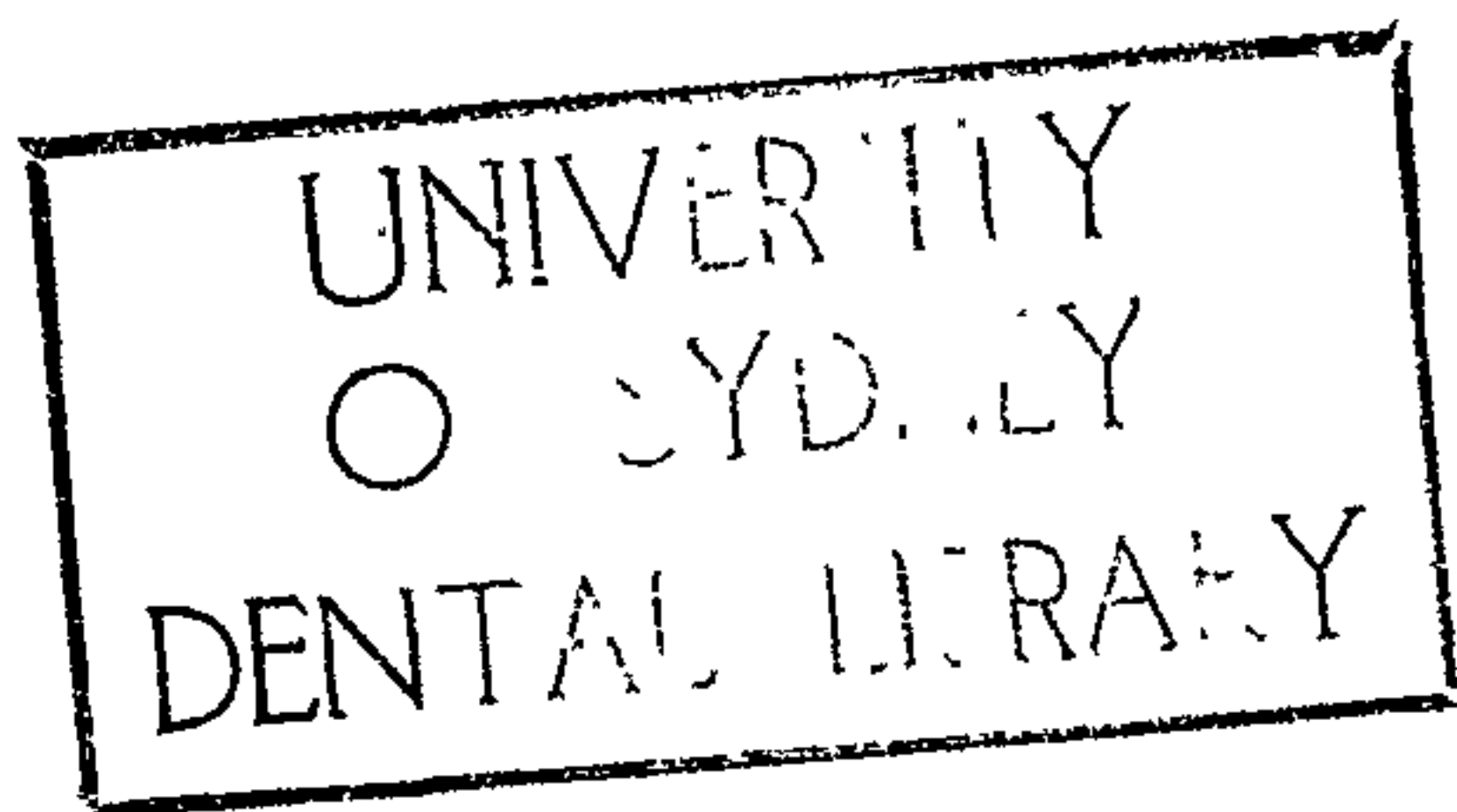




PLANNING, IMPLEMENTATION AND EVALUATION OF
A SCHOOL ORAL HEALTH PROGRAM FOR FIJI
WITH COMPARISONS TO
AUSTRALIAN AND NEW ZEALAND PROGRAMS.

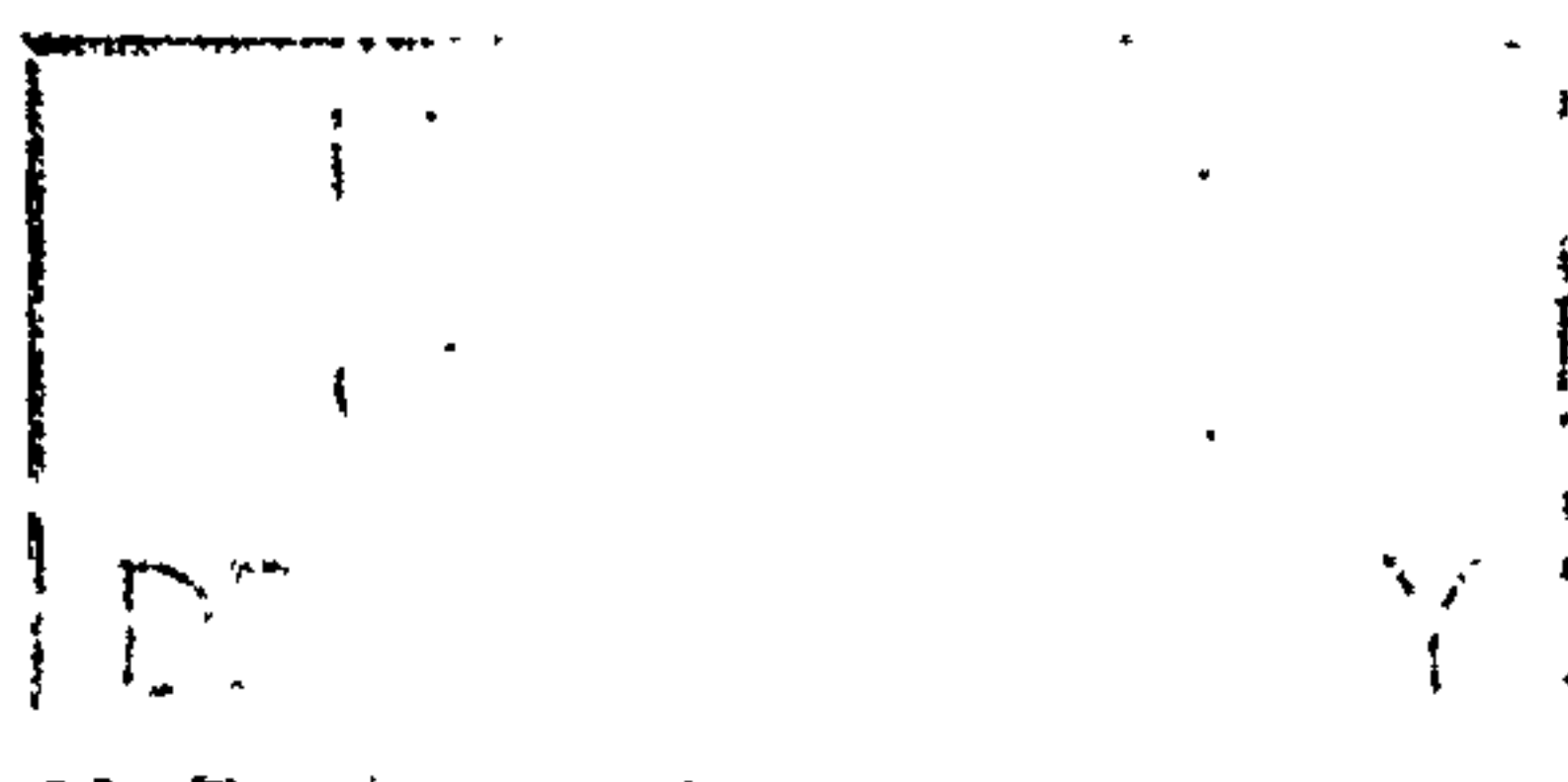
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II.

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We have only begun to knock a FEW chips
from the GREAT quarry of knowledge
that has been given to us to dig out and use.
We know almost NOTHING about everything.
that is why, with all conviction.
I say the future is BOUNDLESS.

- C. Kettering.

