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IMPORTANCE OF ATTITUDE CHANGE AND DEVELOPMENT IN TONGA'S PUBLIC DENTAL HEALTH SERVICES

1974

P. KUPU VANISI


Department of Preventive Dentistry
Faculty of Dentistry,
University of Sydney,
1974.
ACKNOWLEDGEMENT

I wish to acknowledge first Associate Professor Barnard, for making this course interesting and worthwhile.

I also wish to convey my appreciation to the staff of the School of Public Health for their efforts in making their respective lectures good background knowledge for this course. I am also well aware of the assistance and co-operation of the private dentists, government departments and schools, Dental Health Foundation, Dental Associations and many other Dental institutions and N.S.W. Health Commission that have led to a number of experiences and dental health messages greatly appreciated.

I wish also to thank Professor Noel Martin, the Dean of the Faculty of Dentistry, for his efficient administration and management of the facilities for this course of studies, and for the sound background in the Preventive Dentistry that he has given to us all.

This thesis is only a part of the requirements of the diploma and I believe I have gained much more understanding and experience that cannot be written into this thesis. However I hope this thesis will be of informative use for my colleagues, that are to come in the years ahead, to refer to Tonga's dental situation at present.
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1. INTRODUCTION

The dentist has a role in the wide scope of preventive medicine and health services to provide special preventive dental and operative procedures to control the two most chronic diseases in dentistry. Dental caries and periodontal diseases are world wide, affecting 90-95% of persons in both developed and under-developed countries today. Although man neglects the importance of natural teeth in life, an incomplete knowledge about cause of disease should not deter us from the fact that scientists have created satisfactory techniques that each individual could follow in order to maintain a healthy oral state throughout life.

Health is man's right and pride. Good health is to the advantage of an individual but there is no individual right to disregard good health principles because each individual is a component of all community existence.

The writer, after having been in dental service for over 20 years, is in the process of attempting to change the attitudes of the people of Tonga about dentistry. This group of people has been acquainted with free emergency dental services for many years and the change to greater use of conservative and preventive treatment and preventive home care will not be considered an easy change.

There has not been very much in the literature written on Tonga's dental health services but whatever materials could be obtained from literature or reports have been considered in this thesis. The first written thesis on anything about the dental condition in Tonga was by the present Chief Dental Officer of the Ministry of Health in Tonga, Dr. Sione Kilisimis, B.D.Sc. Queensland, and DPH(Dent)
(Sydney). The subject was the prevention of periodontal disease in Tonga.

The aim of the present thesis is to state those factors which appear to be relevant to attitude changes required for development of Tonga's public dental health services for provision of a preventive approach to the community.
2. DEFINITIONS

(a) Attitude.

It may not be relevant to define the theoretical aspect of the word, but for its practical application that may be of more importance and its significance in relation to health conditions in Tonga is being discussed in this thesis.

Attitude of the people on certain issues may be reflected in what they are doing in everyday living. People in the rural areas may have different attitudes on certain things, to those in the urban areas.

Certain conditions do change attitudes of the people in Tonga today. The Government, the Churches, and certain kinds of respected people do influence the general attitudes of the people depending on whatever issues that they may come up.

Katz (1960)\(^1\) stated that attitudes function in four ways to which people may behave according to their personalities:

1. They may act materially and adjust themselves to the issue, to get maximum reward and minimum penalties.
2. They may accept an issue in a defensive action, so as not to acknowledge basic uncomplimentary truths about themselves.
3. They may express that they have certain values which they pride to the particular issue.
4. They may act according to their knowledge about the issue, as this enables them to understand the issue and to predict the outcome.
(b) Public Dental Services.

It is relevant to consider the various definitions that have been made of public dental health services.

The World Health Organisation considered this in detail and the following section is taken from their transactions published in 1965\(^2\).

Further definitions that may be cited are those of the F.D.I. in 1972\(^3\), and of W.H.O. in 1965\(^2\).

The F.D.I. definition was as follows, "A public dental health service is education or curative service provided through organised community efforts or individuals to maintain or improve the dental health of individuals and communities"(1972)\(^3:1\).

The W.H.O. definition (1965)\(^2\) was as follows, "Public dental health services which are designed to promote, maintain or restore dental health." They may include education, preventive or treatment activities in varying proportions.

For Tonga the dental service is supplied by dentists and dental auxiliaries employed by the Government and can be classified as group III in the W.H.O. Transactions of 1965\(^2\).

The definition most appropriate for Tonga is that of W.H.O. 1965\(^2\). It is recognised that to have a favourable attitude to dental health, education of the individual and community is of great importance and should be stressed.
3. **ENVIRONMENT OF TONGA**

The geography, demography, socio-economic conditions, political and educational systems and diet may have a direct effect on the prevalence of oral diseases and have a definite effect on the public dental health services that are required.

Much of the information presented in sections (a) to (d) is taken from a publication of the Department of Trade of the Australian Government.

**(a) Geography:** Tonga is in the Pacific Ocean in the area 15° - 22° Latitude south, and 173° - 175° Longitude west. It consists of 158 islands, of these 45 are inhabited. There are low lands with coral formations and high lands of volcanic nature and good agricultural characteristics. Tonga extends from south to north in six commercial island groups but for many years it has been described as consisting of three main islands. Although in the Tropic of Capricorn the climate is moderate.

Tonga was named the Friendly Islands by its famous discoverer, Captain James Cook. He landed in the island of Ha'apai. Tonga belongs to the Polynesian race. It has a surface area of 276 square miles. It has an estimated population of 94,520, (1973). The main island group has an area of 99 square miles and is called Tongatapu meaning sacred land because the original King and his descendants came from Tongatapu whose capital is Nuku'alofa.

The island of Tonga was under friendship treaty with Great Britain for many years and became independent with

The Tongan land system is unique in that every male adult is allotted 8.5 acres of land for individual ownership. The land is owned by landowners, His Majesty the King and His Majesty's 33 Nobles. Land cannot be sold but can only be leased. Various crops are cultivated, some are exported.

Tonga's chief products are copra, bananas, fruit and vegetables. These are exported to New Zealand, Australia and England. Tonga is about two thousand miles from Australia, over a thousand miles from New Zealand and over four hundred miles from the Fiji Islands.

Generally speaking, the wisdom of the administration in restricting the European influence together with an evident willingness by Tongans to maintain Polynesian culture, gave Tonga the advantage of obtaining the good parts of European influence.
(b) **Demography:** The majority of the population is distributed among three main islands of Tongatapu Island, Vava'u Island and Ha'apai Island. Three more islands of 'Eua Island, Niua Fo'ou Island and Niua Toputapu Island are being rapidly developed. Vava'u and Ha'apai have Governors, 'Eua, Niua Fo'ou and Niua Toputapu Islands have Police Magistrates who are responsible to the King in Tongatapu the main island in the Tongan Group.

It was estimated that there were 25,000 persons residing in Nuku'alofa in 1971. Nuku'alofa is a commercial and industrial city and there is a drift of the rural population to here. After World War II many people from other parts of the islands became permanent residents in Tongatapu.

The volcanic eruption of 1940's in the island of Niua Fo'ou resulted in all of its population being evacuated to the island of 'Eua, but Niua Fo'ou has been reinhabited since 1950's.

Being a small country with limited resources the population will tend to move according to the developmental programmes that are taking place today. In the islands of Vava'u and 'Eua there are airstrips and standardised hotel accommodation for tourists.

Fortunately, Tonga is not in the midst of stress and strain of modern living which prevails in many countries of the world. But, there are indications, that Tonga may not be able to resist this for long.

It is noted that there is an increased number of the Tongans wanting to migrate to other countries like New
Zealand, Australia and the United States of America.

Rural people generally live a simple and contented existence engaged in agriculture and fishing. The women folk prepare attractive handicrafts for the tourist trade.

The traditional Tongan houses constructed with thatched coconut palm leaves are gradually being replaced by timber and brick houses.

Sundays are important for Tongans. The bells and Tongan lalis are sounded on Sundays and the people with their best clothes on flock to the numerous churches, followed by a sumptuous dinner.
(c) **Socio-Economy**: The subsistence cultivation has developed into major importance in the economy. Cultivation consists of a burnt over patch of scrub and coconut palms in which yams, taro, bananas, corn, melon and a number of other crops could be grown on a three rotation basis. Despite the primitive and haphazard methods, returns were usually satisfactory because of the soil fertility though in some places there were marked shortages of land.

With the development of export and industries and increasing population and the soil productivity decreased. The Agricultural Department has developed scientific methods of treating the soil to increase its productivity. People are aware of these facts and the agriculture is now quite a good industry for each individual. The export of bananas, water melons, pineapples, tomatoes and other fruit and vegetables provides one of the main economic resources for the country today. Quite a number of people have developed their living accommodations through their agricultural products in the local markets. Similarly, handicrafts, and other homemade goods are individual economic enterprises. Tuck shops, food stalls and retail stores of imported goods are available and covered by a competent authority ruling.

Fishing enterprise, carpentry, building and other trades and businesses are available as resources of financial significance.

Trade and industries generally are a responsibility of the Tonga Copra Board, the Tonga Produce Board and the Tonga Construction Company.
Shipping:— Union Steamship Co. of New Zealand maintains a fortnightly passenger and cargo service between Auckland, Fiji, Samoa, Niue Island and Tonga. The Bank Line is responsible to the Burns Philp (South Sea) Co. Ltd. Nuku'alofa for approximately six-weekly cargo services to the United Kingdom.

Pacific Navigation Company: (Formerly Tonga Shipping Agency) maintains a service from Australia to Nuku'alofa with the vessel Tauloto, a monthly scheduled service between Suva (Fiji) and Nuku'alofa and local inter-island services.

Civil Aviation:— The Fua'amotu Airport caters now for jet airline and aircraft. Vava'u and 'Eua Airstrips are available for light aircraft for improved tourist services and communication.

Finance:— Tonga adopted the decimal currency in 1967 in its own terminology of 100 seniti (cents) = 1 pa'anga (Tongan dollar). Exchange rates Jan. 1973 £1 Sterling = $T2.068:US$1 = 88.11 Tongan cents. $T100 = £48.36 = US$113.49. Treasury Banking division maintains current accounts and all transactions in foreign exchange.

N.Z. and Tonga Government Financial Aid Programme:— There is a Labourers' Scheme of earning money in New Zealand. This is a popular arrangement where groups of fifty to a hundred men at one time may go to New Zealand to earn money for three months under working permit arrangement. After one term an individual (after paying all his return ticket passages, accommodation and other expenses) may be able to save up to five hundred dollars or more to build
a house or to buy a tractor to develop farming on his
return to Tonga.

Many other Tongans gain entrance to other countries
like Australia and America where they may be able to earn
money to send to their families in Tonga.
MAP OF TONGA

LOCATION MAP OF TONGAN ISLANDS

Tongatapu
Ha'apai Group
Ha'apai Group
Tongatapu
Ha'apai Group
End Island

LOCATION MAP OF TONGA

New Guinea
Samoa
Tonga
Tongatapu
Ha'apai Group
Ha'apai Group
Tongatapu
Ha'apai Group
Ha'apai Group
Tonga
Tongatapu
Ha'apai Group
Ha'apai Group

Prepared by the Office of the Surveyor General, Tonga

TRAVEL AGENT
(d) Politics: Tonga is a constitutional monarchy. The constitution of Tonga is based on that granted in 1875 by King George Tupou I. It provides for a government cabinet, a legislative assembly and judiciary. Legislated law making power is vested in the Privy Council and any legislation passed by the executive is subject to review by the legislature.

The Cabinet consists of Speaker (President), the Privy Council (the Sovereign and the Cabinet), the representatives of the nobles (7) and the elected representatives of the people is open to all male literate Tongans of 21 and over, who pay taxes and all female literate Tongans 21 and over. There are elections every 3 years and the Assembly must meet at least once every year. The next election will be in 1975.

Government of Tonga: The Sovereign King is Taufa'ahau Tupou IV (G.C.V.D., K.C.M.G., K.B.E.). The Cabinet consists of Prime Minister, Deputy Prime Minister, Minister of Police, Minister of Health, Minister of Lands, Minister of Finance, Minister of Education and Works, Minister of Commerce and Governor of Vava'u Island and Governor of Ha'apai Island.

Judicial System: The system of the courts in Tonga is based on the British model:

(1) Magistrate Court.
(2) Land Court.
(3) Supreme Court.
(4) Court of Appeal.

In cases which come before the Supreme Court, the constitution provides that the accused may elect to be tried
by a jury or by a judge alone.

Diplomatic representation: There is now a High Commissioner for Tonga in the United Kingdom. Australian High Commissioner (Fiji), British High Commissioner (Wellington, N.Z.), Indian High Commissioner (Fiji), Korean Ambassador (Canberra, Australia), New Zealand High Commissioner (Apia, Western Samoa) act as representatives for their Government.

There is not much political activity in Tonga as the government is dealing with all of the politics. The people do talk about inflation and all political matters experienced in foreign countries, but only to limited extent.

Religion: The Christian religion was introduced into the Tongan community in early 1820's by the British missionaries and later education was also established. Today there are more than eight churches in Tonga. By this they influence the people in many ways.

Tongans can be described as Christian people of sects of Wesleyan faith, the official one for the Government. Churches help the government in education and many other development programmes, although the government does not subsidise any of their activities.

Press: Tonga's press is named the Chronicle and is a weekly newspaper sponsored by the Government, and published since 1964. There is a regular issue of Church newspapers as well.

