schools is about 5,000 per year. This number is decreasing due to strong family planning campaign. These schools are situated in 55 different islands.

The toothbrushing scheme in primary schools is a combined effort of Ministries of Health and Education and has been functioning since 1957. The toothbrushes

*Figures rounded by the author.

are supplied to the schools at a nominal cost (9¢ each) through the Controller of Government Supplies (Singh-1978). These brushes are used in a toothbrush drill after lunch under the supervision of the teachers (Figures 18 and 19). They are kept in schools in specially made cabinets to keep them clean and free from insects. There is, however, no evidence to indicate that toothbrushing prevents dental caries (Health Education Council (U.K.) - 1979, Horowitz-1980).

The program needs to be intensified to intercept the formation of materia alba and calculus which appears to be widespread among 5-6 years old children (Wong-1965). With the advent of dental therapists and junior dental assistants on the Fiji oral health scene this goal has become a reality, provided these auxiliary personnel are trained in sufficient numbers. To assist in meeting this objective a booklet, 'Dental health through School Program of Lunches, Canteens and Toothbrushing', was prepared by the author in 1976 in collaboration with Education and Nutrition Authorities.

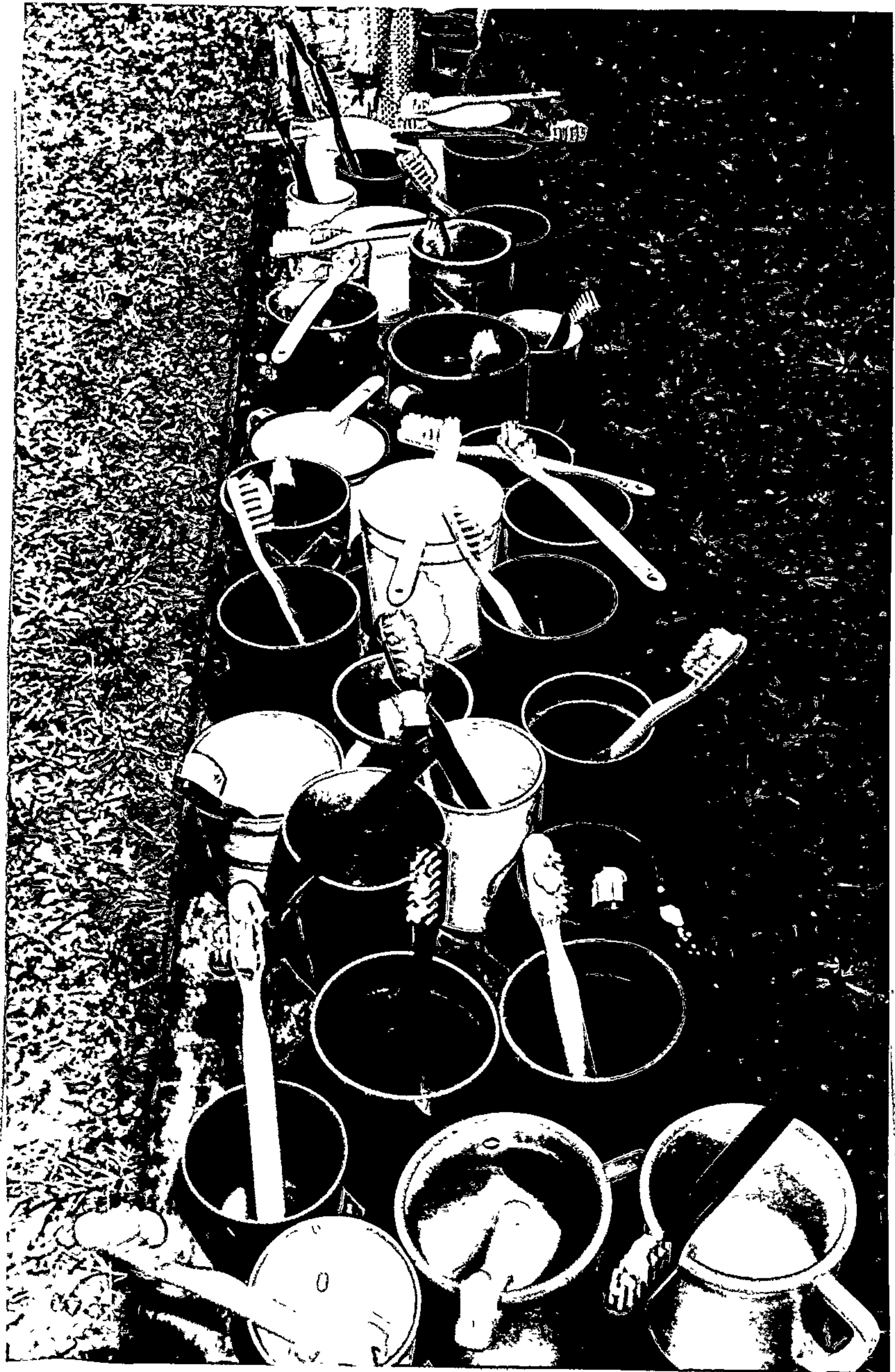
To assist the teachers in the teaching of toothbrushing, they are given teaching charts produced by the Dental Division. This daily exercise takes place after lunch, supervised by teachers, ensures that long term toothbrushing habit will be formed and that while at school every child brushed his/her teeth at least once a day. This active participation on the part of the learner is essential in influencing oral hygiene habits and dietary change.

These rows of toothbrushes in primary schools are an indication that positive steps have been taken to guard children's oral health, but the battle has only begun. Today over 75% of primary schools are voluntarily participating in this program (Singh-1978). Like all other preventive measures tangible results may not be seen in a short-time, nevertheless, foundations for a successful toothbrushing program in primary

schools has been laid. It is important to initiate an evaluation study to measure the effectiveness of this scheme. It is on this foundation, the teachers, health workers and parents must continue to build the habits and attitudes of the children, and in long term, of the community. Wong (1965) recommended that:

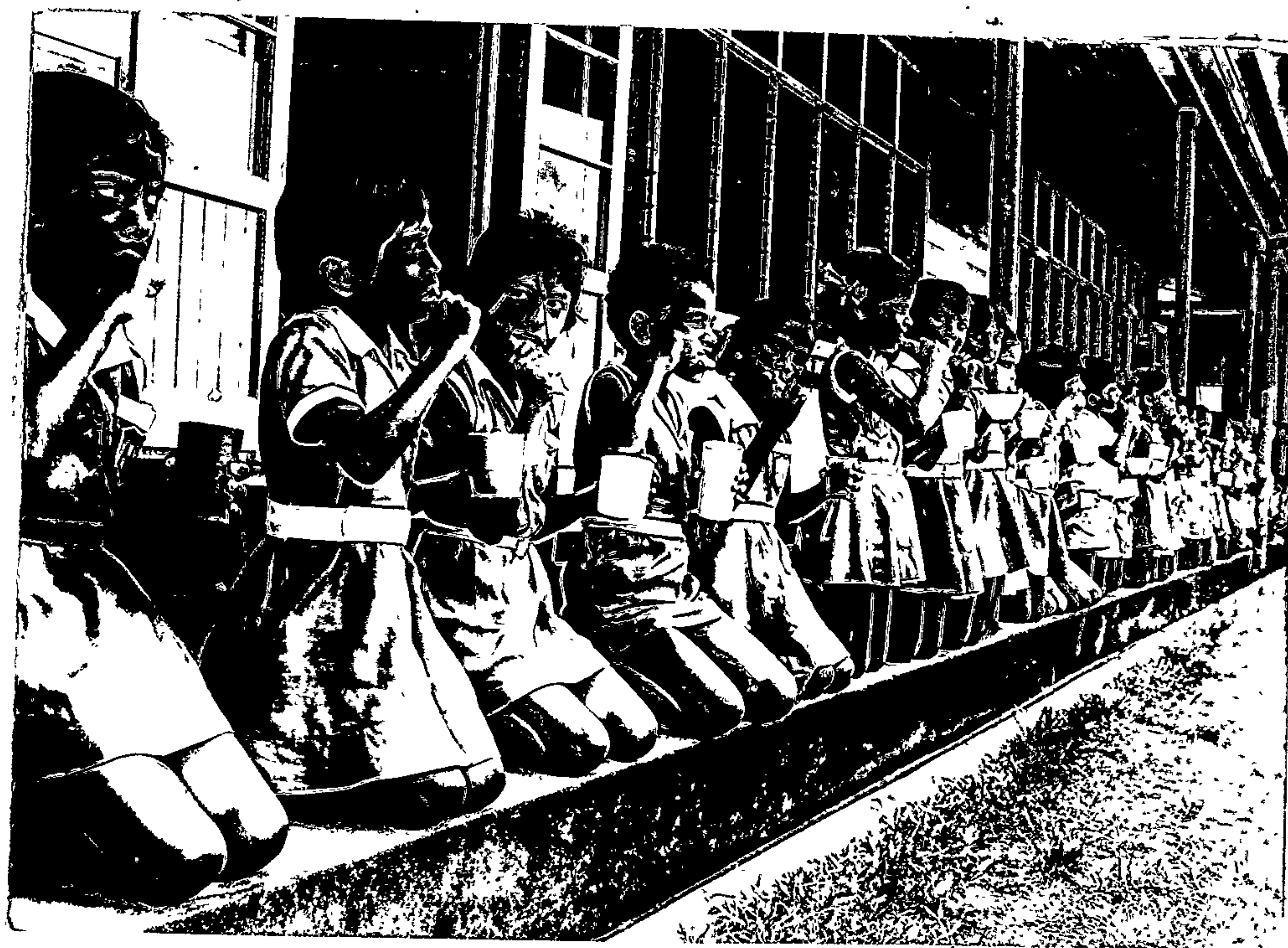
The value of the present toothbrushing campaign cannot be disputed. However, in order to extend the benefits of this operation to the pre-school children, it would be necessary to educate the mothers in the knowledge and importance of oral health practices. These messages may be conveniently conveyed by the health sisters when visiting the families and in particular, the pregnant mothers.

FIGURE 18



Preparation for Toothbrushing at School - Fiji

FIGURE 19



Toothbrushing in a School after Lunch - Fiji

FLUORIDATION

Fluoride is present in varying amounts in food (fish, taro, fruits and vegetables) and water and its impact on human health has been extensively studied (WHO-1970). This level is dependent on geological and soil conditions. Natural waters in Fiji do not contain any significant amount of fluoride. Of all preventive measures available, the use of fluoridated water through fluoridation of reticulated water supplies produces the greatest effect in reducing caries over a 10 year period (WHO-1980). In population with high prevalence of dental caries, 40-60% reduction may be expected (The Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980, Horowitz-1980, WHO-1980).

Suva, the capital city (Population 66,000) is the only area in Fiji to have a fluoridated water supply. It is estimated that about 130,000 people in Suva and its suburbs benefit from this measure (Singh-1978). This public health measure was initiated as result of one of the recommendations made in the report of the oral health epidemiological survey carried out by Wong in 1965:

The reticulated water supply of key cities in Fiji should be fluoridated ...
It would seem the best and most economical long term policy to introduce fluoridation at this stage as a preventive public health measure.