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PLANS are the very
FOUNDATION for SUCCESS

An ADMINISTRATOR is a person
who gets things DONE
by or from OTHERS
to OBTAIN organisational OBJECTIVES
with MINIMUM resources

1. INTRODUCTION

The decision-makers in the public service are always seeking better ways to uncover and select goals that are in the public interest; better ways to design and choose alternatives to achieve these goals and better ways to see that the alternatives selected are implemented properly. It is not uncommon to see signs of ineffective programs, wasted money, unsolved problems and foggy notions of planning. There are complaints that the solutions being proposed range from poor, at best, to counter productive, at worst (Quade-1975).

Today a great deal of interest and concern is being shown throughout the world as to how oral health services can be delivered to the community in the most effective and economical ways. This implies the need for careful planning, implementation and evaluation of oral health programs.

The World Health Organisation publication, 'Planning Oral Health Services' (WHO-1980), emphasizes the following points:

The present global picture in oral health is one of divergent trends. A rapidly increasing dental caries problem, a stable, high periodontal disease problem, and a scarcity of manpower in the developing countries contrast with a stable or decreasing dental caries problem, a stable or decreasing periodontal disease problem and a growth in manpower availability in the highly industrialised countries.

These trends call for integrated, co-ordinated planning of preventive and treatment services for oral health, as well as for appropriate manpower production, as an urgent priority to avoid unnecessary and major wastage or inadequacy of resources.

Today the health and oral health of children is recognised as a public health responsibility.

At present the problems of oral health in Fiji by comparison with Australia and New Zealand are relatively small. In urban children of Fiji, however, there is an increasing dental caries prevalence, which is the result of urbanisation and concomitant dietary changes, and endemic periodontal disease. Over 90% of urban children suffer from tooth decay in the primary dentition and their oral hygiene is poor (Speake, Singh and Ligani-1980). In the current economic climate, finance for personnel, equipment, materials, premises and transport constitute a formidable problem in the provision of adequate oral health services.

In any school oral health care program planning and strategy are of paramount importance (Section 2). Strategies will differ between countries (sometimes within countries) depending on many factors, including: geographical, ecological, dietary, epidemiological, political, demographic, socio-economic and manpower (Section 3).

Special attention has been drawn in this treatise to aspects of decision-making and public policy (Section 4), school oral health programs in Australia and New Zealand (Section 5) and preventive programs (Section 6).

The school oral health services in Australia, Fiji, and New Zealand are considered as examples of different approaches to planning and implementation.

None of these programs conform completely to an ideal program because political needs, lack of finance and shortage of trained personnel have acted as barriers.

This treatise discusses factors that influence the planning and implementation of a national school oral health program. The implications and interlinkage of these factors is illustrated by the author's experience in the replanning and implementation of a school oral health program in Fiji (Section 7). The details of methods and reasons for modifying and replanning a new school oral health program in Fiji are provided.

The author as the Chief Dental Officer (July 1972 - January 1977) in Fiji had the dual roles of - Head of the Oral Health Service as well as Course Director - Department of Dental Surgery of the Fiji School of Medicine. This placed him in an unique position of decision-making on oral health care delivery as well as manpower training. At present (since 1977) he is the Principal Dental Officer in the Dental Health Branch of the Commonwealth Department of Health in Canberra. The author wishes to point out that the details of the Australian school dental scheme described in this treatise have been derived only from published sources.

A number of study tours by the author provided useful background material for replanning of the school oral health program for Fiji and the preparation of this treatise. Between 1969 and 1975 support from WHO, SPC, Commonwealth Foundation, USA and Fiji Governments enabled study and observation of oral health programs in American Samoa, Australia, Hawaii, Hong Kong, Malaysia, New Caledonia, New Hebrides, New Zealand, Singapore, Papua New Guinea, Tonga and Western Samoa.

The author also carried out extensive fact-finding tours of the 4 Administrative Divisions in Fiji during 1972 and 1973. These tours were followed by short annual visits to every Division and District to assess the effectiveness of the existing programs and make modifications in consultation with the local staff.

The evaluation of oral health programs has been a neglected aspect of program operation in the past. The need for and types of oral health evaluation methods are discussed in detail (Section 8).

Without METHOD, there is no
organisation nor construction

- Bulwer

We must PLAN our work
and then WORK the plan

PLANNING

ORAL HEALTH CARE PROGRAMS

2. PLANNING ORAL HEALTH CARE PROGRAMS

2.1 NEED FOR PLANNING

The World Health Organisation (1980) in its publication 'Planning Oral Health Services', stresses the need and importance of planning and evaluating an integrated oral health program:

The growth of oral health services and oral health manpower in the 20th century in highly industrialised countries has been of massive proportions. It came about in response to a demand created primarily by a tremendous increase in the prevalence of dental caries, which probably started in the 19th century and accelerated in the early decades of the 20th century. The effect of this increase, superimposed on an already high prevalence of periodontal disease, was that a growing proportion of the population suffered from repeated episodes of acute pain from early childhood to the 3rd or 4th decade of life and from premature loss of teeth; in some industrialised societies this became a normal state of affairs. Pain produced an immediate demand for services, which were aimed primarily at relieving the acute episodes and in themselves contributed greatly to the premature loss of teeth. The loss of teeth developed demand further in 2 ways. There was an increased demand for restorative care. It was also recognized that there was a changing pattern of oral health in which adults were often edentulous at an early age and dependent on prostheses that were often functionally inadequate, whereas in former times they had reached that state mainly in the 5th and later decades.

Recognition of this situation brought about an increased awareness of oral health needs and of the need for more balanced and comprehensive oral health services to provide regular preventive, curative, restorative and rehabilitative services. As part of this evolution rather than as a result of comprehensive integrated planning, various systems for providing oral health services and different manpower structures developed.

The need for planning, evaluating and replanning oral health services and manpower structures to meet carefully defined measurable goals and in harmony with overall health sector plans is now receiving recognition. Besides health-based reasons for this recognition to prevent caries and pain where possible, and to make services more relevant and available, there is an impelling economic reason: all the comprehensive oral care systems that have developed in highly industrialised countries have been excessively expensive.

2.2 PLANNING AND FORECASTING

Forecasting and planning are everyday activities. Dror (1963) defines planning as follows: 'Planning is the process of preparing a set of decisions for action in the future, directed at achieving goals by optimal means'. (As quoted by Quade-1975). Among the implications Dror draws from this definition are the following (According to Quade-1975):

- . Planning is a continuous process taking place within an organisational unit and requiring resources to do so. As a process, it is to be distinguished from its product, a 'plan'
- . A 'plan', defined as 'a set of decisions for action in the future', can be arrived at by any means whatsoever. It need not be the product of planning.
- . 'Achieving goals by optimal means' implies that the planning process must not only take into account the decisions which result from the planning but also the resources that went into that planning.

Planning involves preparing alternative sets of decisions, not actually making those decisions. Hence, according to Quade (1975) the planning activity can be carried out by persons other than those responsible for the ultimate decision or for operational implementation of the plan. Also, because the set of decisions in a plan are directed toward achieving a set of goals, somebody has to determine as part of the planning process what these goals are to be.

In planning, the first stage is problem analysis: the problem needs to be clarified, objectives determined, alternative courses of action generated, costed, and compared, and a preferred one chosen. The second stage is more a problem in scheduling: the chosen course of action has to be fine-tuned into a time-phased program compatible with available resources and organisational constraints. A plan is therefore a set of decisions for actions to be taken sequentially and intended to produce a desirable set of results at some future time (Quade-1975).

Forecasting is a prerequisite to planning, and planning should be a prerequisite to action.

Forecasting, planning, and programing are all aspects of decision-making. A decision is not made without some idea of what to expect; if that idea is made explicit we clearly have a forecast. Plans and then programs (which are simply more detailed plans) are developed on the basis of the forecast to increase the chance of getting what we want. Once a broad plan is developed then a more detailed plan or program of operations can be devised, that is to say, a statement that specifies the resources to be committed and the sequence of actions that have to be taken in-order to carry out the plan (Quade-1975).

Planning and administration of school oral health programs, to be effective, require careful and rational thought. It is an advantage if program administrators can receive training in dental public health (Burt - 1974).

Failures in Planning:

Many policies and programs aimed at improving oral health or making oral health services more effective have failed to achieve their goal. Moller (1979) lists the following (1 or more) short-comings in planning and management which may contribute to such failures.

- . Incorrect selection of program strategies and methods;
- . Over-optimism about the capacity of the infrastructure to carry out the plans;
- . Failure to develop manpower and other resources adequately;
- . Failure to match program techniques with consumer needs and;
- . Over-reliance on intuition in defining and analysing problems and possible solutions.