The contents of the Chronicle (5,200 words in Tongan, 14,000 in English) is mainly of Government interests, local
and public interests, overseas news bulletins and sport. There is a space for the people's opinions on many varieties of political matters but there is also an Edit section where all letters to the newspaper may be edited and censored before printing. The Churches' newspapers contain mainly church activities and spiritual education.

Radio: There is a Broadcasting Commission in Tonga established in 1961 that is government and commercially sponsored. Programmes from 10 K.W. medium wave 1020 K.H.Z. are transmitted in English and Tongan with some Fijian and Samoan through station A3Z. For 1972, there were 8,000 receivers.
(e) **Education:** Formal education was introduced into the Tongan community in the early 1820's after the establishment of the Christian religion, by the British missionaries of the sects of the Wesleyan faith. Education is now compulsory from six to fourteen years of age. Education is a responsibility of the government. The churches have their own schools and there is only one private school in Tonga.

The school population in 1972 was as follows:

Secondary school level by no. of schools, students and name of sponsorship were as follows.

<table>
<thead>
<tr>
<th>Type of School</th>
<th>No. of Schools</th>
<th>No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Government Colleges</td>
<td></td>
<td>1036</td>
</tr>
<tr>
<td>5 Roman Catholic Colleges</td>
<td></td>
<td>1112</td>
</tr>
<tr>
<td>1 Anglican School</td>
<td></td>
<td>574</td>
</tr>
<tr>
<td>5 Wesleyan Colleges</td>
<td></td>
<td>2735</td>
</tr>
<tr>
<td>21 Wesleyan Middle Schools</td>
<td></td>
<td>978</td>
</tr>
<tr>
<td>1 Mormon College</td>
<td></td>
<td>847</td>
</tr>
<tr>
<td>1 Private School</td>
<td></td>
<td>567</td>
</tr>
<tr>
<td>9 Mormon Middle Schools</td>
<td></td>
<td>866</td>
</tr>
<tr>
<td>3 Church of Tonga Schools</td>
<td></td>
<td>1143</td>
</tr>
<tr>
<td>1 Seventh Day Adventist College</td>
<td></td>
<td>230</td>
</tr>
<tr>
<td>Total 19 Colleges and 30 Middle Schools</td>
<td></td>
<td>10088</td>
</tr>
<tr>
<td>Government 82 Primary Schools</td>
<td></td>
<td>11175</td>
</tr>
<tr>
<td>Church 47 Primary Schools</td>
<td></td>
<td>5391</td>
</tr>
<tr>
<td>Total School population 1972</td>
<td></td>
<td>26654</td>
</tr>
</tbody>
</table>

The kindergarten schools are developing. Some of these are responsible to the Churches and the Government.
Numbers and Description of Schools and Enrolment by Education level, summary by whole territory 1972\(^{6:2}\).

<table>
<thead>
<tr>
<th>Authority</th>
<th>Primary</th>
<th>Enrolment</th>
<th>Secondary</th>
<th>Enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schools M F T</td>
<td></td>
<td>Schools M F T</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>81</td>
<td>5947</td>
<td>5228</td>
<td>11175</td>
</tr>
<tr>
<td>Local Authority</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Churches</td>
<td>47</td>
<td>2664</td>
<td>2727</td>
<td>5391</td>
</tr>
<tr>
<td>Private</td>
<td>1</td>
<td>403</td>
<td>164</td>
<td>567</td>
</tr>
<tr>
<td>Totals</td>
<td>128</td>
<td>8611</td>
<td>7955</td>
<td>16566</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authority</th>
<th>Teachers Training</th>
<th>Enrolment</th>
<th>Technical &amp; Vocational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Schools M F T</td>
<td></td>
<td>Schools M F T</td>
</tr>
<tr>
<td>Government</td>
<td>1</td>
<td>28</td>
<td>45 73</td>
</tr>
<tr>
<td>Local Authority</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Churches</td>
<td></td>
<td></td>
<td>2+ 164 5 169</td>
</tr>
<tr>
<td>Totals</td>
<td>1</td>
<td>28</td>
<td>45 73</td>
</tr>
</tbody>
</table>

+ Note: These figures include Middle Schools with an enrolment of 881 boys and 963 girls = 1844.

≠ One is the Farm Training School conducted by the Department of Agriculture, enrolment of 12 boys, 5 girls. One is the Polic Training School conducted by the Minister of Police, enrolment of 17 men and 7 women.

+ Conducted by the Free Wesleyan Church:
There are also 2 other educational institutions:
1. Hango Agricultural School at 'Eua with an enrolment of 42 boys.
2. Sia'atoutai Theological College with an enrolment of 122 men and 5 women.
Close co-operation has been maintained between staff of the Ministry and the Education authorities of the various Churches.

The Director of Education and the Education Adviser had regular meetings with Principals of Secondary Schools to discuss major aspects of policy and development particularly in relation to the secondary curriculum development programme and the related matter of a regional examinations board. Subject teachers of the secondary schools co-operated closely with the staff of the Ministry in evaluating this curriculum material, supplying feedback to the unit and also in the production of Tongan versions of various units. Training courses for secondary schools' staff were carried out by joint arrangement between the Ministry, the schools concerned and specialist staff of the curriculum unit.

One important contribution made by government in this same area was the supply, in significant quantities, and free of cost, of curriculum material produced under the UNDP, UNESCO Project in which the Tongan Government is a participant.

In the primary school sector the same co-operation was maintained and Church authorities used test papers produced by the Minister as their examination for selection into secondary schools.

The in-service programmes of teacher re-training in English language and modern mathematics were opened to teachers of the Church schools. By the end of 1972, the Free Wesleyan Church alone had had 92 teachers trained in
oral English and 70 in modern mathematics.

Important scholarships were also awarded to key staff in the Church schools.

Apart from these direct practical forms of material co-operation and assistance the services of the Director and Education Adviser are available at all times to assist and advise the Church education authorities in every way possible. (1972)_{6:3}
(f) Diet: Dr. Clements (1970) has put forward a short summary on the importance of diet.

"Everybody eats food. It is one of the characteristics of all living things. People eat food for a variety of reasons and with a wide range of results. In many places in the world, there is not enough of the right kind of food to ensure that everyone, especially the young, get enough to eat to satisfy the needs for health, activity and growth. In other places food is available but because of local conditions, for example, poverty or ignorance about food values or eating habits continued from early life, some people do not get enough of the right kinds of food. In every community there will be found some who eat more than they need, with resulting obesity. Where too little, the wrong kind of too much food is eaten nutrition problems arise and some of these are to be found in every community."

Tongan Diet: The basic diet consists of carbohydrate and protein food sources like taro, 'ufi (yams), manioke (or kasava), kumala (sweetpotato), and kape. Less starchy food like bananas, and mei (breadfruit) are available also. Some of these may be baked or boiled and, together with taro tops and coconut cream, (highly concentrated juice) constitute a basic diet twice or three times a day, depending on what the family is going to do at a particular time of the day. Twice per day is usual while working in the plantation.

The basic protein food sources are pork, other meats, whale meat, fish and sea foods.

There is no real difference in the diet pattern between those living in urban and rural areas. Refined carbohydrate
Foodstuffs from overseas countries are being increasingly consumed and this poses a serious dental and health problem. Cooking is based on the European way of cooking although the way of traditional cooking in the 'umu (oven) in the ground, is also maintained in some circumstances, especially on Sundays. A town located near shops will have a slightly different diet from a country town diet at certain times of the day.

The following observations were made in an annual report of the Minister of Health. (1973)\(^5\)\(^\text{1}\)

Protein-calorie malnutrition does occur in Tonga. Exact figures are not available but from figures collected from hospitals during the year, 14 cases of "Nutritional deficiency" were admitted into Vaiola Hospital and 3 into Ngū Hospital. All of these were under one year of age. One child died of protein-calorie malnutrition (? Kwashiokor) and one died of "unspecified nutritional deficiency."

It can be assumed from the figures given, that the prevalence of protein-calorie malnutrition, for example, marasmus, is common among young children, especially among large families. Undoubtedly, this is due to a combination of late introduction of solids into the infants' diet plus the effects of repeated respiratory and gastro-intestinal infections. The importance of a proper balanced diet, good personal cleanliness and care in preparing feeds plus early treatment of respiratory and gastro-intestinal infections must be strongly emphasised if the prevalence of these nutritional deficiencies in infants is to be reduced.

Other nutritional disorders such as anaemias, non-toxic and toxic goitres are also increasing. Perhaps the major
nutritional problem of public health interest at present, is over nutrition resulting in obesity.

To this report the problem of increasing dental caries as a result of a changing dietary pattern could have been added.
4. ORAL DISEASE PROBLEM IN TONGA

The main oral disease problem in Tonga is periodontal diseases of the gums, and the surrounding tissues of the teeth and the related structures of the oral cavity.

When the dental survey was conducted by M.N. Tapealava for the W.H.O. 1965-1966, the problem of the periodontal diseases was revealed significantly.

It is to be noted here, that most of the problems of oral diseases which appear in heavily populated foreign countries, and recorded in text books, are rarely seen in the Tongan community in the writer's own experience (e.g. tumours and carcinomas).

Dental extraction is a readily available form of dental treatment and I would regard this to have created a problem as people have been accustomed to this as the most common form of treatment sought from the dental personnel.

Injection of penicillin to minimize dental abscesses and periodontal troubles is used by people who have been acquainted with it. In fact, it has been a routine practice that these people seek an injection of penicillin from the medical practitioner when they have any dental abscess, while oral hygiene is neglected and they always finish up with advanced periodontosis. Many people with periodontal troubles do resist dental extraction and resist oral hygiene instruction and create this problem which has to be solved by the dental practitioners.
Mild inflammation of the gingivae and the surrounding tissues leading to periodontitis, should be controlled by minimizing dental extractions and injections of penicillin and using education procedures so that the dental extraction should not be performed as a readily available service unless the whole mouth is maintained by the patient.

Tapealava\(^8\) and Wong, 1969\(^9\), in the report of the dental survey conducted in 1965-1966 stated that, "the greater number of missing teeth in the two oldest adult groups is sufficient indication of the prevalence of periodontal diseases. There has not been any special attention on this problem in the Tongan community."

Their results are given in Tables 1 and 2.

Table 1. Persons with Periodontal Pockets by Age. Tonga Dental Survey 1966\(^8\).

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No. persons examined</th>
<th>Persons with pockets greater than 6 mm</th>
<th>Frequency of persons with periodontal pockets greater than 6 mm in stated units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>20-24</td>
<td>648</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>25-29</td>
<td>580</td>
<td>5</td>
<td>0.9</td>
</tr>
<tr>
<td>30-34</td>
<td>514</td>
<td>8</td>
<td>1.6</td>
</tr>
<tr>
<td>35-44</td>
<td>822</td>
<td>30</td>
<td>3.6</td>
</tr>
<tr>
<td>45-54</td>
<td>485</td>
<td>35</td>
<td>7.2</td>
</tr>
<tr>
<td>20-54</td>
<td>3049</td>
<td>80</td>
<td>2.6</td>
</tr>
</tbody>
</table>

\(2.1\%\) \(0.5\%) \(0.1\%)
Davies, Horowitz and Wada\textsuperscript{10} conducted for W.H.O. an oral health survey in five countries including Tonga in 1971, stated that the objectives of the survey were enumerated, the methods of examination and criteria were described in detail, and the data on both within - examiner and between - examiner variability were presented and discussed. The results from the use of the basic survey methods in each of the five areas were presented.

Only one examiner (Davies) conducted examinations in all areas and the data are confined to the results of his examinations of 1037 patients in 5 countries.

Examinations were conducted at 5 different countries (Australia, Tonga, Fiji, Tahiti and Mexico) but the samples are not representative of the general populations of these countries.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No. persons examined</th>
<th>Persons with extractions indicated</th>
<th>Frequency of persons with extractions indicated in stated units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>1-2</td>
</tr>
<tr>
<td>20-24</td>
<td>648</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25-29</td>
<td>580</td>
<td>4</td>
<td>0.7</td>
</tr>
<tr>
<td>30-34</td>
<td>514</td>
<td>5</td>
<td>1.0</td>
</tr>
<tr>
<td>35-44</td>
<td>822</td>
<td>27</td>
<td>3.3</td>
</tr>
<tr>
<td>45-54</td>
<td>485</td>
<td>33</td>
<td>6.8</td>
</tr>
<tr>
<td>20-54</td>
<td>3049</td>
<td>69</td>
<td>2.3</td>
</tr>
</tbody>
</table>

1.9% 0.3% 0.1%
The Tongan sample consisted of 6, 8, 10, 12 and 35-44 years old Polynesians living at the city of Nuku'alofa and the inland and coastal villages on the island of Tongatapu.

These areas corresponded to locations 12, 13, and 14 in the survey conducted under the auspices of WHO by Tapealava in 1966.

The results from Davies' investigation were tabulated in accordance with the recommendations in W.H.O.

In Tonga 268 persons examined and the percentage of sample by age was:

<table>
<thead>
<tr>
<th></th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>35-44 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonga</td>
<td>18</td>
<td>17</td>
<td>18</td>
<td>14</td>
<td>33 %</td>
</tr>
</tbody>
</table>

Acute necrotizing ulcerative gingivitis was found in only 4 patients in 1037 and two of these were adult Tongan males.