Fluoridation (0.6ppm) was introduced in Suva in 1969 on a much quieter note than in most other countries and has been in operation since then (except for periods totalling 18 months during 1974-1976 caused by technical problems (Speake, Singh and Ligani-1980). The beneficial effect of this procedure will not doubt show in the younger generation and in the community in the longer term. The effect of fluoridation in Suva has not been specifically evaluated

and no baseline studies were carried out, but Speake, Singh and Ligani (1980) in their study made longitudinal comparisons by plotting comparable age specific DMFT rates for Suva in 1965, the non-fluoridated urban rate in 1978 and the Suva rate in 1978 (Figure 20). The evidence of these plots is that despite the break in fluoridation for 18 months caries rates in Suva have been held down and that maximum benefit was derived by children aged 12 years.

In addition to other benefits of fluoridation, the need for orthodontic treatment is considerably reduced (Craig-1980). The reduction in caries incidence means less premature loss of deciduous teeth. Consequently these teeth can perform one of their functions - maintaining sufficient space in the dental arch for the unimpeded eruption of their permanent successors into correct position. Furthermore, the benefits are carried well into adulthood, thereby giving extremely long term caries preventive effects (The Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980). The carious lesions that are present in the fluoride group often appear to be less extensive than those in the non-fluoride group (Craig-1980).

The current level of fluoride in Suva water supply is 0.8ppm (Singh-1978). Singapore has fluoride level of 0.7ppm since 1958 for 100% of population and the caries reduction in children and adolescents is only 35% (Lim-1981) compared to about 60% in many other developed countries (Horowitz-1980, Report of the Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980). The optimum level is considered to be that fluoride concentration in water which produces the greatest dental decay reduction with the least possible fluorosis. In the U.S.A. this has been found to vary with temperature and a considerable effort has been made to determine this amount for each place (Dunning-1979). While the 1ppm level is applicable to conditions in a temperate climate, it may not be

accurate for other countries, particularly for areas in the tropics, where more water is consumed. Therefore, it is felt that the concentration of fluoride in Suva water supply should be constantly monitored and reviewed periodically in the light of level of reduction in dental caries.

Fluoridation of reticulated water supplies should be instituted in other major towns as rapidly as finance will permit, so that its established effectiveness in reducing the level of dental caries can be put to good use for the benefit of children and people of Fiji (Wong-1965, Speake, Singh and Ligani-1980).

More than 35 years of world-wide experience in water fluoridation has confirmed its benefits and as a result, the practice in many countries is being recognised as routine water treatment process (Collier-1980). WHO actively supports fluoridation and has once more endorsed it and urged countries to develop fluoridation programs (WHO, World Health Assembly-1978). Fluoridation remains the cornerstone of an ideal preventive program. Its benefits are received without conscious effort by the individual and are enjoyed by all socio-economic groups.

The Committee of Inquiry into Fluoridation of Victorian Water Supplies (1980) found that although a number of submissions claimed that fluoridation was uneconomical, cost-benefit analysis showed that the annual expenditure in Melbourne per head was a mere 40 cents. In U.K. the average running costs are within the range 5-10p. per annum per head (Oswald-1977).

There were plans for fluoridation of the public water supplies at Lautoka and Nausori in the Fiji's 7th Development Plan. Unfortunately, fluoridation has yet to be introduced in these areas. A Regional Technical Meeting of Chief Dental Officers (New Caledonia-April 1978) recommended that:

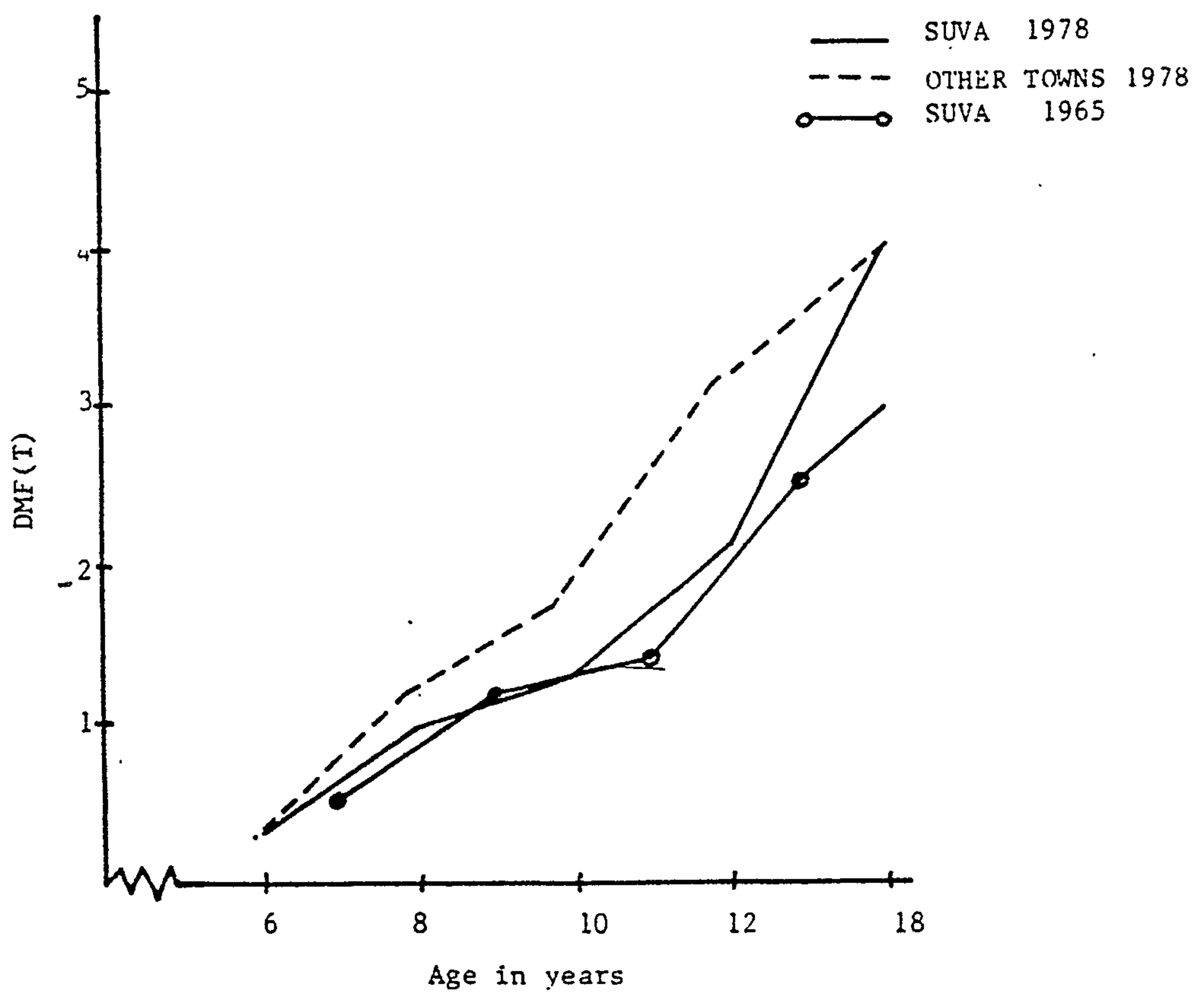
Water fluoridation be introduced where indicated and where practical.

Other methods of fluoride therapy e.g. (tablets, topical application) have been used on an adhoc basis. It would appear appropriate that a pilot project of fluoride tablets, fluoride mouthwashes and topical applications be instituted in high risk areas (Moller-1980).

Toothpastes containing fluoride are available in the local shops. Colgate toothpaste, which is manufactured locally since 1977 has fluoride in it. Efforts to educate the public to use fluoridated toothpaste should be continually reinforced.

FIGURE 20

GRAPHIC COMPARISON OF CARIES RATES (DMF (T))
FIJI 1965 et 1978)



SOURCE: Speake, J.D., Singh, D. and
Ligani, M. - 1980.

ORAL HEALTH EDUCATION

Oral health talks, including dietary advice and toothbrush instructions are given regularly either before or after treatment in primary schools. It is important to concentrate oral health education in school children as it is likely that positive attitudes can be most readily shaped in this group (Davies, C-1974). In 1973, 1974 and 1976 the author was able to solicit the support of the Association of Apex Clubs in Fiji in organising a national dental health week. Opportunities were also taken to place dental floats in the Hibiscus festival, which is held annually in Suva. Dental health talks with the aid of films' charts and models are also given to the 2nd year students at the Nasinu Teachers' Training College. However, it is considered that a formal set of lectures to these students would do much to equip them with basic knowledge of the school oral health program. The teachers need to be regularly motivated by members of the oral health team and provided with information and teaching aids on oral health care.

The teaching of oral health to the community is carried out by indirect education through mass communication media such as pamphlets, newspapers, radio and through the holding of exhibitions. However, face to face education by dental personnel is the most effective method, (Young and Striffler-1969) and this is provided for primary school children. The author has designed a simple method of helping and teaching children to remember and practice preventive dentistry (Figure 21). In addition to the mass media present in Fiji more traditional methods of communication should be utilised for oral health education (Regional Technical Meeting of Chief Dental Officers, Noumea-1978).

With a view to educating the expectant and nursing mothers in oral hygiene practices both for themselves and their offspring, lectures and practical

instructions are given to public health nurses and as well as to final year medical students. As the dental therapist has good background knowledge of general public health methods, strong team work between the public health nurse and the dental therapist was developed in the schools and clinics, so that a total program for promotion and maintenance of good health for all children can be worked out. It has been shown that mothers' oral health practices are the most influential factor in determining the nature of their children's practices (Davies, C.-1974).

To make this situation more successful, dental officers, dental therapists and junior dental assistants were encouraged to contribute and complement the work of other public health workers, particularly in such fields as family planning, value of immunisation and dietary advice, in order to create a team spirit amongst all public health workers and school teachers. The members of the 'team' should also be encouraged to participate in broad community affairs such as any proposal to build a new school or an additional classroom, expand recreating facilities for children, building a community centre and other day to day community affairs (Knutson in Young and Striffler-1969).

In Singapore teaching oral health to children through the media of songs and games has been introduced (Wong H.D.-1973). It is believed that there is a great potential in this method where children can derive pleasure and satisfaction in the activity engaged in and at the same time are learning about oral health unconsciously. This media of oral health education could be used in Fiji as people generally enjoy songs.