The planning, implementation and evaluation of oral health services, therefore, should be based on realistic objectives and attainable and measurable goals and not on wishful thinking. The objectives and goals should not extend beyond what can reasonably be achieved within the given frame in terms of available and projected resources (WHO-1976).

Trends in Planning:

In planning an oral health program there are several principles and trends to be looked at. The trends in basic health services appear to be:

- . Towards health promotion and disease control rather than treatment alone;
- . Towards development of integrated health services;
- . And, as far as training of health personnel is concerned, towards the production of multi-purpose as distinct from single purpose workers.

Although health promotion is the ultimate goal, disease control and prevention must be the primary objective of any oral health program, while treatment or the simple everyday health needs of men, women and children must not be overlooked.

Integrated Planning:

In developing countries integration is essential to ensure that rapid development of oral health. A senior WHO official (As quoted by Franklin-1979) has defined integration as follows:

The development of an integrated health service means a great deal more than co-ordination between curative and preventive health work. It implies that all the various branches of the health services, which have often grown up in isolation from one another, should be closely linked administratively and should participate whenever possible in each other's activities.

It is stressed that while oral health has a specific outlook and mission to fulfill it will always be an integral part of general health. Franklin (1979) points out that:

In fact, it has been noted that oral health needs are expressed forcefully only when the community begins to develop and when the country already has a network of public health services which people have got used to calling on; newly created dental health services should be gradually grafted onto this network. This results in economy and efficiency.

The basis of integrated planning is inter-dependence of all parts of the plan (WHO-1980).

We shape our buildings;
thereafter they shape us

- W. Churchill

There is a force that drives us on
and yet we are the force
and sometimes have controlled it

- P. Engle

FACTORS THAT INFLUENCE THE
PLANNING AND IMPLEMENTATION OF
A SCHOOL ORAL HEALTH PROGRAM

3. FACTORS THAT INFLUENCE THE
PLANNING AND IMPLEMENTATION OF
A SCHOOL ORAL HEALTH PROGRAM

The author in the light of his experiences in administration and planning submits that the following factors need to be considered in the planning and implementation of an effective school oral health program (Narayan-1978):

- . Geographical and Ecological Factors;
 - . Dietary Factors;
 - . Epidemiological Factors:
 - Caries Status;
 - Periodontal Status;
 - Handicapping Dento-facial Anomalies;
 - Prosthodontic Status.
 - . Political Factors
 - . Demographic Factors:
 - School population and its growth rate;
 - Age Distribution of children;
 - Ethnic and Cultural considerations;
 - Urban and Rural Distribution of Children.
 - . Socio-economic Factors:
 - Oral Health Status;
 - Attitudes, Culture, Habits and Values;
 - The Provision and Utilisation of Oral Health Services.
 - . Manpower Factors:
 - The Dental Profession;
 - Dental Officers;
 - Dental Auxiliaries.
-

3.1 GEOGRAPHICAL AND ECOLOGICAL FACTORS

Geography deals with physical features, form and natural divisions of the earth's surface (Concise Oxford Dictionary). Geographical factors could play a vital role in shaping the method of delivery of oral health care. For example: Fiji consists of over 300 islands (Fiji Today-1980), this poses problems of transportation (by land and sea) in the delivery of oral health care, whereas in Australia the need for providing adequate oral health care to rural and isolated communities can pose problems in some States. Geographical and demographic (including population density) factors may influence the choice of either mobile clinic or a fixed clinic, or if there is already a private practitioner in the area, whether he could provide the necessary oral health care to children at an agreed method of payment. The size of the community and the usual modes of transportation employed within it have much to do with location and administration of oral health clinics. The accessibility of the community to other communities in the region may also influence decisions.

Ecology is that aspect of Biology dealing with the mutual relations between organisms and their environment. The word comes from the Greek oikos, meaning 'household', home, or place to live'. The work environment includes both other organisms and physical surroundings. It involves relationships between individuals within a population and between individuals of different populations. Ecology has been defined as 'the study of the inter-relationship of organisms with their environment and each other' (New Encyclopaedia Britannica-1980).

Ecology emerged in the 1960s as one of the most popular and most important aspects of Biology. It has become painfully evident that the most pressing problems in the affairs of men: expanding populations, food scarcities, environmental pollution and all the attendant sociological and political problems, are to a great degree, ecological (Dunning-1979).

In studies of comparative public administration one of the most important trends discerned by Riggs in recent years is from non-ecological toward ecological approaches (Heady-1979). Heady points out that mere recitation of the facts of geography, history, social structure and so forth is not enough, 'for ecology implies not just a characterisation of environments, but rather an analysis of the patterns of interaction between the subject of study and its environment'.

DENTAL CARIES - AN ECOLOGICAL PROBLEM

Davies (1968 and 1974) describes dental caries as an ecological problem. He contends that if we accept the idea of disease as an ecological problem, then the health status of a community will be determined by a dynamic relationship between 3 factors: the agent of disease, the resistance of the host, and the environment, which can affect them both. All mass diseases are subject to this law. The diet is influenced by a large number of environmental factors such as socio-economic status, climate, urbanisation, war, taboos and fads, religious customs and methods of food processing and storage. Davies, further argues that there is a need to study the disease not as a pathological entity alone, but also as a social problem.

3.2 DIETARY FACTORS

DIET AND DENTAL CARIES

Diet refers to the customary allowance of food and drink taken by a person from day to day (Newbrun-1979). It is generally accepted that dental caries is initiated by acids that are produced by oral bacteria from dietary carbohydrates (Andlaw-1977). The breakdown of carbohydrates occur in the dental plaque, which is the 'soft tenacious bacterial deposit which forms the surface of a tooth' (Andlaw-1977).

Circumstantial evidence linking sucrose consumption and prevalence of caries is found in several surveys (Newbrun-1979). There are many examples of effects of refined sugary foods on previously caries free communities, for example the Greenland Eskimos, the Australian Aboriginal and the South African Bantus (Andlaw-1977, Slack-1979 and Enno-1980). The urban Bantu substituted refined carbohydrates (flour and sugar) for the traditional unrefined "mealie meal". The rest of their diet and total carbohydrate intake remained unchanged. As a result the urban Bantu had much higher incidence of dental caries than their rural counterparts. This is explained by the Bantu's adoption of western habit of consuming sucrose containing foods between meals (Enno-1980). Baume (1968) observed similar trends in French Polynesia, where a change in food habits of the people brought about a deplorable change in the oral health conditions of children leading to edentulousness, even in adolescence (Barmes-1977, Speake, Cutress Ball-1979). Similar change has occurred in Rarotonga in the Cook Islands (Speake, Cutress and Ball-1979).

The fact that people of French Polynesia and Cook Islands once had good dentition is a warning to Fiji of the results of change in dietary habits. Many Pacific Islanders are adopting an increasingly western life-style and a change to a western type diet means that they are eating larger quantities of refined foods and sugar (South Pacific Commission-1979). In the 2 countries in the Pacific region which have high caries rates, namely the Cook Islands and French Polynesia have per capita annual sugar consumption of 42.2 and 46.8kg respectively (Table 15) (Speake-1980). In contrast, the children in Tonga are relatively immune to dental caries because sugar consumption is low - 13.77kg total annually (Speake-1980).

A comprehensive study of the effects of sucrose in caries incidence was carried out by Gustaffson et al (1954). The conclusions of the Vipeholm caries study were that an increasing consumption of sucrose led to increased caries activity. However, the frequency of eating and the vehicle in which the sucrose was contained were more important than the total amount of sucrose eaten. Thus a large quantity of sucrose eaten at meal times will result in much less caries activity than small quantities eaten between meals. Sugar in liquid form is much less harmful than in a sticky, slowly dissolving form.

An increasing amount of sugar is going into the preparation of our foods (Tables 1, 2), but the amount that goes into carbonated beverages and snack foods is increasing rapidly. An increased use of snack foods can contribute to increased caries in 2 ways (Enno-1980). Firstly, the manufacturing process converts the sugar and starches into a more cariogenic form, and secondly the availability of variety of snack foods, have given rise to more frequent eating habits that contribute to the caries process.