Prevalence of dental caries: The Tongan group was the least affected (67 percent) by dental caries over all the age groups examined.

In ten year olds, the order of the groups is Mexico (82 percent); Fiji (48 percent); Australia (44 percent) Tonga (18 percent) and Tahiti lowest with only 16 percent of children affected.

The Mean Number of DFI Teeth per child for Tonga was:

<table>
<thead>
<tr>
<th></th>
<th>Age 6</th>
<th>Age 8</th>
<th>Age 10</th>
<th>Age 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonga</td>
<td>4.5</td>
<td>2.8</td>
<td>0.4</td>
<td>0.1</td>
</tr>
</tbody>
</table>
This data could be somewhat misleading since no account was taken of teeth which have been prematurely exfoliated or extracted because of caries. In an attempt to clarify this point, Davies indicated the average number of deciduous teeth per child and the percentage of teeth present which were DFI.

Number of deciduous teeth present and the percentage affected by caries:

<table>
<thead>
<tr>
<th>Age</th>
<th>Group</th>
<th>No. Children</th>
<th>No. Deciduous Teeth</th>
<th>Mean No. per Teeth Child</th>
<th>No. Teeth DFI</th>
<th>Percentage DFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Tonga</td>
<td>47</td>
<td>654</td>
<td>13.9</td>
<td>210</td>
<td>32.1</td>
</tr>
<tr>
<td>8</td>
<td>Tonga</td>
<td>46</td>
<td>468</td>
<td>10.2</td>
<td>128</td>
<td>27.4</td>
</tr>
<tr>
<td>10</td>
<td>Tonga</td>
<td>49</td>
<td>68</td>
<td>1.4</td>
<td>20</td>
<td>29.4</td>
</tr>
<tr>
<td>12</td>
<td>Tonga</td>
<td>38</td>
<td>16</td>
<td>0.4</td>
<td>2</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Percentage of persons with one or more DMFI Teeth in Tonga was:

<table>
<thead>
<tr>
<th>Age 6</th>
<th>Age 8</th>
<th>Age 10</th>
<th>Age 12</th>
<th>Age 35-44</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.5</td>
<td>-</td>
<td>59.2</td>
<td>76.3</td>
<td>-</td>
</tr>
</tbody>
</table>

Davies also noted that Tonga and Fiji were worthy of special consideration. In 1966\(^2\), Tapealava carried out an extensive survey in Tonga under the auspices of WPRO Project 115; this followed a similar survey in Fiji in 1965 by Wong and his associates\(^3\) who were participants in an Epidemiological Training Project. In their report on the Tongan survey, Tapealava and Wong said: "The dietary habits of the people are gradually changing as the economy of the country is being developed and as a result refined..."
carbohydrates will slowly replace the natural diet. This is already reflected by the comparatively large number of children having one or more primary teeth and also a higher percentage of decayed permanent teeth requiring extraction in the younger children. Comparing the caries rate with Fiji, Tonga is very low, being about one half to one third that of Fiji."

Later in their recommendations Tapealava and Wong made what would appear to be a prophetic statement:

"Because there are indications of a rising caries incidence due to the changing dietary habits, it is strongly recommended that a small sample survey should be carried out every five years as a surveillance and safeguard against the sudden onslaught of the disease."

Davies' survey was done five years after that of Tapealava and it is indeed alarming to see that in six year olds the percentage of children with one or more DMF permanent teeth had risen from 2.9 per cent in 1966 to 42.5 per cent in 1971. Also that the mean number of DMF teeth per six year old child has risen from 0.04 in 1966 to 1.2 in 1971. The survey also confirmed the high prevalence of periodontal disease previously found (Davies\textsuperscript{10} and WHO\textsuperscript{11}) but has indicated that dental caries is quickly becoming a problem in Tonga (i.e. DMFT from 0.04 in 1966 to 1.2 in 1971 for 6 year olds).
5. DEVELOPMENT OF GENERAL AND DENTAL HEALTH SERVICES

An idea of the present stage of development of health services may be gained from abstracts from the Annual Report of the Minister of Health for the year 1973\textsuperscript{2}:

The principal functions of the Ministry of Health are:

- To provide a National Health Service for the Kingdom within the financial capability of the country's economy.
- To administer the medical services and public health acts and other public acts relating to welfare of the sick and promotion of public health.
- To act in an advisory capacity and to implement projects and programmes relating to environmental health.
- To investigate, plan and institute measures to prevent communicable diseases.
- To prepare and submit reports and information on health statistics to His Majesty's government and other international agencies.
- To plan, propose, institute and promote such measures as required in minimizing the ill effect on health of a fast growing population.
- To educate and train Tongan nationals to meet the growing requirements of the Ministry of Health.

Organisation: The overall organization of the Ministry remained much the same as in the previous year. The Minister of Health, as the Ministerial Head of the Department, is responsible for the formulation of policies and liaison with international agencies on medical and public programmes. The Director of Health is responsible to the Minister for the implementation and general administration of the various policies and programmes and the efficient running of the
Ministry as a whole.

Administratively, the Kingdom is divided into ten medical and public health districts based on the location of the 3 hospitals and seven rural dispensaries. Each district is in the charge of a medical officer or a medical assistant who is directly responsible to the Director of Health for the medical care and health services in his district.

The new vehicles were received during the year from UNFPA through UNICEF for the use of the MCH/Family Planning services. It also provided much needed transport for 'Eua and Kolovai Dispensaries and the Queen Salote School of Nursing. Motor cycles were also received for the use of the Public Health Nurses.  

With the acquisition of these much needed transports, the demands for further expansion of health services, especially to rural areas, can now be adequately met, and also permits more efficient supervision of field staff and makes health services more readily available to where they are most needed.

Medical course: Seven students were at courses during the year. One in Medical I, one in Medical II, one in Medical III, two in Medical IV, and two in the final year. All these students were successful in their examinations with the two in the final year graduating in December.

Dental course: Three students were at courses during the year. One in Dental I, who successfully completed his first year. One in Dental II, but his course was terminated
during the year due to academic incapability, and one in final year and he graduated in July.

At the Medical College, University of Papua New Guinea, four students were doing the medical course in this University. Two students graduated with their M.B.B.S. degrees during the year and were doing their first year compulsory internship training at Port Moresby Hospital, Papua New Guinea. One student was taking twelve months break from his medical course to undertake a Bachelor of Medical Science degree in Haematology and Parasitology, and the remaining student was in the third year of his medical course.

At the University of Queensland, Australia, two students were doing the medical course during the year. One student was in the fifth year and one completed third year and started fourth year. There was also one dental student repeating his first year course and he was partially successful and permitted to proceed to the second year of his course.

At Monash University, Melbourne, Australia, three students were doing the medical course during the year. One successfully completed his third year, one failed his second year and was permitted to repeat his second year in 1974.

At the University of Tasmania, one student was repeating the first year medical course at this university but was again unsuccessful and her course was terminated.

At James Cook University, Townsville, Queensland, one student was doing the first year Bachelor of Science course
with the hope of continuing to the second year Pharmacy course at Queensland University. His final examinations were unsuccessful and is now being accepted to continue at the same University but for a Bachelor of Science degree.

At Canterbury University, New Zealand, one student was doing the first year course in Dietitics but was unsuccessful and is now undertaking her general nursing certificate. 5:4

The Hospital Boards of Visitors, the Tonga Red Cross Committee, the Nuku'alofa Rotary Club, the Tonga Family Planning Association, the various Women's Village Committees continued to render voluntary assistance and donations to the Ministry. 5:5

These services are under the charge of a senior medical officer and he is directly responsible to the Director of Health for their administration. His administrative supervision includes environmental sanitation, community water supplies, communicable diseases control, maternal and child health, family planning services, health education and the health statistics units. 5:6

Health education, as an essential component of public health work, has as its aims the promotion of public awareness and use of health services; provision of training for health workers; establishment of better working relationships between the Ministry and other related agencies and the enlisting of community support for and acceptance of health programmes.
This section is part of the Public Health Division and is under the charge of a Health Education Officer. He is being assisted in this work by a W.H.O. Education Consultant, who arrived during the year as part of W.H.O.'s assistance to Tonga.5:7

The Health Education Officer participated in the W.H.O. sponsored workshop on the Development of Education and Information Materials on Family Health and the Seminar on Family Life Education which were both held in Nuku'alofa during the year. He also attended the S.P.C. sponsored training course in broadcasting production and presentation which was also held at Nuku'alofa towards the end of the year.

The section planned, organized and conducted training seminars for medical, nursing and paramedical staff on various aspects of Public Health in Tongatapu, Vava'u, and Ha'apai. It also conducted training courses for traditional birth attendants and held motivational discussions with community leaders, and women village committees on matters related to family health. Lectures on health matters, especially family planning were given to primary school teachers, students at the Teachers' Training College and end of year school leavers.

Family planning continued to be one of the top priority programmes of the Ministry. It is fully integrated with the maternal and child health services, as a section under the Public Health Division.

There was a WHO Family Planning Consultant who completed her tour during the year. It is hoped that a new appointment
can be made by WHO during 1974.

During the year four medical officers and two public health nurses were awarded one month WHO Fellowships each to observe family planning activities at Suva, Fiji, Singapore and Manila.

There were 1,831 new family planning acceptors recorded during the year, an increase of 359 over the 1972 figures. It is encouraging to note that over the past eight years, there has been a steady increase of new acceptors each year. The total number of family planning acceptors since 1966 now stands at 8,892. A new immediate post-partum family planning programme was started during the year and it recruited 239 acceptors, 113 of these were IUD acceptors and 42 were tubal ligations. There was a drop in the number of IUD acceptors of the Depo Provera Method. No vasectomies were performed during the year.

The Tonga Family Planning Association continued to assist the programme especially in the motivation of the public through radio, films, pamphlets and small groups meeting in villages.

The Voluntary Roman Catholic Family Planning Service continued its promotion of the ovulation method throughout the year. 5:8

This service is responsible for the ante-natal and post-natal care of mothers, and for promoting the health and welfare of infants, pre-school children and school children. It is closely integrated with Family Planning
Services under the charge of the Family Planning Medical Officer, but he has two public health sisters who are responsible for the supervision and day-to-day management of this service.

Because of the shortage of nursing manpower, this service has continued to be understaffed during the year. Eight new Peace Corps registered nurses arrived during the year to work in this section but at the end of the year four of them had returned to the United States for personal reasons. It is hoped that more local nurses can be recruited next year to fill the existing vacancies in this important section of health work.

There were 2,395 deliveries carried out during the year, 1,259 or 52.6% of these were home deliveries whereas 1,136 or 47.4% were done in the hospitals. Of the home deliveries, 34.21% were performed by traditional birth attendants against 13.3% by the public health nurses. Because of the important part that the traditional birth attendants play in this respect, the Ministry recognized this and had instituted training programmes for them and supplied them with delivery kits in order to reduce risks of maternal and infant mortality.

Immunization programmes were carried out during the year with vaccine received from UNICEF.5:9

"There is no separate service for the schools and the school children but their health care is undertaken jointly by the Public Health Services and the clinical services through the MCH Services, hospital and rural dispensaries."5:10
The extensions of the Health and Medical Services are not to be described fully at this stage. But the following medical services are standardised in the community:

Communicable diseases.
Tuberculosis.
Leprosy.
Immunization.
Environmental health.
Port Health and Quarantine.
Vaiola Hospital (Tonga Tapu).
Ngū Hospital (Vava'u).
Niu'ui Hospital (Ha'apai).
Hospitals utilization.
Rural dispensaries.
Xray and laboratory services.
Ophthalmic services.
Psychiatric services.
Prison.
(a) Registration.

In Tonga, registration to practice dentistry takes place annually, according to the Civil Service Act and Medical Act. The legal right to practice any profession upholds the value of the profession, for dentistry this needs to be developed in Tonga. Other professions like Law, Engineering, Navigation and Carpentry and Medicine have their own acts.

When the first few Medical Officers graduated from the Fiji Medical School in the early 1930's, they were given full legal superiority over local ad hoc medically trained personnel. This did not happen with dental practitioners trained in Fiji who still have the same duties as ad hoc locally trained dental personnel. A better form of registration clearly defining the duties of dentists and auxiliaries is required.

In the United Kingdom their 1944 Act\textsuperscript{12} stated that, "A person who is not a registered dentist or a registered medical practitioner shall not practice or hold himself out, whether directly or by implication, as practicing or being prepared to practice dentistry." Acts and Regulations made subsequently were needed for a local education authority to appoint a Chief Dental Officer and such other dental officers and nurses as may be necessary for securing the efficiency of the School Health Service."

In New South Wales, Australia,\textsuperscript{13} the practice of dentistry is deemed to include:—
a."the performance of any operation and treatment of any disease, deficiencies or lesions on or of the human teeth or jaws and the correction of malpositions thereof and the
performance of radiographic work in connection with the human teeth or jaws; and
b. the giving of any anaesthetic in connection with any operation on the human teeth or jaws; and
c. the mechanical construction or the renewal or repair of the artificial dentures or restorative dental appliances;
d. the performance of any operation on, or the giving of any treatment, advice or attendance to any person as preparatory to, or for the purpose of or for or in connection with the fitting, insertion, fixing, constructing, repairing or renewing of artificial dentures or restorative dental appliances; and
e. the performance of any such operation and the giving of any such treatment advice or attendance as is usually performed or given by dentists."

Medical and Dental Graduates of the Fiji School of Medicine have their medical and dental legislations respectively for the benefit of both the profession as well as the public in Fiji. They also have the right to private practice in Fiji but not in Tonga.