Because of the lack of resources no specific oral health care programs were planned for secondary school children. However, students in these schools are eligible for free oral health care (up to the age of 18 years) at dental centres should they choose to make

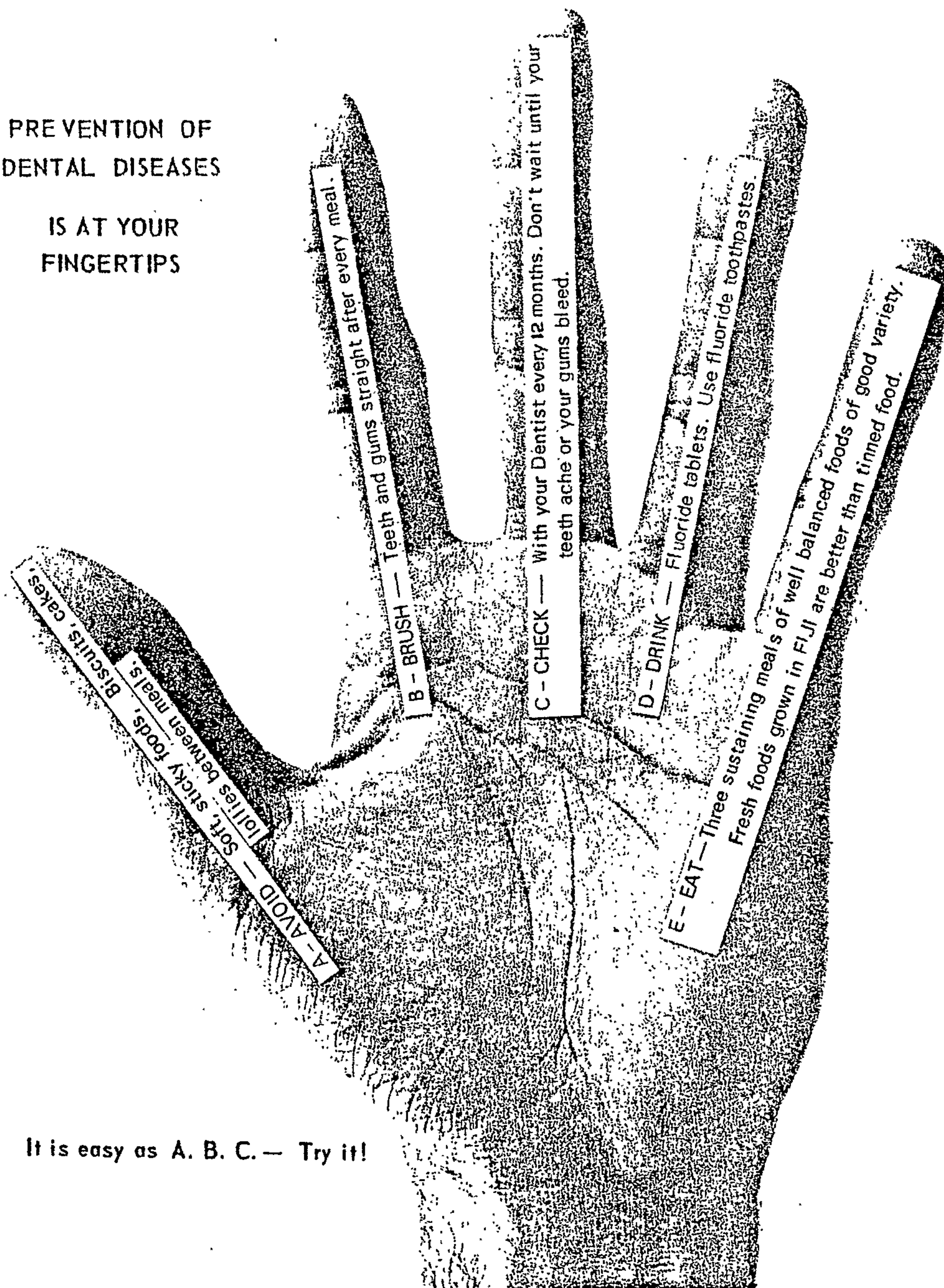
an appointment. Mobile clinics also visit secondary schools in remote areas, and provide free oral health care to needy children. As manpower and other resources become available priority should be given to initiating a preventive, oral health education and referral program in secondary schools. Teachers should be encouraged to include oral health topics in teaching of various subjects.

The most important goal for oral health education is to increase the percentage of people who have changed their oral hygiene practices or their behaviour in utilizing services (WHO-1980).

FIGURE 21

PREVENTION OF
DENTAL DISEASES

IS AT YOUR
FINGERTIPS



It is easy as A. B. C. — Try it!

A Method of Explaining Rules of Prevention

You can't do TODAY'S job
with YESTERDAY'S methods
and be in business TOMORROW.

- Gestener.

PROGRAM EVALUATION

8. PROGRAM EVALUATION

Evaluation of oral health programs has been a neglected aspect of program operation in the past, it seems that only recently has this subject been examined. The South Australian School Dental Service has been extensively evaluated (Roder-1980). The planning and implementation of an effective national school oral health care program is a complex process. It is a continuing and a dynamic process and therefore research and the necessary staff for obtaining the data, which are vital to future planning and ongoing evaluation is essential. The assessment-planning-evaluation approach to a public health program is of paramount importance to the administrator. Broadly speaking, the purpose of oral health planning is to meet the needs and demands of the community (school children) now and in the future.

A well-conceived and carried out program evaluation provides information upon which the worth of program may be judged in terms of degree of success in achieving stated goals and objectives (Narayan-1978). Such information may also serve as a diagnostic tool to identify program components which may be ineffective, thus pointing out new directions for program development. Evaluating effectiveness provides an opportunity to test the validity of assumptions which may underlie any particular program. To provide valid information, evaluation procedures must be conceived and carried out appropriately, using methods that are scientifically sound (e.g. WHO-oral Health Surveys; Basic Methods-1977). Ideally, evaluation methods should be planned and well defined prior to program initiation, so that if change is to be measured, appropriate baseline assessments may be made (Burt-1974). Poorly conceived and conducted evaluations can produce information that is misleading, that can be misinterpreted, which may be misused and

and which may even lead to a false sense of security.

Purpose of Evaluation

The evaluation of a oral health service means, in the broad sense, an assessment of the performance of that service. According to a WHO report (1974), the main purpose of evaluation is to assess the following parameters:

- . The effectiveness of the service, by showing to what degree the planned goals were met (relation of the expected to the attained outcome).
- . The efficiency of the service, by demonstrating how much the service spent in terms of resources in order to achieve the present outcome (relation between resource input and work output).

When evaluating effectiveness and/or efficiency, one measures the output and cost of a system of dental services without considering the circumstances under which the system works (WHO 1974). In order to ensure a broader feedback to the management of the system, it is useful to check:

- . The adequacy of the service, in order to compare the outcome of the service with the total treatment needs of the population or target group (relation between the achieved and the required outcome).
- . The appropriateness of the service's operation, in order to ascertain whether the service uses the most efficient means available (relation of the present efficiency level to the maximum efficiency level, provided alternative methods of work are adopted, e.g., when preventive measures or auxiliary personnel are utilized).

For the evaluation of these aspects of the service, different sources of information are used. The effectiveness can be evaluated by means of surveys of the oral condition of the whole target group or by means of the on-service data, or by a combination of both.

The evaluation of the efficiency will utilize the data on the effectiveness and, in addition, the information on the resources spent by the service. The latter data can be recorded, at least partly, by the oral health service.

The evaluation of the adequacy of the service should be based on a survey of the whole population. For a limited evaluation, certain on-service data (for instance, the number of people utilizing the service) can be used when combined with demographic data.

The assessment of the appropriateness is based, on the one hand, on data on the present efficiency of the service and, on the other hand, on the knowledge of the cost/benefit or input/effect ratio of the alternative measures which might have been used by the service.

8.1 ONGOING EVALUATION

The identification of manpower (dental surgeon, dental auxiliaries) in terms of number, type and distribution is a necessary exercise in any health service planning. The manpower situation will decide the extent and type of service which can be offered to the population. However, once the design reaches a certain stage in planning and implementation; it is felt that a program evaluation using WHO protocol would be of immense value in planning any future modifications of the existing program. One way of doing this evaluation at minimal cost would be to undertake the evaluation with the normal clinical treatment program of the school dental service as is currently done in Australia (School Dental Scheme, Evaluation and Statistical Data-1977 and 1977-1980). This study provides a means of extracting the data from clinical examinations, which are performed routinely in the various clinics, without affecting the clinical program. These data are transcribed from clinical records on to a proforma which is closely based on WHO protocol (1971). These proformas are then sent by State/Territory Authorities to the Commonwealth Department of Health in Canberra for processing by computer. The printout of State/Territory material is returned to the respective States and the national data is published in booklet form and distributed widely (School Dental Scheme-Evaluation and Statistical Data 1977-1980).

It would be within the resources of Fiji Health Department to adapt such a system with assistance from WHO and/or SPC. WHO would also be in a position to arrange processing (Oral Health Surveys, Basic Methods-1977) of the raw data sent from Fiji (and other Pacific Islands). The data gathered in the epidemiological studies (Fiji-1965 and 1978, Tonga-1966 and Western Samoa-1967) would serve as a baseline for comparison.

This survey data was originally processed by the WHO. The WHO method has the advantage that the basic data derived, allows comparisons to be made. The results of the ongoing evaluation should be published once a year. This would be a valuable tool in planning changes in the school dental service.

Objectives of Ongoing Evaluation

The main objective of evaluation study would be to ascertain on an ongoing basis, certain aspects of oral health of school children in Fiji so as to measure the extent of effectiveness (or otherwise) of the existing oral health program. With this approach comparison may be made from year to year. The analysis of routine data can yield information which would include: state of oral health of primary school children (e.g. D M F T), demand for the service, and volume of service delivered.

New Zealand is a good example of a country which after 60 years of school dental service was able to update and modify certain procedure as proved necessary through several surveys (Logan-1978) and the International Collaborative Study findings (Hunter-1980).

In any health service there is a need for ongoing evaluation and monitoring of needs and demands of population and for integrated planning to meet those needs and demands by the least costly and least wasteful means available. Appropriate distribution of manpower and resources within a community form part of this process.

In the comparatively short period the author was the chief dental officer (July 1972-January 1977) in Fiji, it was not possible to initiate a program evaluation, as initial thrust was necessarily placed on the development of training of oral health personnel, including the design of curriculum for dental therapist and junior dental assistant course and the implementation of dental delivery system in the schools. As more operative manpower became available, an active expansion

of clinical programs (control, prevention and treatment) was established. In the Australian school dental scheme, which was established in 1973, the evaluation studies were not initiated until 1977 (Annual Report of the Director-General of Health-1977/78).

In retrospect, however, it is felt that ideally, an ongoing evaluation program should have been considered at the re-planning stages of the Fiji school oral health program.

8.2 NATIONAL ORAL HEALTH SURVEY

In public health programs, epidemiological surveys are the fundamental form of evaluation (Burt-1974). Evaluation or analysis is one of the basic applications of epidemiology (Dunning-1979). Data obtained in an evaluation survey can be assessed against the original data collected for the assessment of need.

If there is more than 1 survey, so that information exists on trends rather than on point prevalence only, the plan will have a sounder basis (WHO-1980). Therefore, it is considered that follow up national oral epidemiological surveys can be carried out at intervals no greater than 10 years. However, it is emphasised that well conducted national surveys are expensive projects, requiring meticulous planning and the co-operation of experts from different fields. If such a survey is not possible, then consideration should be given to a 'path-finder survey' which is an economical and practical way of obtaining data for planning.

New Zealand has carried out a survey of Adult Oral Health in 1976 (Gair-1981), Australia has yet to carry out a national oral health survey and the last national oral epidemiological survey done in Fiji was in 1965.

There is an urgent need to carry out a follow-up survey (incorporating a sociological component) in Fiji before 1985 (end of 8th Development Plan) and subsequently every 10 years based on WHO protocol for combined Oral Health and Treatment Assessment (Table 30). Even data obtained by the WHO Basic Oral Health Assessment protocol (Table 31) would give some information on changing prevalence of oral conditions.