The display and sale of sweets and chewing gums at checkout counters in supermarkets must provide a boost for consumption of sweets. Most supermarket foods sold in Fiji and other South Pacific countries are imported (mainly from Australia and New Zealand). The multinational companies that exist abroad are looking for increased profits by diversifying the food market with multitude of processed foods. Thus the responsibility for the high incidence of oral (dental caries) and general health (obesity, heart diseases, diabetes mellitus) problems in the community rests in part with the food industry, which controls the kind and amount of sugars in foods, and in part with the consumer who has resorted to frequent eating of sweet, sugary foods. Media and aggressive advertising also add to the problem. Accordingly, caries control by dietary modification on a public health scale requires the help and co-operation of the food industry, if it is to have any serious impact.

The evidence briefly reviewed leads to the conclusion that dental caries can be controlled by restricting the frequency of eating refined carbohydrate foods, especially those containing sucrose. Andlaw (1977) claims that between meal eating is such a socially accepted habit that attempts to overcome it by oral health education generally meet with limited success.

The results of many epidemiological studies have shown that people living on unrefined foods have little caries, but once they gain access to refined foods their caries incidence rises markedly (Andlaw-1977, Enno-1980).

SUGAR AND HEALTH

In addition to its well established role in causing dental caries, there is a growing body of literature that indicates a frequent association of high intake of sugar with 3 major systemic health problems,

namely obesity, diabetes mellitus and heart diseases (Shannon-1977, Goldstein-1979).

Armed with these facts, the present dietary trends produce much concern for general and oral health in Australia, Fiji and New Zealand.

NATIONAL NUTRITIONAL POLICY

Canada, Norway and Sweden have introduced national nutrition policies to encourage people to adopt better dietary habits (Goldstein-1979). The Norwegian Government now regards education in nutrition as vital, and children are involved in practical work at school such as working in gardens and helping with the commercial potato harvest. Nutrition education is also an important part of the general teachers training course.

TABLE 1SUGAR CONTENT* OF SOME BREAKFAST CEREALS

PRODUCT	% SUGAR CONTENT BY WEIGHT
KELLOGG'S Honey Snacks	52.2
KELLOGG'S Froot Flavoured Loops	51.7
KELLOGG'S Strawberry Pops	46.0
KELLOGG'S Frosties	44.2
KELLOGG'S COCO Pops	43.7
KELLOGG'S Nutri-Grain	40.9
SANITARIUM Skippy Corn Flakes	38.0
KELLOGG'S Sultana Bran**	33.4
SANITARIUM Mini Weet-Bix	31.1
KELLOGG'S Bran Buds	29.7
SANITARIUM Honey Weets	28.0
SANITARIUM Weeta Puffs	25.8
WHITE WINGS Original Bran Crunch	25.4
SANITARIUM Crunchy Granola	24.9
SANITARIUM San-Bran	24.1
KELLOGG'S ALL-Bran	18.1
SANITARIUM Golden O's	16.9
KELLOGG'S Special K	16.7
NABISCO Extra G	15.9
KELLOGG'S Bran Flakes	12.0
SANITARIUM Popped Rice	11.4
NABISCO Crispies	9.6
KELLOGG'S Rice Bubbles	8.8
KELLOGG'S Corn Flakes	7.4
SANITARIUM Weet-Bix	4.0
NABISCO Vita Brits	3.3
SANITARIUM Puffed Wheat	3.2
KELLOGG'S Ready Wheats	2.9
NABISCO Weeties	2.9
NABISCO Shredded Wheat	2.2

*Total sugars after hydrolysis.

**This product contains sultanas, which contribute fructose (fruit sugar) to the total sugars.

SOURCE: Choice (Australian Consumers Association) 20:4 Jan.-1979.

TABLE 2SUCROSE CONTENT OF OFTEN INGESTED DRINKS, FOOD AND
FRUITS

PRODUCT	SUGAR CONTENT %
Milo	4
Quick (chocolate)	8
Flavoured milk (chocolate)	6- 8
Orange juice	9-10
Orange juice drink	10-11
Cordials	9-15
Soft drinks	10-11
Drink bases (powdered, including vitamin C)	11-13
Jelly	80+
Coffee whitener	60
Chocolate bars	50+
Frozen desserts	30+
Sauces, Tomato etc.	30
Ice Cream	20+
Salad dressing	10-20
Savory biscuits	10
Canned fruit	20
Yoghurt	15
Stock cubes	15
Peanut butter	10
Apple	12
Apricot	9
Banana	17
Cherry	17
Grape	16
Peach	13
Pear	11
Strawberry	7
Cabbage, tomato	3
Peas, pumpkin	4
Sweet corn, sweet potato	5
Carrot	6
Onion	7

SOURCE: Sun/Telegraph (News Paper - Sunday)
15 March 1981.

3.3 EPIDEMIOLOGICAL FACTORS

Epidemiology is the science concerned with the factors and conditions that determine the occurrence and distribution of health, disease, defects, disability and death among groups of individuals (Dunning-1979, Handbook of Health Manpower-1980).

The science of epidemiology is also concerned with the determination of factors that favour the origin and spread of a disease process or a physiological state in a community. Epidemiology is further concerned with elaborating ways and means of preventing and controlling the spread of disease (Handbook of Health Manpower-1980).

As a science, epidemiology is closely related to ecology. Epidemiology in fact, has been called medical ecology (Dunning-1979). Epidemiological studies should ideally have a sociological component. The attitude of people towards their own oral health state, the attitudes of dental practitioners and the interaction between patient and practitioner plan an important role in the level of oral health. Epidemiological and attitudinal findings would provide details of needs and demands by showing prevalence and incidence of oral diseases. This should preferably be carried out in urban as well as rural areas. This would help to pinpoint any specific regional deficiency and/or particular problems.

EPIDEMIOLOGY AND CLINICAL PRACTICE

The main distinction between epidemiology and clinical practice is that an epidemiologist observes groups of individuals and his observations pertain to the whole group, both the affected and non-affected, whereas, a clinician concerns himself with the individual patient. The epidemiologist studies mass

phenomena in terms of type, extent and frequency of occurrence in relation to sex, race, occupation, heredity, socio-economic status, and other variables (Handbook of Health Manpower-1980).

To discover factors and conditions of the origin and spread of a disease process, the epidemiologist must study the 3 epidemiological constraints:

- . The disease agent;
- . The host;
- . The environment of the host.

The epidemiologist is aware that disease occurs only when there is an interaction between the agent, the host and the environment. Having become aware of these factors the epidemiologist is able to indentify the causes of the disease process and suggest appropriate measures to intercept these causes and prevent the occurrence of the disease in a community (Handbook of Health Manpower-1980).

EPIDEMIOLOGY AND ORAL HEALTH PLANNING

If appropriate data are collected with clearly defined objectives and analysed appropriately, they can be used to plan treatment and/or preventive programs, to evaluate current programs, and to provide new knowledge to serve as the basis for innovations in oral health programing. They also can identify outstanding research opportunities (WHO-1979).

There is need for health planning to be based on epidemiological findings with emphasis on preventive measures and the establishment of treatment priorities. For individual countries there may be different rates of disease prevalence in some areas. Barmes (1977) cites Morocco as an example - at 12 years of age the picture varies from areas where the mean is the low level (0-0.9 DMFT) up to areas where the mean is somewhere between 3.1 and 5.9 DMFT. The variations are important

to an administrator who is trying to develop a oral health service because he will need a different approach in the various areas and he would want to know why huge differences occur.

RATIONALE FOR EPIDEMIOLOGY

Epidemiology is one of the sciences concerned with study of the processes which determine or influence the health of people. As an observational science it involves studying the distribution of diseases in populations and identifying and comparing groups having differing ranges in disease levels or conditions. From knowledge of similarities and differences between such groups, hypotheses as to causal process can be formed. Data are collected concerning the state of health or disease and the nature of the environment and habits of the groups. Specific indices have been developed to quantify such data and describe their distribution. Statistical procedures are required to estimate objectively, the strength of any associations found. In order that the findings may be generalised to the whole population it is essential to standardise the methods of data collection and to make the observations on a sample which is representative of the whole population (WHO-1979).

TYPES OF SURVEYS

Barmes and Sardo Infirri (1977) have proposed a categorisation of epidemiological surveys under 6 headings:

- . National Survey - Random and/or comprehensive stratified sampling giving a valid figure for the whole population.
- . Quasi-national Survey - Stratified or random sampling of selected areas of a country to provide very reliable results.