One of the functions of the Ministry of Health is to exercise the Public Acts relating to Welfare of the sick and promotion of public health. A review of the practice of dentistry and functions which may be performed by different types of personnel would benefit both the public and profession.
(b) **Training.**

Dental training for the utilization of Dental Nurses or Dental Hygienists in the Tongan community has been recommended to be implemented long before 1974 but has not yet been done.

Wong\(^9\) stated that "Local training should be stepped up when accommodation is available. With the return of the dental officer from Queensland (Tapealava) a comprehensive training programme could then begin in earnest."

He also recommended strongly that: "More emphasis should be placed on dental health education. The toothbrush is perhaps the best weapon to fight diseases of the gum tissue and a toothbrush programme is needed in the schools. To make this programme a continual success, a revolving fund should be provided for the purchase of toothbrushes.

2: When Hygienists are available a prophylaxis programme should also be carried out throughout the country.

3: A W.H.O. fellowship might be requested for N. Moi Tapealava to gain post-graduate experience at the School of Public Health in Sydney when he qualifies from Queensland University. This would strengthen the teaching staff of the local training programme."

The training of Dental Nurses for Tongan conditions may follow generally the pattern of New Zealand.

"In New Zealand, the dental health of children and young people is maintained by the regular inspection and treatment of teeth by Nurses under the dental auxiliary programme which has now been operating for half a century."
It was the first programme of its kind in the world and has since been emulated in other countries. The scheme was described in an address to the twenty third World Health Assembly by the chief delegate of New Zealand. ¹⁴

So far, training for dentists in Tonga is available from local ad hoc training, the Fiji School of Medicine Dental School, recently from University of Queensland and Sydney.

There have been some recent educational activities in Tonga. Dr. Chellie Sundram, W.H.O. Dental Consultant, visited Tonga on 29th May to 8th June, 1973, to advise on dental services and training here in Tonga.

A Dental Public Health course sponsored by S.P.C. was held in Tonga from 24th to 28th September 1973. Professor Noel D. Martin, Dean of the Faculty of Dentistry, University of Sydney was the consultant and assisted by Dr. M.J. Hollis; the S.P.C. Dental Public Health Officer.

Nurses are at present trained in Tonga. Miss O.T. Manning, W.H.O. Senior Nursing Adviser, stationed at Suva, Fiji, visited Tonga towards the end of the year to assess the results of changes implemented following the review of the Nursing education programme in December, 1972, and to explore the needs for further assistance from the intercountry nursing project. It was noted that the public health nursing demonstration area, at Houma and Haveluloto were not fully utilized due to poor roads and lack of staff. An increase in the establishment is hoped to be requested
in the next financial year so that the Haveluloto area can be covered. Fifteen nurses graduated for the year in February 1973.

It was noted in a S.P.C. report of 1972 that "developed countries concerned with the area provided places in their universities, technical institutes, hospitals and auxiliary training institutions for dental personnel from the Pacific islands at both under-graduate and post-graduate level. The question was raised concerning the desirability of the two dental schools within the South Pacific, establishing a permanent relationship with a dental school in Australia or New Zealand. Benefits which could accrue would be in the fields of staff and students exchange and in the provision of teaching materials."

The local trained dental personnel and the Fiji graduate dental personnel have been regarded as one grade up to the present time. This of course is an advantage to a local trained personnel but not to the Fiji Dental Graduate. Tonga was employing dental assistants in ad hoc schemes, who in due course, had the same right as the dental officer in dispensing dentistry. In years to come the newly graduated dental officers from Fiji may tend to seek other countries where their dental qualifications may receive recognition, if nothing is done to this respect. The standard of Fiji Medical Graduates is recognised and Dr. T. Puloka after 6 months fellowship in Orthopaedics in Australia, also achieved the distinct honour of being elected as a Fellow of the Royal Australian College of Surgeons.
In New Zealand and Australia, school dental nurse training lasts for at least 2 years and their fields of dental utilization in practice is well defined by law and ethics in the conduct of dental practice. In Fiji as well there is a standardized dental hygienist's course where Tonga can send their personnel if such dental auxiliary needs recognition in practice of dentistry in Tonga.

To conclude, if some dental training is incorporated with the General Nursing School of the Ministry, there will be a change of the attitudes of the people towards dental health in Tonga. Dental auxiliary training should also be carried out in this school where basic medical science teaching is available and segmented training first for duties similar to that of a dental hygienist (followed by field experience) then training for school or adult dental therapists.
(c) **Professional Association.**

To form an association, whether professional or non-professional, marks the development of a country. The more associations, the better for the nation concerned, provided that those associations are being directed scientifically and professionally. It is understood in more developed countries, such as New Zealand, Australia and the United Kingdom, that there are various associations of different professions. These may be regarded as efficient resources for the improvements of Science in the community and of various aspects of health.

Dental associations are always in line to medical associations in practically every developed country in the world today. It may not be easy to state which country has the most developed association of this nature, but the objective of the association and how to achieve its goals, are the most important part of any association. Some people may join an association in order to achieve an indirect advantage from it, in which case the association may not be survived. To maintain the interest of the members in their profession does help the community in many ways to achieve its objectives.

It is not easy to get the professional people in such a way to co-operate if one or two are not interested. There has been an effort to join with the medical officers in Tonga but it has not been successful. There is a Medical Officers' Association within the Ministry of Health and it is a registered body and recognised as such. Establishment of a Health Association, so that everybody in
the Ministry could participate, would be an idea for Tonga.

At a seminar of the S.P.C. 15:1 1972, it was stated that, "At present there was little communication between dentists in the Pacific, the Federation Dentaire Internationale and dental associations of Australia and New Zealand. One problem was that many territories did not have a dental association. Brigadier Fuller undertook for the participants as private individuals to bring to the notice of the appropriate people, the desirability of establishing a South Pacific section of the Asian Pacific Dental Federation.

"The general conclusion was that considerable aid was available and that dental personnel should be aware of the forms of aid available to their territory and made requests through the appropriate channels for the assistance they required." 15:2

Tonga's dental unit should be developed by the establishment of a Tongan Dental Association where its staff would meet to exchange views and attitudes toward provision of dentistry to its community levels and to have inservice training.

Dental training and dental associations play an important role in the community as far as health is concerned.

Sir John Hall Best16 in supporting an established dental association said:

"I commend the A.D.A. (NSW Branch) to you for your support by membership and participation in its activities
and benefits. The association needs you. You will gain on being a member. The quality and strength of dentists' organisations largely determine the status and ethics of the profession which is highest in those countries where the Association is most active.

I write with a background of 51 years since commencing practice in New South Wales. I always have been and still am an active member of the Australian Dental Association (New South Wales Branch)."
6. DENTAL MANPOWER

"The perennial problem of shortage of trained manpower in all categories of staff, continued to be a major source of concern during the year. The burdens of the increased demands on the health services by a rapidly increasing population, together with the continue and intensify the training of Tongan nationals at both the undergraduate and post graduate levels to meet the requirements of an expanding health service." 5:13

"The total population of Tonga on the 31st December, 1973 was estimated to be 94,520. To provide medical, public health dental and nursing services for this population, there were at the end of the year, 27 Medical Officers excluding Minister of Health and the Director of Health. This represents a ratio of one medical officer to 3538 of population. This further increase in the ratio of population per medical officer was due to reduction of the establishment by retirements plus the continued increase in the population. In the dental services the number of dental officers at post at the end of the year, was only 8. This represents a ratio of one dental officer to 11,940 persons. This marked increase in ratio was due to reduction of the establishment by 3 due to retirement, overseas undergraduate training and one dental officer leaving the service for employment in another country. Of the nursing service, there were 181 nurses at post at the end of the year, thus giving a ratio of one nurse per 528 persons. Although this ratio appears satisfactory it is still far from being adequate because it includes
the total student nurses of the establishment, also the number of nurses resigning from the service is increasing.
(a) Number and Distribution

"The Chief Dental Officer, Dr. S. Kilisimasi, is in charge of the Dental Division and he is directly responsible to the Director of Health for its administration. The total staff consisted of 7 Dental Officers and 7 Dental assistants. Dental Officer, T. Kapukapu retired from the service during the year and one dental officer, Mr. S. Latu left the service to seek employment in the New Hebrides. One dental graduate from the Fiji School of Medicine, M. Vao, returned and resumed duty in June." 5:15

"The Services provided by this Division in dental care continued to be of very high standard.

The dental clinic at Pangai Ha'apai Islands was staffed by one dental officer and one dental assistant and the dental clinic at Ngu Hospital in the Vava'u Islands was also staffed by one dental officer and one dental assistant.

Dental personnel visited 'Eua, 'Eueiki and 'Atata Islands to attend to school children and adults who were in need of dental treatment. Unfortunately, due to irregular shipping schedules, no visits were made to the Niua Fo'ou and Niua Toputapu islands during the year." 5:16

"Dental officer, Pupunu Kupu and one dental assistant continued full time work on Dental Public Health. Its main work was to cater for the dental needs of pregnant women, nursing mothers, pre-school children and school children and school children up to 12 years of age. Emphasis was placed on preventive measures and dental health education." 5:17
"The new mobile dental clinics donated by the Australian Government under its South Pacific aide programme was put into use in July." 5:18

Diagrammatic Distribution of Dental Manpower and Provision of Dental Services in the Tongan Community, 1974.

Tongatapu Island  
Vaiola Hospital  
DIRECTOR OF HEALTH  
Dental Division  
CHIEF DENTAL OFFICER  
5 Dental officers and 5 Dental assistants

Island of Vava'u  
MEDICAL OFFICER  
Ngu Hospital  
1 Dental Officer  
1 Dental Assistant

Island of Ha'apai  
Medical Officer  
Dental Clinic  
1 Dental Officer  
1 Dental Assistant
(b) **Status**

Fusillo and Metz have summarised studies on status of dentistry in choice of a profession.\(^{17}\)

"The relation of interest in dentistry to occupational values and to preference for characteristics of an occupation has been the subject of three reports from the New Jersey Study. Linn reported that having occupational values of realizing 'financial success' and desire for prestige in a job were related to interest in dentistry. The greater the importance to the student of financial success and prestige, the greater the interest in dentistry. On the other hand, no consistent relation was found between interest in dentistry and the importance of 'pleasure of helping other people', 'not having to be supervised', and 'keeping regular hours'.

"This approach provides the basis for a more general theory of choice of dentistry based on occupational rewards. Dentistry is chosen when it is seen as most nearly fulfilling the occupational value system of the individual."\(^{17}\)

"Choice of dentistry as a career and recruitment into dentistry are two sides of the same coin, certain social and occupational characteristics seem to be related to the selection of dentistry by high school students. Motivations involved in choice of dentistry are considered in the research of More and Kohn, Sherlock, Mannard Parkin, Land, and others in the United States. Studies of career choice in Australia by Barnard, Wearn, Dowsett and Siu, and by Kruger, offer findings which at times differ from those of studies of the American dental student and raise interesting cross-cultural
aspects for comparative research in the future.\textsuperscript{17:1}

"Studies on the choice of dentistry as a career have generally taken one of two different approaches; (a) studies of interest in dentistry (or plans to enter dentistry, among high school students and students entering college, and (b) studies of factors related to the actual choice of dentistry on the part of dental school applicants, predental, and dental student.\textsuperscript{17:2}

... "The study of the interest of high school students in dentistry has focused on several questions, for example: (a) How many students are interested in dentistry, (b) what characteristics distinguish those students with a high interest in dentistry from those with low or no interest in dentistry? (c) what factors distinguish those students interested in dentistry from those interested in other occupations particularly medicine; (d) what are the occupational values of students interested in dentistry and in other occupations, e.g. 'service to others', 'prestige'? (e) how is dentistry perceived compared to other occupations in terms of a number of occupational traits, e.g. 'work regular hours', 'be my own boss'?\textsuperscript{17:3}

... "There have been at least three studies of high school students or teenagers specifically designed to examine career choice of dentistry - (1) a study of 578 boys in college preparatory programs in seven New Jersey high schools, conducted in 1961 (New Jersey Study); (2) a national sample of 340 teenagers (185 male) as part of a larger sample of 1,862 adults, surveyed in the fall of 1959 by Kriesberg and Treiman, and (3) a study by Hood in 1963
of plans to enter dentistry on the part all high school juniors in Minnesota, who were in the top half of their class in academic ranking and in the top quarter in tested scholastic aptitude (11,614 students). In addition a further study on choice of career was conducted by Wertz, who surveyed 127,212 college freshmen in 248 four-year colleges and universities during the fall of 1961. This survey contains information on dentistry as a probable career choice along with other occupational career choices."

In more developed countries, it is customary that a child in his early childhood is asked by his parents, "what would he become when he is grown up?" If one says he would like to be a doctor, parents and teachers, during his school career, help to provide him with all the academic requirements for such a choice, in order to achieve his ambitions.

In Tonga, with regard to dental status or any other choice of profession, the choice is not very necessary because of the economic backgrounds of individuals. The choice of profession is by chance. The resources are supplied mainly by the Government, Churches and other group organisations, such as the Rotary Club, and other overseas aide programmes which are directed through the Government.

In comparison to medicine, there were more trained medical personnel than dental and therefore medicine was more developed and regarded a popular profession by the public. There is no doubt that dentistry in Tonga will be regarded a probable career next to medicine, in times to come, if the government authorities would be interested in developing dentistry. Therefore, if there will be more trained dental practitioners and dental auxiliaries, then
the overall attitude of the public toward dentistry would become high in status and profession.