TABLE 30

WHO COMBINED ORAL HEALTH AND TREATMENT ASSESSMENT FORMSTAGE 1

Note: 1. No codes to be changed		2. Unused sections to be cancelled by diagonal lines	
(1) <table border="1" style="display: inline-table; width: 100px; height: 20px; text-align: center;">J 2</table> (5)	Date . . . 19	(6) <table border="1" style="display: inline-table; width: 100px; height: 20px; text-align: center;"> </table> (7) Registration (8) <table border="1" style="display: inline-table; width: 100px; height: 20px; text-align: center;"> </table> (11) Number (for (12) duplicates)	
PERSONAL AND DEMOGRAPHIC INFORMATION			
Sex M = 1 F = 2	(13) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	Name family other	
Age in years	(14) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	(15) Geographic location	(18) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (19)
Ethnic group	(16) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	Examiner	(20) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>
Occupation	(17) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		
SERVICE UTILIZATION			
Q. 1 Did you obtain dental care in the last 12 months?			
NO = 0 (21) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		CODE CATEGORIES FROM RESPONSE (1 to 6, 9) See list in criteria (p. 1)	
YES = 1			
If YES Q. 1(a) For what reason? (22) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		CODE CATEGORIES FROM RESPONSE (1 to 5) See list in criteria (p. 1)	
Q. 1(b) Who treated you? (23) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>			
If NO Q. 1(c) Why not? (24) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		CODE CATEGORIES FROM RESPONSE (1 to 9) See list in criteria (p. 2)	
Q. 2 Is anything wrong with your teeth, gums or mouth now? (25) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		CODE CATEGORIES FROM RESPONSE (0 to 4, 9) See list in criteria (p. 2)	
Q. 2(a) Do you want any dental advice or treatment? (26) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>			
NO = 0 YES = 1			
If you do Q. 2(b) What sort of advice or treatment do you want? (27) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		CODE CATEGORIES FROM RESPONSE (0 to 9) See list in criteria (p. 2)	
DISORDERS OF MUCOSA TEETH AND BONE AND OTHER CONDITIONS			
ABSENT=0, PRESENT, NO TREATMENT RECOMMENDED = 1, PRESENT, TREATMENT RECOMMENDED = 2			
ORAL MUCOSAL DISEASE (28) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		OTHER CONDITIONS Titles to be entered as needed, from results of pilot study	
Specify Disease		 (31) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	
Treatment			
DEFECT OF TEETH (29) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>			
Specify Defect		 (32) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	
Treatment			
DISORDERS INVOLVING BONE (30) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>			
Specify Disease		 (33) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	
Treatment			
PROSTHETIC STATUS		DENTURE REQUIREMENTS	
NO DENTURE=0, DENTURE WEARING=1 DENTURE NOT WEARING 2		NIL=0, NEW DENTURE REQUIRED=1 REPAIR, RELINE OR REMODEL 2	
UPPER JAW LOWER JAW		LOWER JAW UPPER JAW	
(34) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (35) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (36) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (37) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>	(38) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (39) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (40) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table> (41) <table border="1" style="width: 30px; height: 20px; text-align: center;"> </table>		
full partial full partial		full partial full partial	

SOURCE: WHO: Oral Health Surveys - Basic Methods - 1977.

TABLE 30

WHO COMBINED ORAL HEALTH TREATMENT AND ASSESSMENT FORM

STAGE 2

Note: 1. No codes to be changed. 2. Unused sections to be cancelled by diagonal lines

(1) (5) (6) (7) Registration (8) (11) Number (12) (for duplicates)

Study Number Date 19

PERIODONTAL STATUS		Absent = 0	Present = 1	PERIODONTAL TREATMENT REQUIREMENTS	
SOFT DEPOSITS	max. (42)	☐	☐	NONE	9 (66) ☐
	mand. (45)	☐	☐	Oral Hygiene Instruction	1
CALCULUS	max. (48)	☐	☐	Prophylaxis and OHI	2
	mand. (51)	☐	☐	Periodontal therapy (no extraction)	3
INTENSE GINGIVITIS	max. (54)	☐	☐	Treatment with 1 or more extraction	4
	mand. (57)	☐	☐	Full extraction	5
ADVANCED PERIODONTAL INVOLVEMENT	max. (60)	☐	☐	DENTOFACIAL ANOMALIES	
	mand. (63)	☐	☐	WHO Criteria condition (specify)	(67) ☐
NB. Central segments include cuspids and incisors left and right segments include molars and premolars				treatment	(68) ☐
				Other criteria (to be specified) condition (specify)	(69) ☐
				treatment	(70) ☐

CONDITIONS NEEDING IMMEDIATE ATTENTION		ABSENT = 0	PRESENT = 1
RELIEF OF EXISTING PAIN OR INFECTION (71)	☐		TREATMENT OF PULPALLY INVOLVED TEETH (73) ☐
TREATMENT FOR LESIONS LIKELY TO CAUSE PAIN OR INFECTION IN THE IMMEDIATE FUTURE (72)	☐		OTHER (SPECIFY) (74) ☐

CARD NO. (80) 3

DENTAL CARIES STATUS AND TREATMENT OF TEETH	
CARIES (13)	(28) CARIES
TREATMENT (29)	(44) TREATMENT
CARIES (45)	(60) CARIES
TREATMENT (61)	(76) TREATMENT

DENTAL CARIES	PRIMARY	PERM	TREATMENT
SOUND	A	0	NONE 0
DECAYED	B	1	RESTORATIONS
FILLED & CARIES FREE	C	2	1 surface 1
FILLED WITH PRIMARY DECAY	D	3	2 surface 2
FILLED WITH SECONDARY DECAY	E	4	3 surface 3
PRIMARY TEETH MISSING DUE CARIES < 9 yrs	M	-	> 3 surface or crown 4
PERMANENT TEETH MISSING DUE CARIES (UNDER 30 YEARS ONLY)	-	5	EXTRACTION FOR
PERMANENT TEETH MISSING ANY REASON OTHER THAN CARIES (UNDER 30 YEARS ONLY)	-	6	caries 5
PERMANENT TEETH MISSING ANY REASON (30 YEARS & OLDER)	-	7	periodontal disease 6
UNERUPTED TOOTH	-	8	dentures 7
EXCLUDED TOOTH	X	9	other reason 8
			OTHER (specify) 9

CARD No (80) 4

SOURCE: W H O: Oral Health Surveys - Basic Methods - 1977

TABLE 31

WHO BASIC ORAL HEALTH ASSESSMENT FORM

Note: 1. No codes to be changed.		2. Unused sections to be cancelled by diagonal lines	
(1) J 2 (5)	Date 19	(6) (7) Registration Number	(8) (11) Number (for duplicates) (12)
Study Number			
PERSONAL AND DEMOGRAPHIC INFORMATION			
Sex M=1 F=2 (13) 	Name family other		
Age in years (14) (15)	Geographic location (18) (19)		
Ethnic group (16) 	Examiner (20) 		
Occupation (17) 			
DISORDERS OF MUCOSA; TEETH AND BONE Absent=0 Present=1		OTHER CONDITIONS Titles to be entered as needed, from results of pilot study	
ORAL MUCOSAL DISEASES Specify (21) 		 (24) 	
DEFECT OF TEETH Specify (22) 		 (25) 	
DISORDERS INVOLVING BONE Specify (23) 		 (26) 	
DENTOFACIAL ANOMALIES Absent=0 Present=1 WHO criteria Condition specify (27) Other criteria (to be specified) (28) 		FULL DENTURE STATUS WEARING FULL DENTURES NONE 0 UPPER 1 LOWER 2 BOTH 3 (29) 	
PERIODONTAL STATUS Absent=0 Present=1 SOFT DEPOSITS max. (30) (32) mand. (33) (35) CALCULUS max. (36) (38) mand. (39) (41) INTENSE GINGIVITIS max. (42) (44) mand. (45) (47) ADVANCED PERIODONTAL INVOLVEMENT max. (48) (50) mand. (51) (53)		DENTAL CARIES STATUS 55 54 53 52 51 61 62 63 64 65 18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28 (13) (28) R L 85 84 83 82 81 71 72 73 74 75 48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38 (45) (60) PRIMARY PERM. SOUND A 0 DECAYED B 1 FILLED & CARIES FREE C 2 FILLED WITH PRIMARY DECAY D 3 FILLED WITH SECONDARY DECAY E 4 PRIMARY TEETH MISSING DUE CARIES (UNDER 9 YRS ONLY) M - PERMANENT TEETH MISSING DUE CARIES (UNDER 30 YRS ONLY) - 5 PERMANENT TEETH MISSING ANY REASON OTHER THAN CARIES (UNDER 30 YRS ONLY) - 6 PERMANENT TEETH MISSING ANY REASON (30 YRS & OLDER) - 7 UNERUPTED TOOTH - 8 EXCLUDED TOOTH X 9	
NB. Central segments include cuspids and incisors, left and right segments include molars and premolars			
CARD No. (80) 1		CARD No. (80) 2	

SOURCE: W H O: Oral Health Surveys - Basic
Methods - 1977.

INFORMATION OBTAINED FROM A NATIONAL DENTAL SURVEY

- . An estimate of the prevalence, severity, distribution and pattern of oral health problems (dental caries, periodontal diseases, dento-facial anomalies, traumatic injuries, oral pathology, calculus);
 - . An indication of actual treatment requirements and demand or felt need for oral and dental care;
 - . Show changes in the oral health of the community (as a result of fluoridation and other preventive programs and the school dental service) since last survey-1965;
 - . Evaluate the effectiveness of the existing oral health program;
 - . Assist in planning future programs;
 - . Assist in assessing the effectiveness of training and utilisation of dental personnel;
 - . Whether re-assessment of objectives and priorities is indicated.
 - . The sociological component would provide information on the following: attitudes towards dentistry and oral health, frequency of dental visits and general utilization of oral health services.
-

PATHFINDER SURVEY

As a specific case, and in recognition of the fact that time and personnel for comprehensive oral health surveys are very limited, the concept of a 'pathfinder' survey has been introduced. This type of survey is intended to be an economical and practical way of obtaining data for health service planning by limiting the number of age and other groups as far as possible (WHO-1977).

In this type of survey a few index ages are selected, usually children aged 6 years and 12 years and 1 adult age group, often 35-44 years. In this way, oral health status at entry to, exit from, primary school is assessed in children, while the adult group should provide an estimation of the ultimate caries and periodontal disease pattern of the community (WHO-1977).

Sampling sites should be selected to cover a good range of geographical conditions and a representative cross section of the population. About 20 subjects in the index ages or age ranges should be examined at each site. Usually, between 10 and 15 sampling points are sufficient in any 1 country but if large urban proliferations are included it might be necessary to locate several additional sampling points in each city. This means a composite sample of 200-300 for each age group.

School children are the most accessible group in any population and most of the sample will be drawn from this group. However, in some countries large numbers of school-age children do not attend school; here, an endeavour should be made to survey additionally, 2 or 3 groups of non-attenders, widely separated geographically, in order to compare their oral health status with that of children going to school.

ORAL HEALTH SERVICE STATISTICS

The importance of keeping accurate and detailed oral health service statistics is emphasised. These statistics would assist the administrator to gauge more accurately the availability and quality of services and would indicate trends. The Australia and New Zealand programs have a well-developed statistical records. It is of paramount urgency that statistical records of the rate of resignation, the length of service, numbers resuming employment after period of resignation of dental officers, dental therapists and junior dental assistants (also dental technicians), and expenditure on school oral health service be developed in Fiji.