- . Pathfinder Survey - Careful choice of areas surveyed to reflect the major variations in environment and ethnic structure in a country or population. The number of subjects examined at each sampling point is the minimum necessary to provide reliable data suitable for health service and manpower planning (usually in only 2 or 3 age groups).
- . Informative Survey - 1 or more regions or a combination of selected cities or areas surveyed providing reliable estimates for these areas which, for preliminary planning, could be extrapolated to the whole population, provided there are no strong factors suggesting that such data are likely to be very distant from the national average.
- . Pilot Survey - Particularly by use of convenient sampling, rapid and low cost attainment of a preliminary estimate of disease patterns in a population or area, without attempting to include subjects from all sub-sections of the population, and useful for first-time planning prior to more extensive surveys.
- . Interim Survey - Sampling for which representativeness is very doubtful but not excluded, usually the only available information on a population at that date, but not sufficient even for preliminary planning.

Improvements in the technique of dental surveys will increase the value of data. To this list they add the data collected from records. National records can

be a valuable source of data provided that the information is in accessible form e.g. classification under patient's names rather than dentists (Slack-1979).

EPIDEMIOLOGICAL FACTORS IN PLANNING

The following epidemiological factors must be considered in any oral health planning (Table 30 and 31, WHO-1977):

- . Caries Status;
 - . Periodontal Status;
 - . Handicapping Dento-facial Anomalies;
 - . Full Denture Status;
 - . Disorders of Mucosa, Teeth and Bone;
 - . and other conditions.
-

AIDS TO ORAL EPIDEMIOLOGICAL STUDIES

Oral Health Surveys: Basic Methods (DHS:BS)

To assist public health authorities who require basic epidemiological data on oral diseases and treatment needs for the planning of regional or national oral health programs the WHO has published this manual.

The OHS manual outlines in detail methods and indices suitable for conducting a basic oral health survey to obtain data for planning, evaluating and monitoring oral health services. The recording forms (Table 30) provide indices for the assessment of caries (DMFT); individual tooth treatment requirements, periodontal status and treatment need, oral mucosal conditions and diseases, bone diseases and teeth defects, gross dento-facial anomalies, space for the (simple) recording of any other conditions or diseases which may be of particular importance in a population and a simple questionnaire on utilization of services (WHO-1977).

This manual enables the present status and future needs of a population to be estimated on a sound basis and for providing effective oral health care. The data obtained are particularly useful for manpower planning and in establishing or expanding preventive and restorative services (WHO-1977).

A Guide to Diagnosis and Epidemiology of Oral Mucosal Diseases and Conditions (GEOM)

This manual outlines specific methodology for surveying populations in which oral cancer and related conditions are particularly prevalent. A standard interview and recording form for habits and diseases

and a topographical recording system is provided (WHO-1979).

International Classification of Diseases - Application to Dentistry and Stomatology (ICD-DA)

This document is for use in conjunction with the 9th revision of the ICD prepared to assist the dental profession in reaching a consistent and comprehensive classification of oral and related diseases (Akinosi-1979, WHO-1979). Eventually, the use of this classification may facilitate the widespread collection of epidemiological data on the rarer diseases significant in oral health (WHO-1979).

A Guide to Oral Health Investigations

This guide provides a selection of indices for use in situations where more detailed information on a condition or disease is required, than can be collected using the basic manual's methodology.

This Guide is complementary to the OHS:BM manual. The objective is to assist those interested in applying more rigorous methods to the collection of epidemiological data than would usually be possible in a basic oral health survey (WHO-1979).

Detailed description of indices and criteria include: Caries - Decayed, Missing and Filled Surfaces (DMFS), Plaque and Calculus - Oral Hygiene Index (OHI-S), Gingivitis and Periodontal Disease-Gingival Index (G.I.), Periodontal Index, Enamel Defects - Dean's Dental Fluorosis Index and Criteria for Denture and Bridge Requirements and Possession.

3.4 POLITICAL FACTORS

By political is meant, 'of the state or its government' (Concise Oxford Dictionary-1974). It is often said that experience in the field never fails to confirm that politics and political philosophies are paramount. The political philosophy of the government will influence decision-making in the planning and implementation of oral health programs. Political philosophy concerns the ends or objectives of politics and the way in which political society should be organised in order to realise those ends (Encyclopaedia Britannica-1980).

POLICY

The Minister may evaluate policy alternatives in terms of their importance for his political party or interest groups. Decisions are normally made on the basis of political advantage, with policies being viewed as a means for the advancement or achievement of political party or interest group goals. Political scientists have often studied and evaluated policy-making from this perspective. Particular decisions will be 'explained' as being made for the benefit say, of organised labour, wheat farmers or a given political party (Anderson-1975).

FEE SCHEDULES

In some countries fee schedules have been established by the Government. This schedule may tend to become the base against which all other fees are measured (Newbury-1980). For example in Australia, the fee-schedule negotiated by the Australian Dental Association with the Government for the Department of Veterans' Affairs, have become the official levels for all treatment in the Armed Services, and for those who are incapacitated or indigent (Newbury-1980).

DENTAL PRACTICE

In some countries agencies have been established to examine and regulate the conduct of practice and the dentist-patient relationship (Newbury-1980). Tribunals have been established to receive and investigate claims of excessive charging, Trade Practices Acts have been promulgated to look at professional quality of oral health care. In some countries various classes of operating auxiliary personnel have been established by government insistence and against the active advice and wishes of the profession itself. In some cases they have been given the right to deal directly with the public - for example denturists in some States of Australia (New South Wales, Tasmania and Victoria) (Newbury-1980).

Many countries have social insurance schemes, national health schemes, school dental services and schemes for pensioners, as well as denturists and other operating auxiliary personnel. Newbury (1980) claims that because the cost of health care is escalating rapidly, government is seeking to contain them and so the breadth and quality of health services are being eroded and confined within narrower limits. The individual dentist is no longer able to prescribe the treatment in the best interest of the patient but is frequently forced to compromise to fit the treatment within the range permitted.

In practical terms political events would warrant changes in government policies which will affect programs (including oral health) and procedures within the Public Service.

PUBLIC HEALTH PROGRAMS

It must be accepted that public oral health programs are inherently political in nature. They are initiated by politicians at some level, presumably because a demand for them is seen to exist.

The politicians also allocate finances for them, and set the program at an order of importance in relation to other socially-oriented programs. This will mean that time and resources, especially finances, awarded to the program will have some ceiling set by the politicians concerned.

The oral health administrator and the politician therefore may well look at the program from totally different points of view, and each can have a set of goals which they see the program achieving. Occasionally these goals may coincide, but frequently they do not (Burt-1974).

Political pressures of all kinds on a public dental treatment program are unlikely ever to go away, so the dental administrator has to learn to live with them. Reliable data, especially on costs, may be one hedge against undesirable political action, such as a reduction in the scope of a program which is developing well. Data to assess oral health needs and for evaluation may be of more use to the administrator than simply to help him operate efficient programs, as they can also be invaluable in making a case to politicians.

3.5 DEMOGRAPHIC FACTORS

The numerical study of human population is known as 'demography' (Sahib-1972). The population is viewed as an aggregate of persons, represented by certain types of statistics. Demography is concerned with the behaviour of the aggregate and not with the behaviours of the individuals. A population outlives its individual members. This means that the membership is constantly changing. Some people die each year, and others are born. In addition, there may be some net gain or loss through migration. These factors are sometimes called 'vital' processes, since they are the means by which the population replenishes itself and remains in existence (Sahib-1972).

There are 2 main aspects of the behaviours of populations: the composition of the aggregate, and changes that occur during some period of observation. The composition of a population is described by the distribution of people among certain more or less standard categories. Changes, on the other hand, are the result of 'events', which add or take away members of the population. For this reason births and deaths are called 'vital events'.

Since a population is subject to constant changes, its composition must be determined with reference to some particular time. Correspondingly, there are 2 main kinds of data. One is an 'enumeration', i.e. counting all persons present. This is usually provided by a census, which is an enumeration taken for an entire population on or about the same date. The other form of statistics is a record of vital events, generally the events occurring in a calendar year. This is provided by some scheme of registration, designed to record every event (birth, death, migration, marriage and divorce) as it occurs.

DEMOGRAPHIC DATA IN PLANNING

The demographic conditions of a country play an important part in defining her social conditions and problems (Sahib-1972). For example, the number of persons who are in school or in gainful employment or are inactive, reflect the number of males and females in certain age spans; and the pace at which educational facilities, health facilities and job opportunities need to expand depends on the rates at which these numbers grow. The way in which a population is distributed into cities, towns, villages and farms has much to do with its physical and social environment and the need for public services and amenities. The risks of unemployment, ailments, infirmities and death and the requirement for social services vary with age and sex, socio-economic class, and perhaps ethnic origin of people.