Other professions are also proportionately developing according to the Government's demands and availability of scholarships for the graduated students from high school level. Choice and availability of positions in any field for the person leaving school in Tonga are limited and positions are taken up when they become available. The majority become farmers.
(c) Future Development

W.H.O. 1965\textsuperscript{2, 5} stated that "A public dental health service to a country is influenced by cultural factors and by the social, economic and political philosophy of each country. There was an agreement that a specific set of principles can be applied to almost all organisational systems for the provision of public dental health services, no matter what cultural or social pattern of the country involved.

1. Authority and Responsibilities: To facilitate the organisation and administration of a public dental health programme, adequate authority should be vested in the dental administration. This should apply to all levels, from the person of the dental administrator to those in lesser administrative posts. Experience has shown that without the necessary delegated authority to act with a reasonable degree of autonomy, the dental director is hampered in developing a public dental service within the public dental health programme."

"Authorities involve both duties and responsibilities: These should be defined and committed to paper so that at all administrative and professional levels they are clearly recognized and understood.

"General principles of planning and evaluation of public dental health programmes: Planning and evaluation are complementary processes in the administration of public dental services. It was recognized, the fact that a good plan should contain in itself provisions for periodic evaluation and that the results of this evaluation should
be fed back to the original plan and used for its re-adjustment.

"These plans will of course be co-ordinated with the overall national development plan, but to ensure that adequate provision is made for dental health it is important that the dentists should be included on the bodies set up to advise on the drafting of national plans so far as they relate to health."

The Tongan dental division has been operating now for many years, in its own administrative technique.

The Chief Dental Officer was the sole dental administrator. As for future development activities for Tonga's dental services, I recommend the following suggestion for the authorities' concern for implementation so that the attitudes towards dentistry could be changed and developed in the Tongan community. For dental manpower development the following points should be considered.

1. In-Service Training Programme - This is required under a national level training scheme to bring the locally trained personnel of the division into mutual agreement and satisfaction with the Fiji School of Medicine dental graduates in relation to salary, Preventive Dentistry, general clinical procedures, and Dental Health Education.

2. (a) To include a dental nurses' training scheme into the Queen Salote general nursing school of the Ministry of Health, if a separate dental school for nurses is impractical. (b) Three dental clinics to be established, one in each of the two main health centres in Tongatapu Island, and one in the Nuku'alofa Primary School compound. (These 3 dental clinics will cater only to primary school level up to 12 years of age, during school hours and later to pre-school
and nursing mothers in non-school hours). Also an emergency dental service would be rended when possible. This is always preferable during school holidays.

(c) To establish a Tongan dental association. This is regarded important, and a possibility of joining one of the overseas dental associations, like the Fiji Dental Association, is strongly recommended.

3. Written objectives of provision of dental services and types of priority groups (e.g. expectant mothers, pre-school and primary school and nursing mothers).

4. Development and standardisation of the main dental clinic into specialized fields of oral surgery, periodontics, operative dentistry, pedodontics and dental public health. The same development to take place at a later stage in the dental clinics in Ha'apai and Vava'u Islands.

5. Water fluoridation as a Dental Public Health measure, should be introduced to where the water is being reticulated in Nuku'alofa and Vava'u. This programme must be considered as a step to the prevention of increasing dental caries in young children in city areas. Dental staff would only be required for evaluation.
7. DENTAL HEALTH SERVICE

(a) General Attitudes to Dental Services in Tonga

Dental attitudes of the people in Tonga have been developed gradually and expectations and priorities for dental treatment and health are still low.

The method by which dentistry was practiced, the persons who introduced dental treatment and the conditions under which the service was performed, were the factors that contributed to a negative dental attitude.

The method used was that when one needed a dental extraction, he sat outside on a log of wood, or inside on an office chair, opened his mouth, someone held his head firmly against a tree or against the wall and the doctor or the dispenser or the dresser in the dispensary with a forcep, rocked the tooth out without local anaesthetic. This was the normal dental practice for many years in the Tongan community.

It was not until the Ministry of Health was a bit more thoughtful about dental health in later years, that the Ministry employed a part-time Government dentist, for emergency dentistry free of charge to Tongans. Those who were able to pay for the false teeth and all other dental treatment, were foreigners and Tongans with good economic background who paid fees for service from the private dentist. The private dentist was requested by the government, if he could establish a dental clinic in order to train some Tongan dental apprentices. There was one Tonga dental apprentice initially trained for emergency dental treatment for Tongans especially for dental extractions. This type
of ad hoc training was in operation when the writer joined the dental team in 1951 to make up the staff of 6 in all. The Government dentist recommended that the writer continue with the Fiji Medical School dental training in 1955 to 1957 and he was the second overseas trained personnel to return to the dental team in Tonga in 1958. When he resumed, he was under his locally ad hoc trained personnel in seniority and salary for 9 years.

There was no authority given for the Fiji dental graduate to use his training and assist locally trained personnel in the provision of dental services. This was a result of insufficient management and organisation.

If the dental status was legally recognised and developed in the Ministry from the beginning, the attitudes of the public would be a different story today, as better treatment by more competent persons would have been available.

In the Medical Division of the Ministry, on the contrary, this aspect was well organized, when the first few Medical Officers returned from the Fiji Medical School in the early 1930's and a good status was developed.

To help develop positive attitudes, major actions and proceedings are recommended:
1. The application of dental legislation in relation to a Dental Act.
2. Development of the dental services to offer a rational, planned preventively oriented service given by adequate and competent dental staff of specialist, dentists, dental officers and dental auxiliaries.
3. Development of preventive programmes and dental health education to ensure a positive attitude of Tongans towards use of the services provided and towards their own home care and preventive attitudes.

At present in Tonga the services are mainly available in the 3 main dental clinics in the Kingdom. The majority of dental treatment given is to those who seek treatment during working hours of the week. School services are only available if transport is secured. In the outer dental clinics in Vava'u and Ha'apai islands, operators do not have sufficient time for operative dentistry, because of the increased demand for dental emergency services. In the 3 main clinics a wider range of treatment is given.

Fillings, pulp treatment, desensitization, release of traumatic occlusions, prophylaxis, scaling and treatment of gingivitis and periodontal pockets together with oral hygiene instruction is available for those who are more aware of the need for these types of dental services.

Prison and hospital dental treatment is given on an emergency basis by a dental officer who visits them when requested. The old age group and patients in the homes are treated in a similar manner. Tongans of all ages still receive dental treatment free except for dentures which are paid for on a fee for service basis. Prosthetic dentistry has been provided by the Government for the past 2 years and the charges have not been disputed yet by those who need dentures. There is a laboratory for this service in the main island under the responsibility of the Chief Dental Officer and his assistant.
Remedies for relief of pain such as chewing of leaves and bark of trees, or tobacco, together with the massage use of coconut oil. Aspirin is available through the hospitals and health centre or from local shops.

Other professional treatment, including dental extractions, largely for dental caries and periodontal diseases, impactions under local or general anaesthetic, are available. Treatment of pulps such as pulpectomy, pulpotomy and pulp capping, are commonly performed in the middle aged groups. Orthodontic cases, cleft palate and surgical cases, like tumours, cysts etc. are seen but do not represent a large proportion of the population. Fractures of mandible and maxillae do occur occasionally and immobilizing of the two jaws by wiring is the only method of treatment being used. There is a need for an increase in the number and standard of oral surgery facilities in the dental division. If oral surgery is developed with greater availability of the trained personnel the demand for periodontal treatment would also rise tremendously.

Greater emphasis on early periodontal treatment and preventive home or dental clinic care must be placed in education of patients, the community and also the dental staff.
(b) **Attitude Towards Treatment under Local Conditions**

The attitudes toward treatment under local conditions in the Tongan community need to be developed as a large number of people regard diseases to be caused as consequences of ill doings. Some still prefer consulting primitive local "doctors" and ministers of religions, rather than professional doctors. In the hospital where professional treatment is available, they come with the idea of being treated as soon as possible, otherwise they may go without treatment because they think that they have deserved the illness. They do not care about coming in working clothes to seek treatment. They think that it is the responsibility of the Government to provide treatment for them, no matter what the expense is going to be. Many think that penicillin injection is still the most effective treatment of all. They seek more their own choice of treatment, whether a tablet, a dressing or a certain eye drop, or a tooth extraction, when their choice of treatment is available, otherwise they believe they will not be healed. People still refuse to be admitted to the hospital for treatment purposes. Some prefer treatment to be undertaken at home rather than hospital. Hospitalization is a major concern to a family and more than four family attendants always stay around the patient. If a patient dies, there is still a lot of expense for the family to undertake, from the moment he dies to the time of his funeral, and for a few weeks, people stay in the deceased's home to have feasts at the deceased's relatives' expense as part of the tradition.

It is not uncommon that a diseased person is sent around to local doctors, or Ministers of the Churches, then to the hospital last of all. If treatment in the hospital is not successful, they go back to the Minister for comfort,
psychological recovery or death.

There are no homes for the old folks and pensioners. This is still an individual responsibility and they are cared for properly by their family and relatives.

"'Pay up, patients,' says Ministry," was the heading for a newspaper article in Tonga in 1974.18

"'Patients' unpaid accounts are giving the Ministry of Health a lot of anxiety.

"'In its report for 1973, the Ministry says that unpaid accounts for the year amount to $8,276 giving a total of $20,793 outstanding. The situation continues to worsen in spite of attempts to improve the collection of revenue. 

"'Expenditure for the year amounted to $512,491; direct payment for services and supplies came to $22,137.'"

It was a milestone development for Tonga when she opened her first standardised national hospital in 1971 under an overseas subsidised aide programme. This was the first time that the Tongans had to pay for some sort of medical scheme, only when one is to be hospitalized; otherwise medical treatment to outpatients, consultations and dental services are free, except for prosthetic dentistry, spectacles, xrays, and health certificates. It is understood that these medical services are reasonably charged although this has been disputed.

Generally speaking unfavourable attitudes toward treatment under local conditions will be gradually changed, through education and favourable experience.
The following are reflected as attitudes of the public towards dental treatment: (Tongan Community).
1. Dentistry is not as important as medicine.
2. Dentistry is a fearful operation.
3. Natural teeth are temporary.
4. Dental disease is hereditary.
5. Dentistry is removal of teeth.

The following are also recognized as being significantly involved with the people's attitudes towards dental treatment:
1. Unfavourable dental remarks.
2. Fear from past experience.
3. Death of dental origin.
4. Apathy.
5. Geographical isolation.
6. Exposed dental services.
7. Absence of female staff.
9. Lack of specialized training of staff.
10. Insufficient management or poor relationship with dental staff.
(c) Dental Health Services of Maternal Child Health Department

Mothers should be regarded as priority groups as it was for the Maternal and Child Health scheme of the Ministry on the whole. We have mentioned its development in various health programmes in the Ministry but a dental service to this department would be strongly recommended.

A programme has been initiated in the main island of Tongatapu only at a random and irregular timetable due to the problem of transport in the following manner: The old truck of the Ministry was requisitioned to be used as a mobile dental clinic so that a dental programme was available to the villages in co-operation with the district nurses' programm. The idea here was to reach the rural areas where the nursing mothers and pre-school children were fairly isolated and never aware of the importance of dental health. It was reflected in the dental examination given to this group that not only the children who needed urgent attention, but the mothers as well showed heavy calculus deposits and marginal gingivitis due to neglected oral hygiene. The clinical dental service here was not in full operation but just initiating the service that can be rendered and tried to motivate these mothers about the need of their co-operation for the dental health of the family. The amount of required treatments in the mouths of these mothers were significant, but the time and circumstances did not allow a continuation in the following year. In 1973, a programme for the children began. When a medical officer gave a Medical programme care to the expectant mothers in the villages, the Dental Officer requested his transport in order to add a dental orientation programme as well, when the medical
officer is finished with the mothers and their children. It was thought that a dental mobile clinic like the overseas type in developed countries, should be used by this service in Tonga in a prophylaxis programme into this group. If this was available, the nursing mothers would enjoy it with their children rather than when we were using the truck. Women would like a bit of privacy while working in their mouths and this will draw their attention to a better dental attitude. In the main dental clinic in Tongatapu there was a set up to deal with the dental needs of expectant mothers on their routine visits to the Maternal and Child Health Department of the Vaiola Hospital last year.

From this, the need for dental health information and dental clinical activites for both expectant mothers and pre-school children were significant. Children were always brought very late for preventive treatment, with advanced dental caries of deciduous dentition and six year molars. Instead of dental extraction to relieve pain, prophylactic procedures were introduced such as the demonstration of tooth brushing, excavation of debris wherever possible, the extension of the cavities for self cleansing purposes were established to postpone extractions until an oral hygiene is maintained first. Many children and parents were treated successfully in this way. The number of referred cases for antibiotic injections for cases of dental abscesses were minimised by the establishment of drainage, and regular toothbrushing at home. This was due to the fact that many parents believed that the penicillin injections were the ideal treatment for dental abscesses from the advanced caries and periodontal
troubles. It was also recognised that this special service to the priority group of the Tongan community is urgent.

It was thought that the dental prophylaxis programme was readily available to expectant mothers and children, the cases for periodontology and oral surgery will tend to decrease in the years to come, if this service is continued in the Tongan community.