Spencer, Burt et al (1980) have drawn attention to the possibility of using treatment statistics as indications of time trends in oral conditions. Dental public health programs collect treatment statistics, but all too often these statistics find little use beyond a mention in the annual reports. They point out that specific treatment statistics from public health programs when used under certain conditions, could be a valid and inexpensive source for discerning epidemiological trends in oral health conditions. However, more research is required to indentify those treatment variables which are best indicators of oral health as well as to determine the most appropriate statistical methods for analysis. Slack (1979) contends that even crude statistics from treatment can be used as gross indicators.

It appears that in Fiji more use must be made in future of data from oral health service records for the operational planning of the school oral health service. Danish experience shows that statistics published annually have proved extremely valuable for evaluation and planning purposes (Christensen-1980).

Are the methods of the PAST adequate
to meet the needs of the FUTURE?

DISCUSSION

9. DISCUSSION

A survey of literature reveals that oral health services throughout the world, including Australia, Fiji and New Zealand evolved gradually in response to perceived demands and needs. The services were not designed and implemented on any scientific basis. Lack of suitable manpower was one of the greatest hindrances for a nationwide school oral health service, and consequently the services provided were predominantly restorative rather than preventive. These services usually developed slowly following the pattern of incremental theory of decision-making proposed by Lindblom (1959), i.e. incremental change aimed at arriving at agreed policies which are closely based on past experience. These policies only differ by small degrees from existing policies. It appears to the author that in Fiji policy decisions concerning the school oral health service were made, which differed only marginally from existing policies.

In Australia (Annual Report of Director-General of Health-1972/73) and New Zealand (Public Dental Health in N.Z.-1967, Logan-1978) there was a general impression (based on reports) among the health authorities that oral health of children was poor - high caries prevalence and the shortage of qualified manpower (dental surgeons) to cope with the needs and demands. Consequently, national oral health schemes for school children utilising operating auxiliaries as the main workforce were initiated. However, no national oral health epidemiological surveys were conducted in order to test this hypothesis and to measure accurately the prevalence, severity and distribution of oral diseases. In contrast, Fiji's new oral health care strategy was modified, redesigned and planned on the findings of the 1965 national oral health epidemiological survey.

From the findings of this survey it was concluded that there was a great need for a free public oral health service for all school children and it should be established all over the country. However, the survey did not have a sociological component, which is considered to be of paramount importance in any health planning. It is now over 15 years since this survey was conducted and therefore, there is a need for a follow-up survey to be carried out to measure the effectiveness of oral health program. However, it is not uncommon to see epidemiological data gathered, reported and forgotten while dissociated planning occurs if at all for manpower production, preventive services and treatment services, all isolated from each other (Barmes-1980). A restricted survey of urban school children at alternate years between 6-14 years of age was carried out by Speake, Singh and Ligani in 1978 in Fiji, which showed that the school oral health service was not able to meet the demands and permanent teeth have to be extracted.

Both in New Zealand (Public Dental Health in N.Z.-1967, Leslie-1970) and Australia the local Dental Associations have expressed their support of the school dental service. The Australian Dental Association has 2 representatives on the Australian Dental Services Advisory Council, (Annual Report of Director-General of Health-1973/74, 1979/80) which advises the Federal Minister for Health on matters relating to the school dental scheme. As there are no advisory bodies set up by the Fiji Government to deal with oral health matters, (Permanent Secretary for Health-1981)*, it is strongly felt that an Oral Health Advisory Council should be established in Fiji under the leadership of the Ministry of Health with the specific aim of advising the Minister on matters relating to school oral health, training of oral health personnel and oral health matters generally. This would improve co-ordination and planning.

*Personal Communications.

The authorities represented on this Council should include:

- . Fiji Dental Association (2)
- . Ministry of Education (1)
- . Ministry of Health
 - Director of Preventive and Primary Health Services
 - Assistant Director, Dental Health
 - Fiji School of Medicine (1)
 - Representatives from the Divisions (2)
- . Private Schools (2)

The Council should be chaired by the Permanent Secretary for Health (or his deputy) and should meet at least once a year. The terms of reference of the Council would need to be clearly defined.

The planning and implementation of an effective national school oral health program is a complex process with interaction of many factors; these include: geographical, ecological, dietary, epidemiological, political, demographic, socio-economic and manpower considerations.

When the author assumed the position of Chief Dental Officer in July 1972; he had 2 options open to him:

- . To continue along the established lines; or
- . To design and modify the service so as to make it more effective in meeting the present and future oral health needs and demands of the school children.

In the event, the author decided to take the latter step. It was his considered opinion that in order to design realistic plans for a structured oral health care delivery system, including a comprehensive preventive and oral health education program, the administrator would be wise to pay special considerations

to the following:

- . The effectiveness of the existing school oral health program;
- . On the basis of findings, to modify, redesign and replan future program (if necessary).

With these thoughts in mind the existing oral health program was assessed, using the oral health epidemiological survey carried out by Wong (1965) as a guide for discussion. The implications of Wong's findings have already been discussed. It was clear from this that without drastic changes in the type and numbers of available manpower it would be difficult, if not impossible to make any realistic progress. The identification of available manpower in terms of numbers, types and distribution is a necessary exercise in any service planning. The manpower situation will, in large measure, decide the extent and type of service which can be offered to the children.

The author felt that the new school oral health strategy should be based on sound scientific foundations and not on his personal opinions or wishful thinking. The program should be based on realistic objectives, attainable and measurable goals.

In order to make the service more effective and with a goal to reach all children in primary schools, a new cadre of operating auxiliary (dental therapist) was introduced in January 1973 using the school dental nurse program in New Zealand as a basis for discussion and adaptation. The Australian school dental scheme had not begun then, although South Australia (1967) and Tasmania (1966) were training and utilising operating auxiliaries (Logan-1978, World Dental Therapy Schools-1979). The training and duties of the dental therapists in Fiji was slightly modified after the author had observed oral health care programs (under WHO Fellowship) in Australia, Hong Kong, Malaysia,

Papua New Guinea and Singapore in 1975.

Overcoming the shortage of manpower and extension of mobile clinics was seen as the initial target in planning. Because of geographical, ecological and demographic considerations it was considered that both male and female auxiliary personnel (dental therapists and junior dental assistants) should be trained and employed. In Australia female auxiliary personnel are utilised (except few males in some States and defence services). In New Zealand only female school dental nurses are trained and utilised in the school dental service.

It was realised that the country needed more than an increase in the number of dental officers to lead the oral health team - it needed a relatively small increase in numbers of dental officers of different type and large increases in numbers of operating auxiliaries of a different type from the dental hygienists. Therefore, in order to make the oral health team a reality, the training and duties of dental officers were modified by the author to fit in the new situation. Following these developments, a non-operating auxiliary junior dental assistant was introduced on the Fiji oral health scene to assist the dental officers and dental therapists.

Although the individual members of the oral health team have specific duties and areas of responsibility, they are all working together towards the shared goal of providing more and better oral health care for more children.

The composition of the oral health team within an individual clinic may vary, yet there is no question that the dentist is the leader of the team. He is in charge and must retain ultimate responsibility for the well-being of patients and the actions of his subordinates. All members of the team must give their

complete support and loyalty to the dentist who is the leader of their team.

The success of the oral health team, (like all other teams) is dependent upon the attitudes and co-operation of all team members. They must be able to work together in close harmony and be willing to help each other at all times. They must have the flexibility of personality necessary for close co-operation and mutual support. The morale of the team depends upon this concept of a unified team effort (Torres and Ehrlich-1980).

All these oral health personnel are trained at the Fiji School of Medicine and therefore, have first hand experience of their roles within the oral health team. The author contends that since the provision of health personnel is the primary consideration in program planning, it is essential that there be a close collaboration between national health planners, administrators and training schools. In this context the program had a smooth start because the Chief Dental Officer (author) was also in charge of dental manpower training at the Fiji School of Medicine. He represented dentistry on the Academic Board of the School. This includes: training of dental officers, dental therapists, junior dental assistants and dental technicians. The author feels that this collaboration can be sometimes difficult to attain if the health planner, training institutions and professional organisation have different views on the system of delivery of oral health care. In Australia and New Zealand the dental officers are trained in the University Dental Schools, dental therapists (nurses) in Schools for Dental Therapists (nurses) and dental assistants usually in Colleges of Technical and Further Education. This system causes fragmentation rather than integration of training. With a view to remedy this situation it is suggested that consideration be given to the possibility of dental students and student dental assistants working with school dental therapists (nurses) in school dental clinics in

Australia and New Zealand. If this was done dental students would see a more representative sample of community needs, there would be an opportunity for these under-graduates to work in teams with operating and non-operating auxiliary personnel and gain some experience in team leadership and responsibility. It is the authors belief that much of the opposition of the dental profession to introduction and utilisation of operating auxiliary personnel is due to the lack of understanding and appreciation that is a consequence of separate and independent training. In this context, it is important to note that a seminar (WHO-1968) recommended that:

When dental schools are est^aablished provision should be made to have an auxiliary department because of economy and team work of various categories.

The author strongly supports this recommendation in the light of his experiences, and strongly feels that if dental personnel are to work together as a team their training must reflect this spirit and mood.

The differences in deployment and control of oral health personnel in Australia, Fiji and New Zealand within the school oral health service leads to constructive ideas along several different lines.

Perhaps, the first consideration is the dental manpower that is required to mount a large-scale program of child care. In New Zealand, the diversion of only a small number of dentists (45 Supervisory staff-Hollis-1980) and a large number of school dental nurses (1178-Hollis-1980) to the school dental service, has permitted a large increase in the availability of oral health care to children between the ages of 2½ and 13 years. In Australia, similar trends exist in States, with the dentist free to perform more involved oral and dental procedures for children.

All primary and pre-school children (3 years-13 years) in Fiji can have adequate oral health care provided at reasonable cost by increasing the availability of dental therapists. Currently there are 38 dental officers and 36 dental therapists (Permanent Secretary for Health-1981)*. As the salary of dental therapists is less than half (Table 29) that of a dental officer and the training period is also shorter (2 years - dental therapist, 4 years - dental officer) it is felt that training of dental therapists be accelerated to cope with the need of services to children. The Australian and New Zealand experiences in regard to the training and utilisation of operating auxiliaries should be a valuable tool for Fiji. It should also be noted in this context that the cost of training a dentist at the university level would exceed \$45,000 (Davies-1978).

The tendency to express operator to population ratios in terms of professionals only needs to be modified in the Fiji context. While professional to population ratios will continue to be useful to insure that professional numbers do not fall to a dangerously low level, the exclusive use of this ratio in national or regional assessment ignores the fact that in many situations, (e.g. a school dental service) a large part of the population's oral and dental care is provided by operating auxiliaries (as in New Zealand and Australia). In such cases the situation can be completely mis-stated.

Of course, the argument can be raised that duties of professionals are not the same as those of auxiliaries, but this same argument could be raised for professionals who are divided among various specialties. The important consideration is that a professional or an operating auxiliary represents 1 manpower unit devoting his/her operating skills to treatment of the public (Barnes-1969).

*Personal Communications.