Therefore, it can be seen that a clear understanding of demographic trends is a prelude to any manpower planning. A manpower system may be defined as any identifiable group of people working with a common goal in view (Sahib-1972). In health manpower planning the assistance of economists and behavioural scientists, who have specialised in health is of paramount importance.

PUBLIC HEALTH PROGRAMS

In planning manpower requirements for a school oral health program the following demographic factors should be considered:

- . Total school population (pre-schools, primary schools and secondary schools);
- . The rate of growth of school population;
- . Age distribution of children;
- . Urban and rural distribution of school children (and schools);
- . Ethnic and cultural considerations.

Population trends are essential profile for planning and projecting manpower requirements. Demography and geographical features may have an interlinking influence in determining the provision of health services in a country.

In Australia there are many areas where isolated communities do not have convenient access to oral health services. The problem arises from vastness of the country and the small, scattered nature of the population outside the large cities and towns. In Fiji there are many isolated islands (about 100 inhabited) and the population in many, is sparse. Access to many is only by sea, and this makes delivery of oral health care to villages and their schools difficult and sporadic.

Ethnic and cultural factors should be considered because people of certain ethnic origin have different and sometimes more severe oral health problems. In Fiji the permanent teeth of Fijian children erupt earlier than that of children of Indian origin and this could explain why Fijian children have a higher decay rate (at the same age) in the permanent dentition (Speake, Singh and Ligani-1980). A similar trend was noticed by Baume (1968) among children of various ethnic origin in French Polynesia.

3.5 SOCIO-ECONOMIC FACTORS

Dentists have been disturbed for a long time because their appraisals of oral and dental diseases are not taken seriously. It is obvious that many people do not consider their oral health a valued asset and give oral health care a low priority (Martin-1965).

Martin (1965) claims that the impediments in the way of good oral health in the community are only slightly, if at all, technical ones, and almost entirely social and psychological.

Unlike many other situations in which health programs have to be planned, oral and dental diseases in one form or other may affect the entire population. Moreover, some dental diseases are irreversible and cumulative. The problem of oral health education is complicated by the fact that unlike general physical fitness or health, it tends to be valued lightly by a large proportion of the population. Oral illness in one form or another can be more readily ignored and dismissed by the patient than can most other forms of physical illness (Martin-1965).

ATTITUDES, KNOWLEDGE AND CULTURE

Davies (1968) argues that oral and dental diseases should be studied not as a pathological entity alone, but also as social problem. In order to achieve this social scientists should be encouraged to study the attitudes of people and behavioural factors involved.

One can only understand why people do things by understanding their beliefs, attitudes, knowledge and culture which underly their actions.

Social research into medical treatment has shown that class attitudes are extremely prevalent (Susser and Watson-1962). The middle class are more health-conscious than the working class and are much more prepared to accept medical advice and act on it than the working class. The latter are more prepared to act on advice from their neighbours (Susser and Watson-1962). Ignorance, superstition, misconceptions, traditions and apathy towards oral health therefore, appear to be major obstacles to better oral health throughout the world.

Although the attitudes of other people are never seen or felt - they are only inferred - they make a great difference in almost everyone's life. Indeed, very few acts or decisions in everyday affairs do not somehow take account of the way in which the attitudes of others may be affected. An attitude is a tendency to respond positively (favourably) or negatively (unfavourably) to certain objects, persons or situations (Morgan and King-1966).

Culture consists of the customs and traditions of a people as well as the attitudes and beliefs they hold about important aspects of life. The cultural influences help to shape ones attitudes. Consonant with the beliefs about causation of illness are the traditional means of cure.

Once learned, attitudes are quite resistant to change. Newspapers, radio, television, advertising, and education are all fields in which attempts are made to induce behavioural change.

INFLUENCE OF SOCIAL SCIENCE IN PLANNING

It is one of the important developments in public health in recent years that social scientists have been enlisted to aid in adapting new health programs to existing cultural patterns. A look at other cultures often helps us to understand our own, and

an understanding of the whole culture is often necessary in order to change 1 item, one must often change many (Morgan and King-1966). For instance, the difficulty the dental profession has found, and still finds, in restricting slowly cleared carbohydrates (such as sweets) in people's diet.

They are given to children as rewards for good behaviour, even by physicians following medical visits. The adjustment of culture to the responsible use of sweets by caries-susceptible individuals constitutes a major challenge.

When applied to a practical problem such an oral health program planning, social science in effect adds a new dimensions to the process of planning. Without the social scientist it is fairly easy to decide what a given program should attempt to do and to measure the effort theoretically needed for the execution of the program, in terms of reduced susceptibility to dental caries and periodontal disease or increased amounts of oral health care received. The social scientist helps in the assessment of the process the program is using or plans to use, in finding out how well this process fits with the socio-cultural system of the groups with which one is working (Dunning-1979).

CLASS ATTITUDES TO ORAL HEALTH

Dickson (1968) conducted a survey in Manchester - United Kingdom to investigate class attitudes to dental treatment and various other related items, and came to the following conclusions:

The general outcome is that the Dental Service is not being used as well by the working class as by the middle class, help although it was originally designed to those in greatest need. Dental treatment is still viewed by the working class as a

'luxury' service. The middle class appear to be making greater use of the service offered, especially for dental conservation, while the working class is more concerned with 'emergency' treatment.

He also found that the lower income group was strongly against having deciduous teeth filled to prevent further decay. However, over $\frac{1}{3}$ of the higher income group also did not favour having deciduous teeth filled. The school dental service must be affected by such strong attitudes towards children's oral health, especially by the working class. The main reason for not agreeing with having deciduous teeth filled was that 'they will come out anyway'. This takes no account of the effect on the child's general health of decaying teeth, nor of the effect on his digestion, of his inability to chew food properly nor of the effect upon his permanent teeth of losing his deciduous teeth early.

In addition more of the working class parents thought that school dentists are not fully qualified, although more of this group have their children treated at school clinics.

Beal and Dickson (1975) in a study in West Midlands - United Kingdom, found that whilst the British and Irish mothers are best at visiting the dentist regularly themselves and favour taking their children to the dentist before the age of 5, they do not have as great a preference for the conservation of decayed teeth as the Asian mothers. Conversely, the Asian mothers who had the most favourable attitudes towards filling teeth were the least likely to make sure that their children visit the dentist early in life.

They also found that whilst Asian mothers had a better attitude towards oral health than the others, but there was a considerable gap between their attitude and the related dental behaviour.

ORAL HEALTH PLANNING

For a long time dentistry has been unsure of its success, or otherwise, in meeting the oral health needs of the population. The situation is now changing rapidly, many countries have a comprehensive knowledge of the oral health status of the population, with reliable data, both of oral health and sociological, on most age groups - pre-school and primary school children, adolescents, and adults. WHO global data bank and International Collaborative Study provide us with an international basis of comparison (Barmes-1977, WHO-1980). These studies should have a sociological component. This new dimension in oral epidemiology identifies problems within particular social groups, provides information on the attitudes of members of those groups towards oral health and oral health care, and defines barriers to the obtaining of adequate care. Armed with such information an assessment of the situation can be made and this can be followed by rational planning for improvement and modification where deficiencies are shown to exist.

The oral health component of the WHO long term goal of health for all by year 2000 is 3 DMF teeth at 12 years of age for all countries. This goal should be used in planning to ensure that every child receives regular, total oral health care in order to maintain optimal oral health throughout life. If this is to be achieved, then the present barriers that prevent a large proportion of the population receiving regular oral health care must be removed or lowered, and expectations for oral health raised.

It appears from the literature that no matter what oral health plan is developed for a community it is likely to be used less by persons in the lower socio-economic group. However, no research appears to have been carried out to ascertain if this is also the case in developing countries.

3.7 MANPOWER FACTORS

The supply of oral health care available in a given country, and to some extent the demand for oral health care are closely linked with number and type of personnel involved and the way they use their time. In most developing countries there is a shortage of oral health manpower. The number of oral health personnel and the ratio of population to operating personnel is a crude measure of manpower requirements in a country.

OBJECTIVE OF MANPOWER PROGRAM

According to Federation Dentaire Internationale (FDI) (General Assembly-July 1962; as quoted by Walsh-1970) the objective of the manpower program is as follows:

The primary objective of the dental manpower program is to provide as promptly as national resources permit, a legal and qualified work force to provide adequate dental health care for all. The program should be designed on well-defined goals, identifying the various steps that will be taken to meet these goals and establishing a schedule or time limit for that achievement.