Tonga's dental division needs a regular service of dental treatment for nursing mothers and expectant mothers, because of their important rôle in the family.

Mothers never thought that teeth can be scaled off with the tartar and polished as well, but the feeling of freshness and air getting around into the interproximal surfaces of the teeth amazed the nursing mothers, because although they may or may not look after their teeth, after a single prophylaxis programme they like to come again and finally enquire if the same job can be done to the children or the husband.

Mothers do not normally want to have their mouths exposed or told that it is needed to be cleaned; unless the service is made available to them.

The service was continued in 1973, specifically in the dental clinic in the main hospital for the expectant mothers where there were always a mixture of nursing mothers as well. By this service, neglected mothers did not feel out of place because as a rule all mothers are attended on a particular day for their Maternal visit and check up with
the Maternal Child Health Department of the hospital when in their first month or two of pregnancy.

A dental health record here is part of her general health record. In most cases, the proper dental procedures cannot be performed during the first visit, but a mere dental instruction, toothbrushing demonstration and tooth-brushing drill in the chair was enough, because of the long waiting list on such a working day. Interested patients may come back after one week with improved oral hygiene, then the scaling of gross calculus continues with gingival treatment. In many cases, mothers bring pre-school children with them and when the time was available, they were introduced successfully to dentistry, even if they have never been to the dentist before because their mothers have had their dental treatment beforehand.

In many instances the co-operative mothers and well known ones in the community, felt a bit embarrassed on a day like this, in which case we assured them of the importance of their presence among the neglected ones as to help them to co-operate more in the programme and the recall visits.

An extension of this service to the other islands in the Tongan community was recommended strongly but because of money and manpower difficulties, we could not repeat it.

It has been proved widely and by experience that the periodontal diseases can only be solved with regular tooth brushing and regular visits to the dentist. If we wait for them to come they will always come late. Therefore the only way to change and develop the attitudes of the people
towards dentistry is to increase preventive services, train more auxiliary personnel and educate the community to make use of the services available.

The Reports of the dental treatment services performed in Tonga in 1972 and 1973 are given in this thesis as Tables 1 and 2.
Table 19 1972 - Dental Treatments Tonga Government.

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Table 1: 1972 - Dental Treatments Tonga Government

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<td>17</td>
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<td>37</td>
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</tbody>
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Table 25: 1973 Dental Treatments.
| Service                      | Adults | Pregnant Mothers | Nursing Mothers | School Children | Pre-School Children | Miscellaneous | Apexectomy
|-----------------------------|--------|------------------|----------------|-----------------|--------------------|---------------|-----------------
| Make Adults                 |        |                  |                |                 |                    |               |                 
| Orthodontics                |        |                  |                |                 |                    |               |                 
| Dental Health Talks         |        |                  |                |                 |                    |               |                 
| Tooth Brushing Demonstrations |        |                  |                |                 |                    |               |                 
| Others                      |        |                  |                |                 |                    |               |                 
| Dental Crown                |        |                  |                |                 |                    |               |                 
| Partial                     |        |                  |                |                 |                    |               |                 
| Full Lower                  |        |                  |                |                 |                    |               |                 
| Full Upper                  |        |                  |                |                 |                    |               |                 
| Dental Prosthetics          |        |                  |                |                 |                    |               |                 
| Whole Kingdom Tongatapu Vaea, u Ha'apai | 27 18 22 25 87 97 14.97 35.52|                  |                |                 |                    |               |                 
|                            |        |                  |                |                 |                    |               |                 

Table 2: 1973 Dental Treatments.
These reports indicate that there was a marked development in the services rendered, and the number of dental patients attended in 1973.

It should be noted that the number of pregnant mothers shown above were the ones who normally visited the Maternal and Child Health Centre of the hospital and were also given the dental scaling and prophylaxis programme, otherwise they did not mean to pay a dental visit at all. The number of polishings meant that over a thousand of them were pregnant mothers, and the other thousand was the number of prophylaxis programmes performed by the other clinics in the Kingdom. The more scaling and prophylaxis performed in the dental division, the better for the whole kingdom.
8. ATTITUDE CHANGE

It has been proposed that favourable attitude change to dentistry and individual and community oral health will be possible through extensive dental health education.

This thesis section considers attitude changes which have taken place in Tonga, changes which could be expected through dental education and how dental health education can be developed in Tonga.

(a) Review of Attitude Change

To review the attitude changes to health in Tonga, it is understood that whatever happens in other countries according to various backgrounds is basically what is going on in Tonga, since the principle attitudes in the human species are practically the same. There may be some outstanding differences in the individual's acquired knowledge. In Tonga, health means sound mind, sound body and sound spirit. In the world of science, 'health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.' The word spirit means the spirit of God and is quite significant as far as health is concerned in the Tongan community. It is not uncommon that many people today regard health in a narrow and incomplete way. Their attitude may only be one of the following:

a. health is the responsibility of the government,
b. health is an individual task,
c. health is to manage to maintain the general needs of your family,
d. health is the provision of sufficient education to your children,
e. health is high salaried jobs,
f. health is living in good houses,
g. health is to be active in the Church activities and become a minister or a lay preacher.

These are all the experiences in regard to the attitude changes of the people about health and individually they usually do not consider all the problems of the community as a whole. As far as health defined by the W.H.O. is concerned, attitude of the people towards health on an individual basis rather than a community basis creates a problem to be solved by the health organisation.

It was realized in Tonga that the attitude changes to health of some sectors in the community, would never respond at all for the required healthy living standards unless the sanitation health act is exercised by the community.

There is also significant influence by the Churches' denominational doctrines in the people's attitude change to health. Many people do not have a positive attitude on a health activity unless it is supported by the Minister of his Church. This is also applicable to so many people who do not bother to spend their earnings for renovation of an old kitchen, or an old house but when the Church collection (which is an annual occasion) comes up, they can spend all the money saved and then make a new start again. Most Tongans do not save money for tomorrow, and their attitude to health is based on the fact that what comes first is
is their main concern. This is related to a theological teaching, about the uncertainty of tomorrow for mankind.

Unfavourable attitude changes to health in any community cannot be prevented completely and the significance of these changes are different from one country to the other and the health organisation must be prepared to cope with these.

In the Tongan situation, educational, financial, and traditional backgrounds must be blended to mean a community effort for health.

Community effort and attitudes to good oral health also need to be developed in Tonga and from the dental literative examples of behavioural change can be quoted.

"Kegeles\textsuperscript{20} considered factors that appear crucial in determining whether care is sought on a periodic basis." It was said that, 'An individual, in order to take a voluntary health action, must have a readiness to act. This readiness for action is defined in the following way: (1) the individual must feel susceptible to illness or disease; (2) he must believe that, should he become afflicted by the illness or disease, such an affliction would have serious consequences for him; (3) he must believe that the need to take such action is more important than a variety of other things he might do; and (4) he must see that there are actions which he can take which will be of benefit for either preventing or alleviating the seriousness of the illness and that such actions in themselves do not cause greater disability than the illness itself.'
The last set of barriers likely to influence seeking or not seeking dental care revolves around the psychological make up of the individual. This problem has been the major concern of the psychiatrist, as is demonstrated by statements about the mouth as a region of love and hate, by Carl Binger.

This argument is based on the following assumptions:
1. That the birth process is traumatic for the child and that this trauma is relieved by breast feeding.
2. That general relief of tension comes through use of the mouth for nutritional purposes.
3. That the mouth is later used in expressing love and affection.
4. That the mouth is subsequently used for expressing aggression.
5. That since the mouth is seen as a valuable, there is a resultant fear of insertion and instrumentation into the mouth.

Whether or not such assumptions correctly interpret behaviour remains to be proved. Such proof can be gained in a variety of ways. The method most frequently used by the clinician is validation through individual clinical cases. Thus, the literature contains cases of bruxism or periodontal disease which have been corrected by psychotherapy.

It seems legitimate to conclude that the mouth is a body part used for expressing emotional tensions by some individuals. Granted this fact, before we can assume that these emotional tensions affect regular periodic dental visits, data are needed that show: (1) People fear oral pain more than they do pain to other parts of their bodies; and
(2) people are more anxious about work performed on their mouths than on other parts of their bodies. Further, since these assumptions are held true for all people, yet data exist which show that some people seek regular periodic dental care, data are needed which show differences in dental behaviour which mirror individual differences in fear of pain and anxiety about dental work. Since such studies are extremely difficult to perform, there is, as yet no study which tests these points.

Data from a variety of studies have touched on aspects covered by these points. Some of the data are contradictory. For example, Freidson and Feldman discuss the fact that fear of the dentist and of the pain he inflicts may be a strong deterrent to dental care, yet an unpublished study by Golblum and Kegeles points to the fact that children with strong internal desires for orthodontic care co-operated well in treatment even though they perceived treatment as being very uncomfortable to them.

A study by Shoken and Borland attempted to study the etiology of dental fears among dental patients. The only two categories which differentiated fearful and non fearful patients were (1) unfavourably family dental experience, and (2) unfavourable family attitude toward dentistry.

In regard to personality differences between people who show evidence of good dental care and those who do not, Manhold found slight relationships between neurotic tendencies DMF, and between nonauthoritarian personality and dental decay.
These psychological data reported seem to reflect three points: (1) Fear of the dentist, perhaps based on fear of oral exposure, does not seem to exist, (2) there are indications that persons with certain personality structures have more dental disease, and (3) there are no data indicating that such psychological problems have profound effects on keeping people from obtaining adequate dental care.

Giddon\textsuperscript{21} defined behavioural science in the following way, "For the academic administration behavioural science may encompass the disciplines of psychology, sociology, anthropology, and any combinations thereof. These disciplines are subdivisions of the term social science which also includes economics, political science, history and all their ramifications. Behavioural science has also been defined as the interaction between the organisms and his environment internal and external. Such a definition would include the study of almost all human endeavours from micro to macro levels, and finally, into its broadest sense ecology."

A knowledge of the basis of behaviour is a necessity for change of behaviour through health education. Counsell\textsuperscript{22} stated that "implicit in a programme of health education, one must repeat, is the conscious attempt to change the habits and patterns of action in a group for its members' benefit. The inducement to change health habits and practices or the influence of human behaviours, so that people do what they have not wanted or been inclined to do before is an enormously complex undertaking that has to be approached with thorough awareness of the problem associated." Counsell suggested that behavioural change might be defined "as the resultant of at least three
interacting phenomena: (1) Motivation to change (2) gaining access to information or education about the proposed or recommended change (3) utilizing an acceptable substitute in behaviour."
or knowledge is a pre-requisite to the development of proper attitudes and behaviour.

It is generally agreed that all behaviour is motivated. Motivating to develop proper attitudes toward dental health and to practice acceptable disease depends to a considerable degree upon what the individual can and will do for himself. Oftentimes, what he must do is time consuming, interferes with his usual way of life and may be expensive and perhaps even painful.

To bring about change in behaviour three steps are frequently necessary: (1) creating or changing perceptions, (2) utilizing motivational forces, (3) making a decision to act.

Creating or changing perception results from experiences, understanding and knowledge. Many of the attitudes people hold toward dental health no doubt result from misinformation and unfortunate experience.
(b) Dental Health Education

Health is defined in the constitution of W.H.O.\textsuperscript{2:2} as 'state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.' This definition applies to the whole individual and therefore encompasses such specific parts of the organism as the oral cavity.

A W.H.O. Expert Committee considered that dental health was concerned with the functional efficiency not only of the teeth and supporting structure but also of the surrounding parts of the oral cavity and of the various structures related to mastication and the maxillo facial complex. The scope of dental health is therefore broader than the term implies, and it might be more correct to use the expression 'oral health'.

Dental health cannot be separated from general health, since oral disease may be a manifestation of or aggravating factor in some more widespread systemic disorder. Consequently, action taken to improve or maintain dental health may be very important in safeguarding general health.

Some major problems in developing a concept of positive dental health: Health tends to be appreciated only when it is impaired. Early symptoms of disease frequently go unnoticed or are regarded as of little significance. This tendency applies also to dental disease.

The development of a concept of positive dental health is made difficult by the chronic, recurrent, irreversible, cumulative and prevalent nature of dental disease. These
characteristics contribute to the belief that dental problems are inevitable and non preventable.

Moreover, the teeth have different degrees of importance to different individuals. Some protect their teeth because of their functional and aesthetic value; others look after them because of their contribution to social and mental well being; to many individuals, the teeth are seemingly of such low value that few attempts are made to preserve or protect them.

The difficulties are further increased by the relative efficiency, comfort and social acceptability or artificial replacements for the natural dentition. Those who regard the loss of teeth through disease as inevitable may consider dentures to be the best possible solution to their dental problems.

The W.H.O. Expert Committee on Dental Health Education also stated:

"Other major obstacles to the development of a concept of positive dental health are the undramatic nature of most dental diseases; the association of dental treatment with pain, discomfort, and anxiety; and the reluctance of many individuals to accept and to carry out on a regular, continuing basis the oral and general health practices related to the prevention and control of dental diseases."