It is important to consider the relationship of New Zealand school dental service to the environmental and ecological features, in the accomplishment of incremental care for school children. The school dental nurses have such continuous access to their enrolled children and such determination to work out a satisfactory plan of treatment, that failure to control caries to at least a reasonable extent seems to be almost unknown (Dunning-1972). A careful effort must be made to assess the ecological, cultural and the environmental factors that might have contributed to such a result. Several factors are suggested by Dunning (1972):

- . Dental care is brought to the schools throughout New Zealand with a minimum reliance on busing. This provides maximum accessibility to the child population and a small logistic problem.
- . The school dental nurse is a full-time resident teacher, without competition in the health field in her personal relationship with the children. She sees the children as individuals in the clinic, as groups in the classroom and in sports.
- . Each nurse is given a numerically controlled population whose care she is able to complete. (Non-fluoridated area 450-500 children, fluoridated area - 650-1,000 children).
- . The New Zealand program is so extensive (1431 school dental clinics, Hollis-1980) that movement of families from one area to another interferes little with incremental care.
- . The program gives such a real and challenging responsibilities to the nurse that her occupation has become prestigious. There is an excellent esprit de corps.

- . The direction of the nurses, although distant, is good and a minimum of time and manpower is expended in direct supervision. The dental nurses have reacted well to this system, fulfilling their responsibilities without exceeding them. Written rules are clear and their enforcement thorough. The responsible contacts the women have with their patients and with other members of the school staff, however, compensate for the rigidity of the rules.
- . 95% of primary and intermediate school children (5-13 years of age) and 66% of the pre-school children (2½-5 years) in New Zealand are reported to be receiving periodic dental care at the hands of school dental nurses (Hollis-1980). Approximately 85% of eligible adolescents are enrolled in the dental benefits program (Hollis-1980). These enrolments are high for a non-compulsory health service.

Traditional methods of providing care are often hard to change, especially when the program is operated by a well-entrenched bureaucracy. A more scientific approach to administration and planning may be difficult to initiate in these circumstances. New Zealand, however, provides a good example of a long-established treatment program which is in the process of making drastic modifications in the system following periodic evaluations (Logan-1978).

In sharp contrast to the New Zealand program, which commenced in 1921 the incremental school oral health care program in Fiji is comparatively new (1973) and at present serves a much smaller proportion of school population. Environmentally ecologically, and

culturally the Fiji society appears very different from Australian and New Zealand societies. Fiji should therefore, select as many of the good qualities of the New Zealand and Australian programs (and other programs e.g. Scandinavia) as may be reasonably applied to a developing country taking cultural ecological, economic geographical and social factors into consideration and adapt them to achieve its own goals. The Australian school dental scheme (March 1973) came into existence in the same year as Fiji's (January-1973) modified school oral health program, although States of Tasmania (1966) and South Australia (1967) ~~had~~ their own small oral health care program (Dunning-1972, Logan-1978, World Dental Therapy School-1979). In spite of this, the study of the Australian school dental scheme also leads to constructive ideas along several lines.

In Australia, a Federal Labor Government had been in office for almost 3 years (from December, 1972 to November, 1975) and had provided large sums of money for expenditures by the States on a wide range of health care program. Public oral health service developed almost entirely through the increase of school-based services for children, with regional dental officers in charge of 8 to 10 dental therapists each (Dunning-1978). This development shows the effect of political decisions on the provisions of oral health care.

All of the Australian therapists ultimately go singly or in pairs into school-based clinics distributed throughout the various States according to population needs. Dental officers make initial examination of school children and repeat these examinations at intervals of not greater than 2 years, but the intervening examinations as well as simple operative dentistry including cavity preparation, restoration and preventive procedures are performed by the therapists. The regional dental officer has

a chair in the central clinic for each region and performs operative tasks for children whose problems are beyond the usual range of the therapists. The therapists are under general supervision rather than direct supervision. This gives them a responsible contact with their patients and full-time membership in the staff of the schools where they are located. They have opportunities for classroom teaching and also for joining with the teachers in coaching sports and in a variety of other school activities that places them in close, continuous contact with the children they are serving (Dunning-1978).

However, the construction of new clinics in which the therapists could work and the general expansion of the scheme has been badly hampered by the removal from power of the Labor government in November, 1975. Since then a Liberal Government has been in power and has gradually reduced the Commonwealth contribution to the school dental scheme from 100% (1975) to 50% (1979-1981) and limited the scheme to primary schools. From 1 July, 1981, there are no specific purpose grants to the States for the school dental scheme. These are now absorbed in general revenue grants. In effect this means that State Health Authorities will have to compete with other areas for funds. Similarly, the dental services will have to compete with other health services for funds. The Labor Government would however, extend the school dental scheme to all primary school children and subsequently, to all pre-school and secondary school children (Australian Labor Party-1979). From this it can be seen that the political philosophy of the government is of paramount importance.

In Fiji the Alliance Government has been in office since the inception of the new school oral health program in 1973. One of the major problems in the expansion of school oral health program in Fiji has been (and is likely to be) the escalating cost of

imported dental equipment, instruments and materials. The public oral health service, however, can be less bound by style competition and may therefore purchase much simpler dental equipment at the same time paying a smaller unit cost because of the possibility of large-scale purchase. Thus, the New Zealand Department of Health now has a comprehensive equipment development program (Dunning-1978). The broad principles behind this program are to provide inexpensive modern equipment suitable for 2 handed dentistry. The equipment will be of local manufacture with some imported components, and is designed to be functional, easy to maintain and pleasing to the patient (Dunning-1978). Fiji (and the other South Pacific Countries) could explore, with the New Zealand Authorities, the suitability of this equipment for their area. The other alternative would be for all the South Pacific countries, including Fiji to buy major equipment (including: units, chairs, lights, X-ray machines, stools) in bulk as in Australia. In Australia, the Commonwealth Department of Health, through the Office of Purchasing Commission, negotiates with the manufacturers for the bulk supply of major items of dental equipment for school dental services in the States. Each State purchases its own supplies at the negotiated prices (Report of Director-General of Health 1974/75, 1975/76, 1976/77, 1977/78, 1978/79, 1979/80. The last contract expired on 30 June 1981 and under new financial arrangements for the school dental services, the contracts have not been renewed.

In order to do this representatives of South Pacific Countries would need to meet to consider and draw up a list of equipment, instruments and materials required for bulk purchasing. This would require standardisation of certain equipment, instruments and materials throughout the region. Such bulk purchasing contracts would:

- . Reduce costs;
- . Provide continuity of supply;

- . Make maintenance easier;
- . Provide easier availability of spare parts.

Such a meeting of representatives may be either jointly or singly sponsored by the South Pacific Commission (SPC) and/or the World Health Organisation (WHO).

The choice of equipment is important. Franklin (1979) contends that:

We must systematically reject any installation which is too sophisticated, complicated or expensive, we must also beware of certain generous gifts in this field, which may become burdens due to serious and prolonged breakdowns and a lack of qualified maintenance technicians or spare parts.

He suggest that equipment chosen must meet the following criteria:

- . standardized, simple, robust and perfectly adapted to the conditions in which it will be used;
- . easy to use, maintain and repair (after-sales service);
- . reasonably priced.

Mobile dental clinics and health centres in Fiji need to be equipped with very simple equipment, which can be easily handled by dental auxiliaries. Realizing the importance of this subject the author decided to send a dental technician to the University of Otago (in early 1976) for advanced study of equipment servicing and maintenance (for 3 months). Since, his return this officer is involved in teaching this aspect to all members of the oral health team.

Facilities, especially clinics and equipment are of particular importance to the execution of the plan and in an expanding program of systematic care the provision of clinical facilities must be matched by the provision of manpower, otherwise the staff will be hindered from providing maximum services required of them.

Speake (1979), found that in Fiji children at 8 years of age the proportion of teeth indicated for extraction or already extracted was almost 10%. He claims that in light of low caries rates, the I and M components in Fiji is disappointing. He points out that whilst there is room for improvement in the diagnosis and treatment procedures used and in the deployment of personnel within the service, the lack of facilities and of transport are major contributing factors to this situation. Speake, Singh and Ligani (1980) point out that curative and restorative services currently available are not keeping up with the need and permanent teeth have to be extracted for reasons of pain and infection from 8 years onwards.

The author has also found from his personal experience that many permanent teeth are extracted in Fiji which normally could be saved. Unfortunately 1979 and 1980 annual reports of dental services in Fiji are not available (Permanent Secretary for Health-1981)* for study. The attitudes of the people must be changed so that they would come to regard natural teeth as a valued asset. Socio-economic factors also play a large part in the loss of permanent teeth. The Government's policy of providing only relief of pain service to poorer adults and the provision of low cost dentures also contributes to loss of teeth. Some people get teeth extracted through medical officers (in areas where there are no dental facilities) so that they can have low cost dentures. A visit to a medical officer costs only 20c in Health Centres and 50c in Hospitals against \$2 for each extraction from a dental officer.

*Personal Communications.

Many teeth could be saved in adults if the Government were to provide conservative treatment service or subsidy or fee for service to poorer adolescents and adults, particularly in areas where there are no private dental practitioners.

Evaluation of oral health programs has been a neglected aspect of program operation in the past, it appears only recently has this subject been carefully examined. The evaluation of a oral health service means, in the broad sense, an assessment of the performance of that service. A well-conceived and carried out program evaluation provides information to measure the degree of success in achieving stated goals and objectives. Such information may also serve as a diagnostic tool to identify program components which may be ineffective, thus pointing out new directions for program development.

The need for program evaluation to measure the oral health status for planning and modifying oral health care programs have been previously discussed in detail (Section 8). Poorly conceived and conducted evaluation can produce information that is misleading, that can be misinterpreted, which may be misused and which may even lead to a false sense of security.

To provide valid and readily comparable information, evaluation procedures should be carried out accordingly to the WHO protocol (Oral Health Surveys: Basic Methods).

One way of doing an evaluation at minimal cost is to undertake an ongoing program evaluation with the normal clinical treatment program of the school dental service. This method provides a means of extracting the data from clinical examinations performed routinely in various school oral health clinics without affecting the clinical program.

The other method is to carry out a national oral health epidemiological survey using WHO protocol. If there is more than 1 survey, so that information exists on trends rather than point prevalence only, the oral health plan will have a sounder basis. A well conducted national survey, is however, an expensive project, requiring meticulous planning and the co-operation of experts from different fields. An economical and practical way of avoiding some of the problems of a national survey is to carry out a 'path-finder survey', which limits the number of age groups. In this survey a few index ages are selected, usually children 6 years and 12 years and 1 adult group, often 35-44 years. In this way, oral health status at entry to, and exit from, primary school is assessed, while adult group should provide an estimation of the ultimate caries and periodontal disease pattern of the community.

There is a possibility of using treatment statistics as indications of time trends in oral conditions. This can be an inexpensive way of discerning epidemiological trends in oral health conditions. Even crude statistics from treatment can be used as gross indicators. It appears that in future because of costs more use must be made of data from school oral health service records for the operational planning and modification of the service.

The oral health component of the WHO long-term goal for health for all by year 2000 is 3 D M F T at 12 years of age (Sundram-1980). This is a single relevant figure used as an indicator for measuring the achievement of the long term goal by the year 2000.

This is particularly important because the present average for developing countries which need to halt the increasing trend of dental caries prevalence or even decrease the trend where the 3 D M F T average has

already been met (Sundram-1980). In this context it is important to note that (according to Sundram-1980) Fiji has already met the WHO global goal of 3 D M F T for 12 years old (1978) (Table 32). Fiji should endeavour to decrease the 3 D M F T rate by strong preventive measures. Barnard (1980) contends that if the demand for the services most desired by parents, politicians and dentists, for children had not been for filling services, and a completely preventive program at community and school level had been introduced in 1974, Australia would by 1990 have had all school children throughout the nation at low level of dental caries with minimal treatment requirements that could be handled at a fraction of the costs.