CATEGORIES OF ORAL HEALTH PERSONNEL

At a WHO inter-regional seminar on the training and utilization of dental personnel in developing countries, held in New Delhi during 1967, the following definitions were given for oral health personnel categories (WHO-1968).

Professional

Graduates of a university or dental college

who are registered to practice dentistry independently. They may, in addition, have had special training and experience in a recognized branch of dentistry.

Operating Auxiliaries (School Dental Nurse/Dental Therapist, Dental Hygienist)

Personnel who, by virtue of having undergone formal training, perform a limited range of diagnostic, preventive, and curative services in dentistry, and whose work is supervised by a dentist, either directly or indirectly depending on national regulations. Such personnel have usually not completed dental education at university or equivalent level.

Non-operating Auxiliaries (Dental Laboratory Technician, Chairside Assistant)

Non-operating auxiliaries assist dentists and operating auxiliaries (some countries) in their clinical work, but do not independently carry out any intraoral procedures. They have usually acquired technical training either in formal courses or during an apprenticeship.

But, whatever the particular category of operating personnel decided upon, training must embrace prevention and health education aspects and not just treatment alone.

MANPOWER PLANNING

Health manpower planning may be defined, 'as the process whereby goals, objectives, priorities and activities for health manpower resources, both current and future are adequate to meet the requirements for the delivery of health services to a population' (Weiss and Signer-1979). It is the responsibility of the health planner to determine the number and types of health providers, their availability, and the health service areas which are in need. To accomplish this goal, the existing manpower supply must first be

evaluated. Projections must then be made about present and future health manpower requirements.

Data also must be gathered on the demographics of the resident population; characteristics of the current oral health care delivery system (that is, numbers and types of services available, geographic location, numbers and types of professional and auxiliary personnel), and standards against which manpower requirements may be determined. By considering both the supply of health manpower and the expected need and demand for oral health services, it should be possible to make an informed projection of future manpower requirements.

The categories proposed by WHO (1968) provide a sufficient range and variety of persons to handle all oral health problems that are in existence at present. In drawing up a syllabus for training of these personnel the oral health needs of the particular country should be the prime consideration; together with political, cultural and socio-economic factors which may modify the course of action adopted.

THE ORAL HEALTH TEAM

The concept of the oral health team is the most significant step proposed in recent years to overcome the manpower shortage in the provision of oral health care. In the developing countries difficulties remain in producing oral health personnel of the right type/s and in adequate numbers to make those teams a reality.

First, one should assess present needs and forecast likely changes. To do this, one should study the data on the type and extent of oral diseases prevailing. The data will facilitate decision-making about the type of personnel that individual countries need.

It should be remembered that dentistry is an elective commodity; thus, the need for care, as projected from the demographic characteristics and epidemiological surveys of the population, may not constitute the public's actual demand for services.

THE DENTIST/POPULATION RATIO

The method most often used to determine the adequacy of the oral health manpower in a country is the dentist-to-population ratio. However, Weiss and Signer (1979) contend that this measurement has several deficiencies; namely:

- . Its major shortcoming lies in its inability to distinguish between the need and demand factors.
- . It does not take into account whether a dentist employs auxiliary personnel.
- . Users of this measurement may fail to differentiate between general dentists and specialists, thus lending the false impression that the entire oral health manpower is providing general oral and dental health care.
- . The dentist-to-population ratio does not give the age of the practitioners; therefore, the number of expected years of practice cannot be determined.

It is important that oral health manpower resources closely correspond with community requirements. Insufficient manpower would have undesirable health consequences whereas an excess would be wasteful of resources, predisposing to overservicing and social and economic hardship among dentists.

THE OPERATOR/CHILD RATIOS

With the advent of oral health team in the school oral health service it would be appropriate to have operator (dentist/dental therapist) to children

ratio for this service. This ratio is a crude guide as requirements would vary from country to country depending on several factors, including disease levels, manpower structures (team approach) and program goals. Therefore, there can be no universally accepted manpower ratios (WHO-1980) (Table 3). Vast differences in the ability of countries to provide health services are shown by simple statistical table (Table 4) on the existing manpower prepared by the WHO (1980).

It can be seen from this table that large numbers of countries have very unfavourable ratios. Given these ratios, oral health programs and their goals will be different (WHO-1980).

TABLE 3DENTISTS PER CAPITA IN SELECTED COUNTRIES

<u>COUNTRY</u>	<u>POPULATION PER DENTIST</u>
Monaco	970
Norway	1,090
Denmark	1,310
United States of America	1,970
Australia	2,460
New Zealand	2,890
Nauru	3,500
French Polynesia	5,520
American Samoa	6,200
Hong Kong	8,190
Tonga	12,250
Fiji	13,280
Jamaica	18,670
Ecuador	24,010
Guyana	35,180
Sri Lanka	46,550
Solomon Islands	55,330
New Hebrides	90,000
Pakistan	114,260
Papua New Guinea	156,000
Nigeria	578,710
Ethiopia	1,080,540
Nepal	1,539,880
Rwanda	2,061,500

SOURCE: WHO From: Book of World Rankings - 1979

TABLE 4MANPOWER RATIO IN ORAL HEALTH SERVICES

MANPOWER RATIO	NUMBER OF COUNTRIES
1: 3000 and less	30
1: 3001 to 20 000	83
1: 20 001 to 100 000	32
1: 100 001 to 1 million	40
1: more than 1 million	6

SOURCE: Planning Oral Health Services - WHO, 1980

To strive, to seek, to find,
and not to YIELD

- A. Tennyson

Right conduct can never be promoted by
ignorance or hindered by knowledge

- B. Russell

DECISION - MAKING

AND

PUBLIC POLICY

4. DECISION - MAKING AND PUBLIC POLICY

4.1 DECISION - MAKING

Political and social scientists have developed many models and theories for the analysis of policy-making and its component, decision-making. Concepts and models are necessary and useful to guide policy analysis, as they help clarify and direct our inquiry on policy-making, facilitate communication, and suggest possible explanations for policy actions (Anderson-1975).

Decision-making involves the choice of an alternative from among a series of competing alternatives (Anderson-1975). Theories of decision-making are concerned with how such choices are made. A policy by definition, is 'a purposive course of action followed by an actor or set of actors in dealing with a problem or matter of concern (Anderson-1975). Policy-making typically involves a pattern of action, extending over time and involving many decisions, some routine and some not so routine. Rarely will a policy be synonymous with a single decision.

The major theories of decision-making that focus on the steps of activities involved in making a decision are discussed (Lindblom-1959, Dror-1964, Anderson-1975, Dye-1975).

THE RATIONAL COMPREHENSIVE THEORY

Perhaps the best-known theory of decision-making, and also perhaps, the most widely accepted, is the rational-comprehensive theory. It includes the following elements:

- . The decision-maker is confronted with a given problem that can be separated from other problems.

- . The goals, values, or objectives that guide the decision-maker are clarified and ranked according to their importance.
- . The various alternatives for dealing with the problem are examined.
- . The consequences (costs and benefits) that would follow from the selection of each alternative are investigated.
- . Each alternative, and its attendant consequences, can be compared with the other alternatives.
- . The decision-maker will choose that alternative, and its consequences, that maximizes the attainment of his goals, values, or objectives.

The result of this process is a rational decision, that is, one that most effectively achieves a given end.

The rational-comprehensive theory has had substantial criticism directed at it by Lindblom (1959), who contends that decision-makers are not faced with concrete, clearly defined problems. Rather, they have first of all to identify and formulate the problems on which they make decisions.

A second criticism holds that rational-comprehensive theory is unrealistic in the demands it makes on the decision-maker. It assumes that he will have enough information on the alternatives for dealing with a problem, that he will be able to predict their consequences with some accuracy, and that he will be capable of making correct cost-benefit comparisons of the alternatives.

THE INCREMENTAL THEORY

The incremental theory of decision-making, or, more simply incrementalism, is presented by Lindblom (1959) as a decision theory that avoids many of the problems of the rational-comprehensive theory and, at the same time, is more descriptive of the way in which public officials actually make decisions (Anderson-1975). Incrementalism can be summarized in the following manner:

- . The selection of goals or objectives and the empirical analysis of the action needed to attain them are closely intertwined with, rather than distinct from one another.
- . The decision-maker considers only some of the alternatives for dealing with a problem, and these will differ only incrementally (i.e. marginally) from existing policies.
- . The problem confronting the decision-maker is continually redefined.
Incrementalism allows for countless ends-means and means-end adjustments that have the effect of making the problem more manageable.
- . Incremental decision-making is essentially remedial.