"Education for dental health is a very complex problem, and remains to this day an intriguing challenge to the dental health educator. This is so, because it involves re-shaping the attitudes of the audience as well as their re-education."
"The prevention of physical, mental or emotional disabilities is most effective when begun early in life. Therefore to be most effective, education for dental health should be started as early as possible and should be continued throughout the life of the individual. Not only should it occur in the school, but in the home and in the community as well. Public and private facilities such as pre-natal clinics, maternity wards, well-baby clinics, and physicians' offices should be utilized to the fullest extent for this purpose.\textsuperscript{25}"

We have considered general dental health in Tonga and found that only a small part of the population receive dental treatment and are able to see the dentist every year and these figures can be almost the same each year. In the 1973 Annual Report of the Ministry 28,247 persons visited the dental section or received a form of dental attention; 20,011 persons were of the school services, pre-school expectant and nursing mothers' programmes. Therefore there were only 8,236 persons of the 94,520 population of Tonga in 1973 who sought dental treatment. It should be noted, that if there were no school services and other public health programmes conducted, the majority of the population would not be bothered visiting the dentist at all. The general dental health in Tonga should be easily developed as they receive free dental treatment. The attitude towards dental health would be changed by adequate education.

"It has been further pointed out that among families with incomes above $7,500 only about 56 per cent of the individuals make one or more visits to a dentist during the year. In families earning less than $2,000 only 17 per cent of the individuals see a dentist within any given year."
It is generally felt that, regardless of income, the patient should be seen by the dentist at least twice a year. In Tonga, if the general dental health is to be developed, the question of efficient management arises so that the services are available in most rural areas, through various public health programmes, to all sections in the community, at least twice a year. With adequate facilities available and good dental health education use will be made of the services.

Dental health education in the Tongan community is not as developed as the other sections of the Ministry of Health and is not a part of health education activities of the Ministry. However, it has been a normal activity of the Dental Division to use the Broadcasting Commission for dental health education media of the public. Dental health education has been extended to schools in various ways such as talking in class rooms about dental anatomy and functions of teeth at primary school level and secondary school in the main island only. An effort has been made to present a dental health education programme on request to special groups in the community - the teacher's training college, women's committees and other churches' congregational meetings. This programme will not be significant unless the department is able to have a regular dental health educational programme to such community groups preferably as an integral part of general health education.

It was mentioned earlier, that there was a dental health education seminar conducted by the W.H.O. and S.P.C. to emphasize the importance of dental health in 1973. This was only attended by the small dental staff for 4 days and other health personnel did not attend.
From experience, dental health education cannot be extended efficiently unless staff is well organised so that all members are co-operating to emphasize the same objectives in dental health education. Dental health education and its place in dentistry is very important in the Tonga community.

A mere dental health education talk from the dentist beside the chair will not be as effective as a thorough scaling of tartar, gingival treatment followed by polishing; dental health instruction and demonstration. This will establish within the patient a real dental health message to take home.

"Dental health education has its place in dentistry in the dental office where dentists have unique opportunities for dental health education." Most educators and communicators have concluded that education and communication are best conducted on one-to-one basis at a time when something that is real and has meaning is happening to the person who is being educated.

Young and Striffler\(^27\) have put forward the views of Sandell:

"Sandell has stated flatly, "The most effective dental health education can be accomplished in the dental office by dental personnel....the dentist in his office has the finest educational opportunity available, if he will but use it. The most powerful, most effective methods of influencing people is through face-to-face communication which may be defined simply as 'to talk with someone and to get him to talk back with you.'"

"Sandell also has pointed out that the dentist has the knowledge to advise the patient concerning dental health and
that he has the skill required to provide the treatment that is needed."

It is not necessary to define Dental Health Education at this stage, and it should be noted that there are many good definitions by different authors, but if they are not able to be applied then the definition is of no use. Dental Health Education however, should be simple, as one says, 'get him to understand his teeth so he can make use of it,' Help him to help himself, whether at the individual or community level. Many dental personnel enjoy the dental profession just for its clinical and surgical aspects, disregarding its educational aspects completely. Therefore, dental health education is not to be on its own, but it is as important as any other aspect of dentistry. A general dental practitioner should be completely well equipped to preach its teaching without depressing any of its co-specialities.

"The most important factor in determining the effectiveness of patient education is the personality and attitude of the dentist, the dental hygienist and the dental assistant. Traeger's admonition to physicians is relevant to the dental profession:

"'A basic change in the doctor's attitude is necessary... The doctor must recognize that he lives in a changing world; one in which people don't want to be condescended to; people just don't want to have their diseases cured - they want a permanent relationship with their physicians (dentists); they don't want a 'general practitioner' - they want a 'personal physician' (dentist).'

"A doctor must discover a new kind of dignity - not based on pretence. He must cease to be a 'medicine man'."
The patient wants to be allowed to participate... He does not want to be treated as a medical (dental) illiterate. The patient is going to other sources for information only because he is not getting it from doctors. Medical (dental) people... should disseminate knowledge themselves rather than have others do it."27:1

There are many requirements to be considered before an efficient dental health education programme in the Tongan dental division can begin, such as:

1. Personal qualities, which, if not essential, are at least important to the conduct of patient education.

2. Dental officer and dental assistant. They must be sincere, interested, and hospitable in caring for the health of their patients.

3. They must understand people and human behaviour.

4. If the practitioner wants to understand his patients, he must first of all understand himself.

5. It is well to remember that a patient's understanding of, and his attitude towards dental health and dental treatment depends largely on his past experience, home environment, education and sense of values.

6. Educational opportunity - In places like Tonga, where people seek dental treatment very late, this is very important for the concern of the receptionist, dental assistant and dental officer - to make good use of all opportunities for communication, whether on telephone, in the waiting room, or at the chairside. Even if the patient has to have an extraction performed it is important to relieve the pain but it is most important to tell the patient what caused the pain, how he feels after the pain is gone and how future pain can be prevented.
"Patient education is particularly important for the parents of young children, since many will seek for their children advantages that they have not had themselves. Mothers, and fathers too, are concerned about having a better life for their children. Many thoughtful parents include, in that definition on a better life, better dental health for their children. Therefore it would seem wise to capitalize all opportunities to educate parents.

"Patient education in the dental office can reach directly only to those patients (or their parents) who come to the dental officer although only 40% of the population (in USA) visits the dental office at all during a given year, the opportunities to educate this group should not be lost. Those people who visit the dentist are usually the better educated, have a better income, and are frequently the opinion leaders in the community. If dentists and their office personnel use every chance to educate those who do get into the dental office, there is hope that these people will spread the information through their families, through their neighbourhoods, through child study groups, and through parent teacher associations."27:2

Dental health education is very much needed in the Tongan dental situation and great benefit would be derived if such a small staff is organised to concentrate on dental health education and its place in dentistry. This staff could influence personal relationships, educational opportunities, and conscious use of dental health education among the existant staff, to minimize dental extraction and achieve a more positive dental health attitude among those being treated by the Tongan dental service. This small staff could also co-ordinate with general dental health education
staff to reach the community. Some of the staff will need to obtain training in dental health education and these should be both dental officers and dental auxiliaries.
(c) **Dental Public Health Activities and Programmes**

In the dental division in Tonga, the consideration and establishment of dental public health activities and programmes in a wider range have been limited in extent by the financial support allowed from the Ministry's fund. The small dental team does not think any longer of only clinic services, but also of how and where dentistry may be extended into the awareness of others in the public. A programme of extension of dentistry and dental health education to the community will be ideal for Tonga.

It is necessary to have strong dental health education and services in the schools. It is unfortunate that there have not been any definite regular school dental services performed for even 2 years in succession due to the difficulty of securing transport for such a service from the Ministry. Dental health education programmes are long term and should take a number of years before gaining a satisfactory outcome. A separate vehicle for this purpose is required so that the dental health education team is able to participate closely with the teachers and school children anywhere at the time during the school hours.

The dental health team will need extension also for service and dental health education for pre-school children and mothers in maternal and child health programme. In the villages this also needs to continue for a number of years so as to have the dental message planted and continually reinforced into pre-school children as early as possible. Together with the nursing mothers, husbands can also be included in the programme and it has been found that a few families have been dentally re-adjusted in this way.
General dental health in Tonga can be improved in the home and family level by the approach of the General Health Ministry through their Family Planning Department, Nursing Section and the Maternal and Child Health Services.

The combination of dental health education with an oral hygiene and prophylaxis programme for special groups in the community should be considered.

The most dental health concerned groups are adolescents and adults in responsible positions. Out of these groups, the members of the Civil Service List, Commodity Boards, Public Work Department, Electric Power Board, and briefly all Employment groups could be approached and once a year, a prophylaxis programme should be made available to these groups.

A letter should be circulated to all heads of various departments, advising them that the dental division of the Ministry of Health would give each one a dental examination. This will include dental health instruction, toothbrushing demonstration, dental prophylaxis and any preventive form of dental treatment required on the spot. Anyone with more preventive work to be done would be put on an appointment list for the main clinical centre.

For this kind of service it may be best to use the mobile dental clinic which is now working for schools. During school holidays should be the best time for this programme, (if a separate mobile clinic cannot be made available) and the dental team would move from one office to the other during official working hours.
This programme is designed to get in touch with the more educated people in the community to inform and to motivate them to be dental health minded and in turn they are expected to motivate others towards dental health. A certificate recording the status of an individual's health could be issued.

It is recognised that the employment groups are the ones that do not attend readily for dental treatment, if pain is not experienced, because of the time consumed during their working hours. Therefore, if a dental public health service of this nature is organised in the community the barriers which affect most people from seeking dental health advice and care will be solved. Their morale will be developed too.

The dental officer and his assistant will be very much involved with the programme and very busy too, compared to the normal dental officer in the general clinic who waits for the patients to come. This service could be well extended to Institutional Establishments, like the Police School, Teachers Training School, Nurses Training School, Prison and other vocational groups etc.

Dental public health programmes involving toothbrushing demonstration and drill, performed in the school compound have been conducted in the Tongan community on a random scale. A separate vehicle for this service was necessary so that the dental team would be able to be in the school at the required time to work together with the teachers in performing the toothbrushing drill in the school as a routine service. This concept needs to be extended and of course includes other preventive measures and dental health education.
The introduction of topical fluoride applications would be acceptable in the Tongan community, a programme to the schools would create interest because the children have been accustomed to the oral intake of polio vaccines, and other medical and health programmes in relation to oral administration of drugs.

Disclosing of dental plaque as a dental public health programme to both schools and adults would be applicable too in the Tongan community. All in all, the prophylaxis programme around the villages' level, institutional level, and groups mentioned above would be the most beneficial programmes to be considered in the Tongan community, if combined with dental health education.

Finally, the form of dental public health activity of talking to Church congregations, should also be of a worthwhile consideration, because the Tongan community is very much influenced by the Churches, and our dental health programmes should be implemented in a way as to co-operate with the churches' programme.

For the city areas with reticulated water supply the Tongan Water Board should be approached to fluoridate the water supplies to prevent the development of a large part of the dental caries in children.

Dental Hygienist Training Programme.

Another way of developing the attitudes toward dental health in Tonga is to establish a dental auxiliary training programme. It should be recommended, that such a profession be for females only in the Tongan community and that they be part of the dental team.
There is a dental hygienist training programme in the Fiji school of medicine dental school, but for the Tongan community it would be best if training were conducted in Tonga in a way to meet the local situation. The dental auxiliary would need to have more training than a dental hygienist but training could be segmented.

In Tonga, as it had been mentioned earlier, auxiliary training will not be very new because the Ministry of Health has had a General Nursing School for more than 20 years.

Dental auxiliary training programmes are well developed in New Zealand and Australia today, and are all attended by young females, and it is quite a popular career for them. Each of the main cities of New Zealand has its own school for dental nurses and it is practically the same in the Australian states today.

This specialised auxiliary training of the dental profession for young women is also well organised in other countries like Singapore, Malaysia, New Guinea and Indonesia. Such a training programme would be a popular career in the Tongan community because unemployment of college graduated females is increasing today.

"Most of the research on training and education of auxiliaries is simply descriptive or formative. Thus for example, Leatherman reports a world wide survey by the F.D.I. of types, legal status, duties, acceptance, and education and training of dental auxiliaries. Training programmes are increasing but their nature varies, as do the number, types, and duties of auxiliaries over the countries of the world. The dental assistant, the most common auxiliary internationally, is still without much formal, theoretical training compared
to the one and two year training programmes of dental nurses and hygienists.

"An evaluation of the training programme of the British dental auxiliary combined and empirical assessment of the new training and employment with suggestions for operational definition of the new auxiliary role.

"Formal training programmes have been increasing rapidly in the United States over the past decade and a half with the rise in dental auxiliary training programmes among the community junior colleges, and the vocational training schools. In 1967 the A.D.A. Council on Dental Education reported 212 training programmes for auxiliaries: 120 teaching dental assistants, 75 hygienists, 17 dental technicians. The same report estimated to the total training capacity of auxiliaries to reach around 15,000 by 1970. The report is a useful summary of the development of training given auxiliaries in the United States: Its scope, kind, curricula content and length. Also useful is the overview by Sullens of past, present and future dental assisting to the A.D.A., and presents an organisational history of assisting which recapitulates some of the stages in a professionalizing occupation under the control of organized dentistry.