Despite the environmental and cultural differences between Australia, New Zealand and Fiji, 1 conclusion seems very clear: any large-scale incremental care plan for children if it is to succeed, must be brought to them in their schools (either through static clinics or mobile clinics). In Fiji this is carried out by mobile clinics, as this method has been found to be of greatest good for the largest number of children. However, more of these clinics are required in order to provide optimum care to all school children. It is pointed out that shortage of facilities, poor roads, and means of transportation (sea and road) are a major problem in Fiji. The author considers that the Government should give higher priority to the school oral health service than is provided at present.

In New Zealand the teenage children who have excellent oral health through comprehensive dental treatment had become the worst in the world in terms of tooth loss. This questions the value of treatment without prevention. The dental profession has now available a powerful set of complementary preventive measures which, if fully implemented, could significantly decrease the incidence and prevalence of oral diseases. The types of preventive strategies now available to improve oral

TABLE 32
DENTAL CARIES LEVELS AT 12 YEARS OF AGE
IN COUNTRIES OF SOUTH PACIFIC REGION

<u>DMFT LESS THAN 3 (DATA SINCE 1968)</u>		
<u>COUNTRY</u>	<u>DMFT</u>	<u>DATE OF SURVEY-</u>
Fiji	3.0	1978
Gilbert Islands	0.5	1971
New Hebrides	1.2-3.4	1970
Papua New Guinea	3.0	1971/74
W. Samoa	1.1	1972
Solomon Islands	1.7	1969
<u>DMFT GREATER THAN 3 (DATA SINCE 1968)</u>		
American Samoa	3.7	1978
Australia	2.6-6.0	1973/78
Cook Islands	4.9	1978
French Polynesia	10.7	1977
New Caledonia	4.4	1969
New Zealand	6.0	1973

SOURCE: Sundram, C.J. - 1980.

health through prevention and control generally includes; the use of systemic and topical fluorides; controlling distribution and selection of highly cariogenic foods; plaque removal or control through mechanical or other means; the provision of early, routine periodic oral examinations and treatment. Prevention and oral health education should be the cornerstone of any oral health care program. Suitable preventive measures applied effectively would significantly reduce the need for treatment and therefore demand for expensive equipment from abroad.

In preventive programs the main thrust in Fiji has been towards fluoridation of reticulated water supplies (Suva); toothbrushing in schools; choice of health-promoting foods; particularly school lunches and wise use of school canteens. Oral health education on individual and group basis is a regular feature of the school oral health program. Suva and its suburbs (130,000 people) is the only area in Fiji to have fluoridated public water supply (since 1969). Other major urban areas were on the Government's list of projects in the 7th Development Plan, but apparently did not eventuate. At present about 22% of population have access to fluoridated water.

In Australia 66.3% of the population embracing some 750 cities and towns in all States and Territory are using fluoridated water. It is interesting to note that in the Australian Capital Territory 99.7% of people have been drinking fluoridated water since 1964 (Fluoridation of Water in Australia-1980).

In New Zealand 54% of the population is using fluoridated water (Hollis-1980, Gair-1981). Since 1976 periodic topical fluoride prophylaxis is a norm. Fluoride tablets are distributed in school districts that are not fluoridated (Nash-1980). Fluoridation of reticulated water supplies is considered to be the safest, most economical and most effective way of

distributing fluoride to the community (Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980). Davies (1974) has carried out a study of cost and benefit of fluoride in the prevention of dental caries.

While topical application of fluorides is widely practised in the Australian and New Zealand school dental service, it has yet to be established in Fiji as a routine public health measure in schools. However, the daily use of fluoridated toothpastes is encouraged in Fiji. While preventive procedures using topical fluorides have been shown to be effective to some extent (Horowitz-1980), in recent years the cost-effectiveness of professionally applied topical fluoride (particularly for children living in fluoridated areas) have been questioned by several authorities.

It is emphasised that different 'mixes' of procedures and programs are appropriate for different countries and these must be carefully evaluated in the local environment. It is felt that cost-effectiveness of 'brush-ins' and 'rinse-ins' should be evaluated in Fiji before being introduced as a public health measure in schools rather than adopting their use on the basis of research in developed countries. In this context the thoughts of Jackson (1981) are pertinent. He contends that:

Many of the preventive methods are recommended on the basis of short term clinical trials. The paradox of short term clinical trials is that they cannot tell us whether an observed decrease in caries incidence associated with a tested agent or method, constitutes a delay in onset or true primary prevention. Further, the cushioned circumstances of clinical trials means that the findings cannot be translated directly to the real world. There is a danger in interpreting percentage reductions. The normal increment of caries over a typical trial

period of 3 years is numerically small, and hence percentage reductions, however high are also numerically small.

If it is thought important to get fluorides into teeth when they have erupted then the simplest and cheapest method is to regularly use a fluoride toothpaste. The concept behind fluoride toothpaste is that each person can give himself or herself a twice daily topical fluoride at a cost no greater than that incurred by the normal routine of personal oral cleanliness. Also teeth are given this environmental advantage as soon as they erupt and before they decay. Whereas I think the benefits of a fluoride toothpaste (and indeed of all other topicals) are marginal, they might as well be obtained particularly when no extra costs or extra efforts are required.

A leading article (BDJ-1976) points out that, 'the widest exposure of the population today to the beneficial effect of fluoride treatment is almost certainly through fluoride toothpastes'. In United Kingdom 95% of the population use a fluoride toothpaste.

In British Columbia, experience has indicated problems with continuing school co-operation in mouth-rinse programs. Statistical proof of the effectiveness of 'brush-in' programs was adjudged as inconclusive, but hopeful (McCombie-1979).

It appears that the taking of fluoride tablets for about 18 years requires a high degree of co-operation and motivation from the recipients and is therefore difficult to implement as a public health measure. The danger of overdose by using fluoride tablets cannot be ignored and must be considered as a disadvantage of this method of caries control.

The potential of fluoridation of school water is limited because children do not begin school until the age of 5 to 6 years. To achieve maximum benefits the intake of fluoride should begin while teeth are forming, from birth. Furthermore, attendance at school is restricted to approximately 200 days each year so that a continuity of intake of fluoride is not achieved.

While the effects of water fluoridation are well established for populations with a high to very high caries prevalence (e.g. 4.5 or more DMFT per 12 year old child) the situation is not a clear for populations with low to moderate caries prevalence (e.g. 0.1-1 DMFT (very low), 1.2-2.6 (low), 2.7-4.4 (moderate)). Therefore, the precise level of caries prevalence at which various fluoride methods have their effects is still uncertain (WHO-1980), although in high to very high prevalence areas disease has been reduced by approximately 40-60% through water fluoridation over a 10 year period. However, WHO (1980) claims that there is enough evidence that through water fluoridation plus other preventive methods and practices the prevalence level of 2.5-3 DMFT at 12 years of age can be achieved.

The general consensus is that while pit and fissure sealants fulfil a special need in the prevention of dental caries in occlusal pits and fissures, they are not cost-effective for public health programs and may be more expensive than restoring decayed occlusal surface of teeth.

Barnes (1977) contends that there is an urgent need for thorough field testing of all preventive measures in populations with low to moderate caries prevalence. It may be found that for these disease levels, currently used measures may not reduce the level, but may still be vitally important in preventing increases in prevalence.

The belief that 'a clean tooth never decays' has become hallowed by time and constant repetition, but

is not supported by clinical studies. Epidemiological studies of large groups of children have shown no significant correlation between caries prevalence and the range of oral hygiene found in children (Mc Hugh in Slack and Burt (ed.) - 1974). It has been shown, however that careful toothbrushing can keep the teeth clean, reduce plaque and maintain the gingivae in a state of good health (Health Education Council (UK)- 1979, Horowitz-1980).

In view of the recent trends for countries (Canada, Norway and Sweden) to adopt a national nutrition policy it is strongly recommended that the Fiji Government should introduce and adopt such a policy to guide the people to grow and select fresh local foods, which would improve general health as well as promote better oral health. In this context it is noted that the Government initiated a National Food and Nutrition Committee in 1976 to assist in the co-ordination of the activities of various organisations involved in food and nutrition and also to formulate an integrated national food and nutrition policy (FDP8). This policy will be developed during Development Plan 8. It is suggested that Fiji's dietary goals include the following:

- . Cutting down on fat intake;
- . Reducing refined sugar consumption;
- . Increasing foods with fibre (e.g. fruits, vegetables, root crops and unprocessed cereals);
- . Reducing salt intake.

Food is produced to feed people, but it is also produced to make profit. There is more profit in processed food than in raw, natural products. By living on processed food one faces the problems of obesity, malnutrition and dental caries (Shannon-1977, Goldstein-1979). The Fiji Department of Health would be wise to examine the claims of imported processed

food advertising and set some controls in order to protect the community, particularly children, and also to promote prevention.

The widespread belief in the inevitability of tooth loss is a fallacy that must be dispelled through active oral health education program. The prevention of dental caries and periodontal diseases hinges on wide recognition of what they are namely, pernicious threats to the well-being of a large proportion of the world's population, but threats that can be controlled by conscientious, intelligent community and personal health practices. As a result of school oral health service, fluoridation and other preventive measures and active oral health education programs, oral diseases in Fiji can be reduced to a low level with minimal treatment requirements within 10 years.

An oral health program should periodically be scrutinised by using a system for policy analysis (Table 2) suggested by Quade (1965). By using this model a decision-maker would be in a better position to make required decisions than he would be without analysis. No matter what the problem; 5 activities are involved: Formulation, Search, Comparison, Interpretation and Verification (Figure 2).

Given the well deserved support of the Government of Fiji, the new school oral health program would be effective in providing, the greatest good for the largest number of children with the minimum of costs and would promote the long term goal of 'sound natural teeth for a life time'.

It is the author's hope that no gloomy oral health prospect lies ahead of Fiji and the friendly people of this country will continue to smile and show their big white teeth and healthy gingivae, which are their natural heritage.

It is good that 1 machine can do
the work of 50 ordinary men
No machine, however, can do
the work of 1 extraordinary man.

- T. Hsieh.

We expect to
pass through life
but once.
If there is any
kindness
we can show.
Any good we can do,
Or beauty we can share.
Let us not defer nor
neglect it.

SUMMARY.

10. SUMMARY

- . It is not uncommon to see signs of ineffective public programs, wasted money, unsolved problems and foggy notions of planning. There are complaints that the solutions being proposed range from poor, at best, to counter productive, at worst.
- . Because of increasing problem of oral diseases, particularly in developing countries, integrated, co-ordinated planning of preventive and treatment services as well as for manpower production is an urgent priority in any oral health service.
- . The planning and implementation of an effective school oral health care program is a complex process with an interaction of different, but interlinking factors.
- . Geographical, ecological, dietary, epidemiological, political, demographic, socio-economic and manpower factors must be taken in consideration in the planning and implementation of a school oral health care program.
- . The above factors were taken into consideration in the replanning and modification of Fiji's school oral health program. This program places strong emphasis on prevention, oral health education, early detection and treatment of oral diseases and conditions.

- . Decision-making involves the choice of an alternative from a series of competing alternatives. Theories of decision-making are concerned with how such choices are made.
- . A policy is a course of action followed by an individual or group in dealing with a problem or matter of concern. Policy-making typically involves a pattern of action, extending over time and involving many decisions.
- . The major theories of decision-making that focus on steps or activities involved in making a decision are: The Rational Comprehensive Theory, The Incremental Theory and Mixed Scanning Approach.
- . The public policy process can be viewed as a sequential pattern of action involving 5 functional categories of activity that can be analytically distinguished: Problem Formation, Policy Formulation, Policy Adoption, Policy Implementation and Policy Evaluation.
- . A very good decision can be made by the schematic model suggested by Quade (Figure 1). Quade claims that a successful analysis of public decisions depends upon a continuous cycle of : formulating the problem, selecting objectives, designing alternatives, and building better models until a satisfactory solution is arrived at.
- . Quade has proposed a system for public policy analysis (Figure 2). No matter what the problem; 5 activities are involved: Formulation, Search, Comparison, Interpretation and Verification.

- . By using Quade's Schematic Model a decision-maker is in a better position to make required decisions than he would be without analysis. This model (Table 2) is particularly suited for Fiji as the oral health care program is not deeply entrenched and is being implemented incrementally as finance and resources permit.
- . In any oral health care program treatment, prevention and oral health education should be closely integrated in planning, implementation and evaluation.
- . Prevention of oral diseases and oral health education should be the cornerstone of any school oral health program.
- . Following the lead set by New Zealand in developing an operating auxiliary service for primary and intermediate school children, many countries are currently training and utilising school dental nurses/dental therapists to meet the demands and needs of school children for oral health care.
- . In New Zealand the teenage children who have excellent oral health through comprehensive dental treatment program, later become one of the worst in the world in terms of tooth loss. This puts in jeopardy the value of treatment without active preventive programs.
- . New Zealand provides a good example of a long-established treatment program, which is in the process of making drastic modifications in the system following several evaluation studies (Logan-1978). Since 1976 there has been major re-emphasis on preventive measures in the school oral health service (Nash-1976).

- . The concept of oral health team is the most significant step put forward in recent years to overcome shortage of oral health manpower and to increase productivity. The usual members of the school oral health team are: Dentist (leader), operating auxiliaries (school dental nurse/dental therapist and non-operating auxiliaries (Junior dental assist/dental assistant)).
- . Generally speaking dental therapists in Australia have a wider range of duties than the school dental nurses in New Zealand. The Australian auxiliary is under much closer dentist control than her New Zealand counterpart. School dental nurses in New Zealand work under remote supervision of district dentists and dental nurse supervisors.
- . School dental clinics in Australia reflect a somewhat different philosophy than those in New Zealand. Clinics are on a larger scale and often include operating facilities for dentist, who is assigned clinical, teaching and supervisory functions in a cluster of clinics. In New Zealand the schools have a small permanent field clinic, which are designed to accommodate 2 school dental nurses. In New Zealand the dental officers are primarily concerned with continuing training and quality control of clinical work.
- . Despite geographical, ecological, dietary, epidemiological, political, demographic, socio-economic and manpower differences in Australia, Fiji and New Zealand, it appears that any large scale quality incremental oral health care plan for children, if it is to be effective, must be brought to them in their schools.

- . At present there are no ravaging oral diseases found in Fiji. Dental caries in the permanent dentition is comparatively moderate in prevalence in non-fluoridated areas and overall caries rate is low in the 1 fluoridated area (Suva). In children of Fiji there is an increasing dental caries prevalence, which is the result of urbanisation and concomitant dietary changes. Over 90% of urban children suffer from decay in primary teeth. Their oral hygiene is generally poor, calculus is present in children at 14 years of age and periodontal disease is endemic (Speake, Singh and Ligani-1980).
- . In order to intensify the delivery of oral health care to school children, 2 new types of oral health auxiliaries, namely dental therapists (operator) and junior dental assistants (non-operator) were introduced in the Fiji school oral health service by the author during 1973. These supportive personnel work under the general direction and supervision of a dental officer (team leader) in the oral health team.
- . All personnel engaged in the school oral health program in Fiji have the advantage of being trained at the Fiji School of Medicine in Suva. The duties of each team member is clearly defined (Tables 26 and 27), so that members are aware of their respective roles in the team.
- . In order to prepare dental officers for their new role in the oral health team, the dental course was modified to meet more accurately the oral health needs of Fiji. Pedodontics, periodontics, public health and preventive dentistry courses were strengthened.

- . The training and clinical duties of dental therapists in Fiji includes; prevention, oral health education and treatment of periodontal diseases (adults and children) and dental caries, (children). Thus the dental therapist is an effective multi-purpose worker in varied clinical situations within the oral health team.
- . The training and utilisation of dental therapists in Fiji needs to be intensified in order to reach an optimum ratio between professional and auxiliary personnel.
- . It is noted that there are 19 dental students and 10 student dental therapists in training at the Fiji School of Medicine during 1981 (Principal, FSM - Personal Communications-1981).
- . In 1981 there are 38 dental officers, 36 dental therapists and 50 Junior dental assistants in the Fiji oral health service.
- . Australia has 1 dentist to 8 therapists, while New Zealand has 1 dentist to 60 nurses (Logan-1978). As the salary of dental therapists in Fiji is about half that of a dental officer (Table 29) it will be an economical move on the part of the Government to train more therapists, thereby improving the ratio between professionals and auxiliaries.
- . The training and duties of junior dental assistants in Fiji includes: routine servicing and maintenance of dental equipment as well as driving mobile dental clinics and trailers to and from schools and oral health education in schools.

- . It appears from the 1978 oral epidemiological survey that the present school oral health service in Fiji is unable to keep up with the need and permanent teeth have to be extracted for reasons of pain and infection from 8 years onwards. In the current economic climate, finance for personnel, equipment, materials, premises and transport constitute a formidable barrier to the provision oral health care (Speake, Singh, and Ligani-1980). If the situation is to be controlled, far greater emphasis will need to be placed on prevention of oral diseases and better provision of oral health services to children.

- . The oral health care program in Fiji is being integrated with the health services in primary schools, hospitals and health Centres. Free incremental oral health care excluding orthodontics, crown and bridges but including prevention and oral health education is provided by the oral health team. Utilising static base clinics, mobile clinics and trailers services are provided to children up to the age of 15 years. Strong emphasis is given to preventive and oral health education programs in the schools. Daily tooth-brushing drill (after lunch) is carried out in most primary schools. A booklet, 'Dental Health Through School Programs of Lunches, Canteens and Toothbrushing' was prepared by the author (in collaboration with education and nutrition authorities) to assist teachers, parents, children, mother's clubs, organisers of school canteens and public health workers in the promotion of oral health care.

- . All members of the oral health team are actively involved in oral health education at individual and group levels. Oral health campaigns are held regularly in collaboration with service clubs (Apex, Jaycees) to provide children and adults information and motivation in interceptive and preventive care.
- . In order to intensify and co-ordinate these efforts an oral health education section should be established within the Oral Health Division. The oral health education section would be able to liaise with the Health Education Unit of the Ministry (based in Suva) and the Ministry of Education. The oral health section would be responsible for planning, directing, co-ordinating and evaluating all oral health educational activities, training of personnel in oral health, production of materials and audio-visual teaching aids. This section could be staffed by dental therapists and directed by the Assistant Director, Oral Health.
- . The primary school toothbrushing and dietary campaign should be intensified and extended to the pre-school children. This can be assisted by health sisters and nurses when visiting families and attending to the needs of nursing mothers. The effect of toothbrushing and other preventive measures in primary schools should be periodically evaluated. Toothbrushing is useful in controlling and preventing periodontal diseases. There is no evidence that toothbrushing prevents dental caries.
- . As there are only 2 full-time teaching staff and limited teaching facilities, it is considered that urgent assistance should be provided to the Department of Dentistry of the Fiji School of

Medicine in the form of well qualified teaching staff, equipment and other facilities to strengthen the existing school with a view to expanding it into a fully-fledged Dental School in the near future. Teaching staff would need to be provided for every major dental discipline, including Preventive and Public Health Dentistry, Conservative Dentistry, Pedodontics, Periodontics, Orthodontics, Oral Pathology and Surgery and Prosthodontics.

- . With the school oral service being responsible for oral health of some 130,000 children there is a need for more dental officers to have advanced training in periodontics, pedodontics and public health dentistry. Ideally, these officers should be placed in each of the 4 Divisions. At present there are 2 dental officers trained in public health dentistry, 1 dental officer in periodontics and 1 in pedodontics.
- . The effects of fluoridation in reducing dental caries is well established. In the present economic climate of escalating health costs; fluoridation is a very cheap (about 40¢ per head annually) public health measure. Suva has been fluoridated since 1969 with beneficial effects. There is an urgent need for the public water supplies in other major towns in Fiji (Ba, Labasa, Lautoka, Nadi and Nausori) to be progressively fluoridated as finances permit. The cost of fluoridation in Suva should be carefully monitored and the program periodically (10 yrs.) evaluated to measure the reduction in dental caries in children.

- . While the effects of topical application of fluorides are well established for population with high caries rate, the situation is not clear for populations with low to moderate caries prevalence (WHO-1980). Therefore, it is felt that the cost-effectiveness of fluoride tablets, 'brush-ins', 'rinse-ins' should be evaluated in high risk areas of Fiji before their introduction as a large scale public health measure.
- . The dental director has to be certain that programs introduced for prevention of oral diseases represent benefits commensurate with costs. In a constrained economy dental directors will have to carefully vet programs to ensure only effective strategies are used.
- . To get fluorides into teeth, the simplest and cheapest method is to brush regularly with a fluoride toothpaste, which has demonstrated anticaries effects. Therefore, the use of fluoride toothpaste in Fiji should be continually encouraged. In U.K. more than 95% of the population use a fluoride toothpaste (Dental Reporter-1981).
- . In view of the recent trends (Canada, Norway and Sweden) for countries to adopt a national nutrition policy it is considered an advantage for Fiji to have a national nutrition policy to promote good general health and oral health.
- . The sale of 'junk' foods such as sweets, biscuits, and soft drinks should be banned from school canteens and mobile canteens visiting schools.

- . The need for an ongoing evaluation of school oral health care program and follow up national oral epidemiological surveys (every 10 years), using WHO protocol is emphasized in this treatise. However, the conduct of a well planned survey requires co-operation of experts from different fields and is expensive. If a national oral health survey is not within the financial means of Fiji, then a 'pathfinder survey', which is an economical and practical way of obtaining data for planning may be conducted.
 - . Difficulties in transportation (land and sea) due to geographical and climatic considerations, together with the lack of suitable portable equipment does pose problems in the delivery of oral health care to smaller islands and remotely situated areas in Fiji (Figure 3). There is an urgent need to develop and produce suitable portable equipment to meet this need.
 - . In order to reduce costs and provide continuity of supply, the bulk purchasing of equipment, instruments and materials for Fiji and other South Pacific Countries should be explored in consultation with the South Pacific Commission (SPC).
 - . The name of the Dental Division in Fiji should be changed to Oral Health Division and that of Assistant Director, Dental Services to Assistant Director, Oral Health. These changes would appropriately reflect the wider sphere in which dentistry operates and would be in keeping with the example set by the WHO (Oral Health Unit).
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EACH day brings NEW PROBLEMS
NEW MEASURES must be found to solve them.

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