"The A.D.A. Council conducted a national opinion survey on dental assisting in 1967. Mail questionnaires were sent to four groups; practising dentists, dental educators, certified dental assistants, and teachers of dental assisting. Each group received 500 questionnaires and the overall response was 31 per cent.
"The report concluded, among other things, that,
(a) there was presently an urgent need for increasing the supply of qualified assistants
(b) future dental graduates will utilize assistant services even more than recent graduates
(c) current economic and skill intensives to enter dental assisting were not adequate to attract sufficient numbers of workers into the fields
(d) the current levels of renumeration were not high enough to retain the existing work force
(e) the certification programme has been a factor in providing recognition and encouraging competent personnel to stay in the work force
(f) dental students were not receiving adequate instruction utilization of auxiliaries in light of future practice needs
(g) it is desirable to extend the duties of qualified assistants beyond current legal limits (assuming additional formal training) and
(h) the proper level for dental assistant education requires a post high school, formal training programme of one or two years duration."^27

In Australia school dental nurses are being trained at Royal Newcastle Hospital under a curriculum which is still under review and may require further development. A committee with the title of 'School Dental Services Committee, Health Commission of N.S.W.' composed of representatives of the Dental Board of the Health Commission of N.S.W. and the Australian Dental Association of NSW Branch, has been formed, to advise on the establishment of centres for the training of school dental nurses and the curricula to be used.
The training of dental chairside assistants and dental technicians is continuing under existing methods in NSW of instruction and control until such time as new legislation is prepared and approved. No action would appear to have been taken as regards the training of dental hygienists.

"Training of both the dental chairside assistant (expanded duty) and dental hygienist would appear to be dependent upon: a. Governmental approval
b. Legislation
c. Preparation of curricula
d. Decision upon responsible training authority
e. Provision of facilities and finance
f. Provision of staff."

It would appear that in Tonga suitable dental auxiliaries can be utilized as a Dental Hygienist after one year of training to participate in prophylaxis and dental health education programmes, after a number of years of field work a further one year training could be undertaken to expand duties into that of Dental Therapist. These duties would include injections, fillings, extractions in the schools and as well in adults in expectant and nursing mothers in the field activities.

The Dental Hygienist and Dental Therapist recommended could be introduced to Tonga and training carried out in Tonga. After the first year training as a dental hygienist the person will be effectively utilized in field clinics and if they shape up well in service then through further recommendation they may undertake the training to become a dental therapist.
Contrarily, if Tonga's authorities would consider sending females overseas for dental auxiliary courses then Australia would be recommended where all other dental auxiliary schemes have been evaluated beforehand.
9. DISCUSSION

Attitude change that has taken place in Tonga is seen in many aspects of the community. As far as health is concerned this is gradually development and the changes of attitudes to certain kinds of the objects are relatively proportionate to various situations such as economy, traditions and demographic conditions. The government, the churches, the community leaders, families and educations are the main resources for the changes of attitudes of the people.

Tonga has played its part in the professional and scientific paths of importing the changes from the outside world to the benefits of its community. The inflation which is taking place in the more developed countries is experienced in the Tongan community as well. Tonga has changed from local participation to more national enterprise via education, industries, and communication with so many other countries like Japan, India, Australia, United States of America and New Zealand in wider scale.

In sports, Tonga has taken part with other countries in boxing, football and some of the athletic events. It has participated in a South Pacific enterprise with Fiji, Samoa, Nauru and other Pacific islands in a South Pacific Navigation Company. Tonga has developed a system for the protection of its waters, for the security of its natural resources. Old ideas and primitive attitudes towards living and Tongan medicine are gradually being released by most people.
The Tourist Bureau is maintained by the Government and the villages are developing good standards of sanitation to attract the tourists. There are less primitive ideas nowadays, less ignorance, but there are still problems of uneducation and unemployment due to the increased population and economic barriers.

The attitudes of the people towards their traditions and cultures is shown through a Tongan cultural scheme to maintain a Polynesian civilization of which Tonga may be proud of. The Government is doing its best to maintain Tonga on the whole for its motto, "God and Tonga are my Inheritance."

Attitude change which has taken place in Tonga in relation to health in general, may be considered under the following number and percentage distribution of the types of environmental sanitation activities which are carried out today.5:19

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<tr>
<td>All Activities</td>
<td>95,471</td>
<td>100.00</td>
</tr>
<tr>
<td>Sanitary Inspection</td>
<td>77,571</td>
<td>81.25</td>
</tr>
<tr>
<td>Registration of Establishments and Food Handlers</td>
<td>2,504</td>
<td>2.62</td>
</tr>
<tr>
<td>Approval of Plans</td>
<td>311</td>
<td>.33</td>
</tr>
<tr>
<td>Water Sample Taking</td>
<td>94</td>
<td>.10</td>
</tr>
<tr>
<td>Insect Control</td>
<td>3,917</td>
<td>4.10</td>
</tr>
<tr>
<td>Rodent Control</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Food Condemnation</td>
<td>2,424</td>
<td>2.54</td>
</tr>
<tr>
<td>Issueance of Written Notices</td>
<td>611</td>
<td>.64</td>
</tr>
<tr>
<td>Health Education</td>
<td>201</td>
<td>.21</td>
</tr>
<tr>
<td>Quarantine Services</td>
<td>7,836</td>
<td>8.21</td>
</tr>
</tbody>
</table>
The standards of general dental health in the Tongan community has not been built from a good foundation and need adjustments and development. Preventive dentistry and dental health programmes were moulded into the services too late and it will take another decade to evolve a more definite preventive background. Attempts have been made to explain in this thesis the development necessary in the existing staff, and practice of dentistry in relation to a number of dental public health activities, for special groups in the community. We will have a fair idea as to what extent our effort in the community have been successful in a specific time by comparison to the position at the present time.

It has been understood that the general dental health of a country has been justified by the amounts of scientific research and to the extent of dental knowledge gained by each individual in response to so many varieties of conditions such as social, geographical, economical, educational and philosophical situations. Most of these situations have been developed in many developed countries today by different ways or approaches. No country has ever been able to develop completely with these situations in relation to the significances of the diseases, and the increasing rate of population completely under control.

To find out the level of the community's attitudes toward dentistry in particular, may be the answer to the general dental health of the whole community. There has not been any form of research taken on this, but a question may arise 'why a dental patient seeks dental advice or dental treatment.' In Tonga the answer is because one has experienced dental pain. It is necessary to have more
people coming to the surgery, asking, 'When could I come again?' Going to the dentist only to seek treatment does not ensure the complete general dental health of a community.

The natural resources for better dental health in Tonga as far as diet is concerned, were regarded to be satisfactory in earlier days but dental caries showed a significant rise in a national dental epidemiological study which took place recently. This increase is due to the increased imported refined foods to the country. To import only what is of benefit from other countries should be an aim for Tonga.

There is no need whatsoever for importation of refined carbohydrates such as sugar which have no value but only deleterious effect to health and oral health.

The general dental health in the Tongan community is still to be developed. Comprehensive set up of services, efficient integration, co-operation, in what is available, are necessary.

General Dental Health of the community, is best considered and then the priority is that of special groups and the early adolescence's dental health. The middle aged and elderly groups should be controlled with the availability of dental health services. Naturally, adolescents looked after their teeth according their personal status and pride, and unless the profession is active dental health fades with age. The way in which we should motivate the community on an individual basis should contribute to the general dental health of the community on the whole. In order to achieve favourable general dental health the following should be maintained:-
1. To find out why people seek treatment.
2. To motivate them about the use of dental treatment.
3. To confirm if the motivation be of use to them or not.
4. To make them aware of the dental services available.
5. To help them to be aware of what causes the trouble and how to go apply preventive procedures.

Looking into the general dental health in Tonga, the following Annual Reports of 1965, 1972, and 1973 are presented for consideration.

<table>
<thead>
<tr>
<th>Description &amp; Nature of Services</th>
<th>1965</th>
<th>1972</th>
<th>1973</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No. of patients attended dental treatments</td>
<td>16,386</td>
<td>26,853</td>
<td>28,247</td>
</tr>
<tr>
<td>2. No. of pre-school children attended</td>
<td>-</td>
<td>2,253</td>
<td>2,077</td>
</tr>
<tr>
<td>3. No. of primary school children</td>
<td>-</td>
<td>4,577</td>
<td>15,973</td>
</tr>
<tr>
<td>4. No. of pregnant mothers attended</td>
<td>-</td>
<td>1,738</td>
<td>1,874</td>
</tr>
<tr>
<td>5. No. of nursing mothers attended</td>
<td>-</td>
<td>-</td>
<td>87</td>
</tr>
<tr>
<td>6. No. of teeth extracted for various reasons</td>
<td>13,414</td>
<td>11,837</td>
<td>12,287</td>
</tr>
<tr>
<td>7. No. of fillings performed</td>
<td>5,629</td>
<td>8,828</td>
<td>9,902</td>
</tr>
<tr>
<td>8. No. of oral hygiene instruction performed</td>
<td>2,963</td>
<td>4,697</td>
<td>7,275</td>
</tr>
<tr>
<td>9. Estimated population</td>
<td>-</td>
<td>-</td>
<td>94,520</td>
</tr>
</tbody>
</table>

The number of pre-school and number of primary school children, pregnant mothers and nursing mothers who attended, were dependent on the availability of the services in the villages. If services are available they are used.

The present dental division personnel establishment consists of:
2 University dental graduates, 3 Fiji School of Medicine dental graduates, 4 locally ad hoc trained Dental Officers and 5 Dental Assistants (all males). It is believed that
their attitudes toward preventive dentistry would be totally different to one another. There is a problem in the provision of dental services from such a mixture of dental statuses, and there is a need for standardised inservice training if an efficient organisation is to be developed.

Programme 1. Object:: of Inservice Training
a. To establish a written comprehensive standardisation of provision of dental services. This will include objectives and goals to be achieved etc.

b. Written authorities, responsibilities and duties of each individual officer of the establishment, together with the Dental Assistants' duties and clinical engagements.


d. The priority groups and dental legislation in relation to maternal and child health, pre-school children and primary school (aged 6 to 12 years).

e. Importance of public health activities and programmes such as fluoridation, topical application of fluoride compounds, toothbrushing programmes and plaque disclosing techniques.

f. The proposed prophylaxis programmes - mass media - In the community level - scaling and polishing - public places and institutional level. Police, army, public service (by mobile dental clinic), to be known as "Invited Dental Prophylaxis Programme."
Programme 2.
1. To establish a Dental Act.
2. To establish a Tongan Dental Association with sections in the other islands of Vava'u and Ha'apai.
3. Membership of the Dental Association to consist of all dental personnel and 3 non-dental personnel, to be selected from the community, preferably the Governors of Vava'u and Ha'apai, as Honorary Presidents. Male and female members from the community may be desirable. The Minister of Health to be invited as the Patron of the Tongan Dental Association.
4. The arrangement of a dental health week as an annual function to fall on the annual hospital week of the Ministry.

Programme 3.

To establish a School for Dental Nurses (2 years course is recommended). Alternatively, this can be incorporated with the General Nursing School of the Ministry by an enrolment of 5 dental nurses for the first year if the Minister of Health will be in favour of such a motion. The training proposed could be segmented with dental hygienist duties being carried out after the first year of training.

Programme 4.

To establish three dental clinics in the district of Tongatapu Island:
1. One dental clinic to be built in the Western District Medical Centre (Kolovai).
2. The second one to be built in the Eastern Medical Centre (Mu'a).
3. The third dental clinic to be built in the Middle District that is, in the capital of Nuku'alofa, preferably in the
Government schools' compound.

4. The objectives here are not really concerned with the clinical procedures for a start, but with introduction dental health programmes such as toothbrushing demonstrations and simple prophylaxis etc., with home care instructions.

5. In school holidays, these clinics will cater for pre-school children, expectant and nursing mothers for introduction to dentistry with emphasis on preventive dentistry and dental health education including diet.

6. Demonstration of fluoride programmes - The dental nurses, will be catering here to deal with application of fluoride compounds and all phases of prophylactic dentistry.
10. SUMMARY AND CONCLUSION

In order to summarize this thesis in relation to the role of dentistry in Tonga, all the most relevant information about its general background has been presented.

This has covered the delivery of health care to a certain extent, and the development of dental services since the introduction of the first practice of dentistry in the Ministry of Health.

The present situation of the Dental division such as Organisation and Management, Dental Manpower, type of services rendered and the distribution of dental care has also been reported for information.

An effort has been made to show that for Tonga change and development of dental attitudes is important. Change of attitude must take place within the dental personnel first of all so that individuals and the Tongan community are educated to know about dental health and preventive dentistry, that they are motivated to change to an acceptable substitute for the present treatment they at present seek and receive.

To bring about the change, the following should be considered at the individual level within the community.
1. Each individual in clinical dentistry should be motivated to dental health through face to face opportunities.
2. He must believe that whatever disfavourable dental health he is involved with can be harmful for his general health.
3. He must believe that he must play his part to obtain good oral health.
4. He must see that there are actions, which only he can apply for his success over oral diseases.
5. Health attitudes can be adjusted in these ways for a favourable dental condition and emphasized in the Tongan community through education methods.

This thesis has stressed that the following must be taken into consideration for implementation at departmental and community level.

1. In Service training of dental staff to create integration, co-ordination and understanding between the profession and the public for an efficient organisation of the system of dental health care.
2. Defined objectives, delegation of authorities and the application of dental legislation.
3. The comprehensive establishment of dental procedures in the existing dental dispensaries to give positive preventive services.
4. Taking of defined priority groups for dental services.
5. Fluoridation of water supply.
6. Dental nurses training scheme.
7. Installation of school dental clinics and preventive programmes.
8. Dental Health Education.
10. Restriction of imports of refined sugar and sugar based products.

Changes in these areas with special attention to emphasis on these dental services that are preventive and educational in nature will enable development of Tonga's public dental health services and of favourable attitudes to oral health in the community.
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