Incrementalism is politically expedient because it is easier to reach agreement when the matters in dispute among various groups are only modifications of existing programs rather than policy issues of great magnitude of an 'all or nothing' character (Lindblom-1959). Since decision-makers operate under conditions of uncertainty with regard to the future consequences of their actions, incremental decisions reduce the risks and costs of uncertainty (Anderson-1975). Moreover, people are essentially pragmatic, seeking not always the single best way to deal with a problem, but more modestly, 'something that will work (Anderson-1975).

MIXED-SCANNING MODEL

Etzioni (1967) agrees with the criticism of the rational-comprehensive theory, but also suggests there are some shortcomings in the incremental theory of decision-making. For instance, decisions made by incrementalists would reflect the interests of the most powerful and organised interests in society, while the interests of the underprivileged and politically unorganized would be neglected. Moreover, by focusing on the short-run and seeking only limited variations in current policies, incrementalism would neglect basic social innovation. Great or fundamental decisions are highly significant and often provide the context for numerous incremental decisions (Anderson-1975).

Etzioni (1967) presents mixed-scanning as an approach to decision-making and provides the following illustration:

Assume we are about to set up a worldwide weather observation system using weather satellites. The rationalistic approach would seek an exhaustive survey of weather conditions by using cameras capable of detailed observations and by scheduling reviews of the entire sky as often as possible. This would yield an avalanche of details, costly to analyze and likely to overwhelm our action capacities (e.g. 'seeding' cloud formations that could develop into hurricanes or bring rain to arid areas). Incrementalism would focus on those areas in which similar patterns developed in the recent past and, perhaps, on a few nearby regions; it would thus ignore all formations which might deserve attention if they arose in unexpected areas.

A mixed-scanning strategy would include elements of both approaches by employing 2 cameras: a broad-angle camera that would cover all parts of the sky but not in great detail, and a second one which would zero in on those areas revealed by the first camera to require a more in-depth examination. While mixed-scanning might miss areas in which only a detailed camera could reveal trouble, it is less likely than incrementalism to miss obvious trouble spots in unfamiliar areas.

Mixed-scanning permits decision-makers to utilize both the rational-comprehensive and incremental theories in different situations (Anderson-1975). In some instances, incrementalism will be adequate; in others, a more thorough approach along rational-comprehensive lines will be needed.

Mixed-scanning is thus a kind of 'compromise' approach that combines use of incrementalism and rationalism.

DECISION CRITERIA

Whether the decision process one selects is rational-comprehensive, incremental, or mixed-scanning in nature, those who make choices among alternatives must have some basis for doing so. While some 'decisions' may be the product of chance, inadvertence, random selection, or inaction that permits particular actions to prevail, most decisions will involve conscious choice (Anderson-1975). The question then becomes: What kinds of criteria (values or standards) influence the actions of decision-makers? Of course, many factors appear to impinge upon decision-makers including political and social pressures, economic conditions, procedural requirements, previous commitments, the pressure of time.

In ones concern with these, however, one

should be careful not to neglect the values of the decision-maker himself, notwithstanding that they may be difficult to determine and impossible to isolate in many instances.

4.2 PUBLIC POLICY

The policy process can be viewed as a sequential pattern of action involving a number of functional categories of activity that can be analytically distinguished, although in various instances this distinction may be difficult to make empirically. Anderson (1975) has proposed the following 5 categories:

- . Problem Formation: What is a policy problem? What makes it a public problem? How does it get on the agenda of government?
- . Policy Formulation: How are alternatives for dealing with the problem developed? Who participates in formulation?
- . Policy Adoption: How is a policy alternative adopted or enacted? What requirements must be met?
- . Policy Implementation: What is done to carry a policy into effect?
- . Policy Evaluation: How is the effectiveness or impact of a policy measured?

Within this framework, policy formulation, adoption and implementation are perceived as political in that they involve conflict and struggle among individuals and groups having conflicting desires on issues of public policy (Anderson-1975). Policy-making is 'political', it involves 'politics' and there is no reason to resist this conclusion, or to imitate those who dismiss policies they do not like with such phrases as 'Its just a matter of politics'.

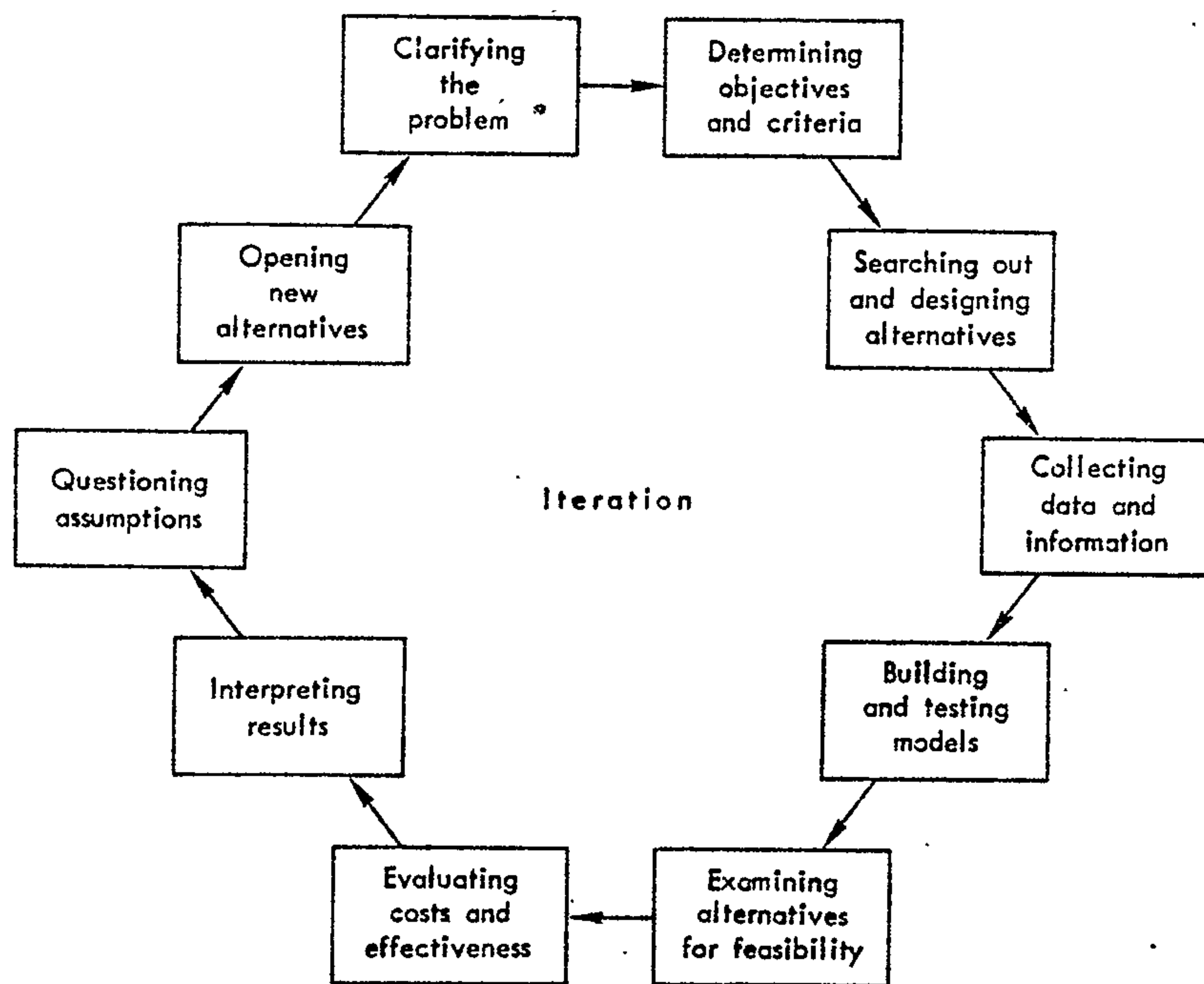
In actuality, policy-making often does chronologically follow the sequence of activities listed. The sequential approach thus helps capture the flow of action in the policy process.

QUADE'S SCHEMATIC MODEL

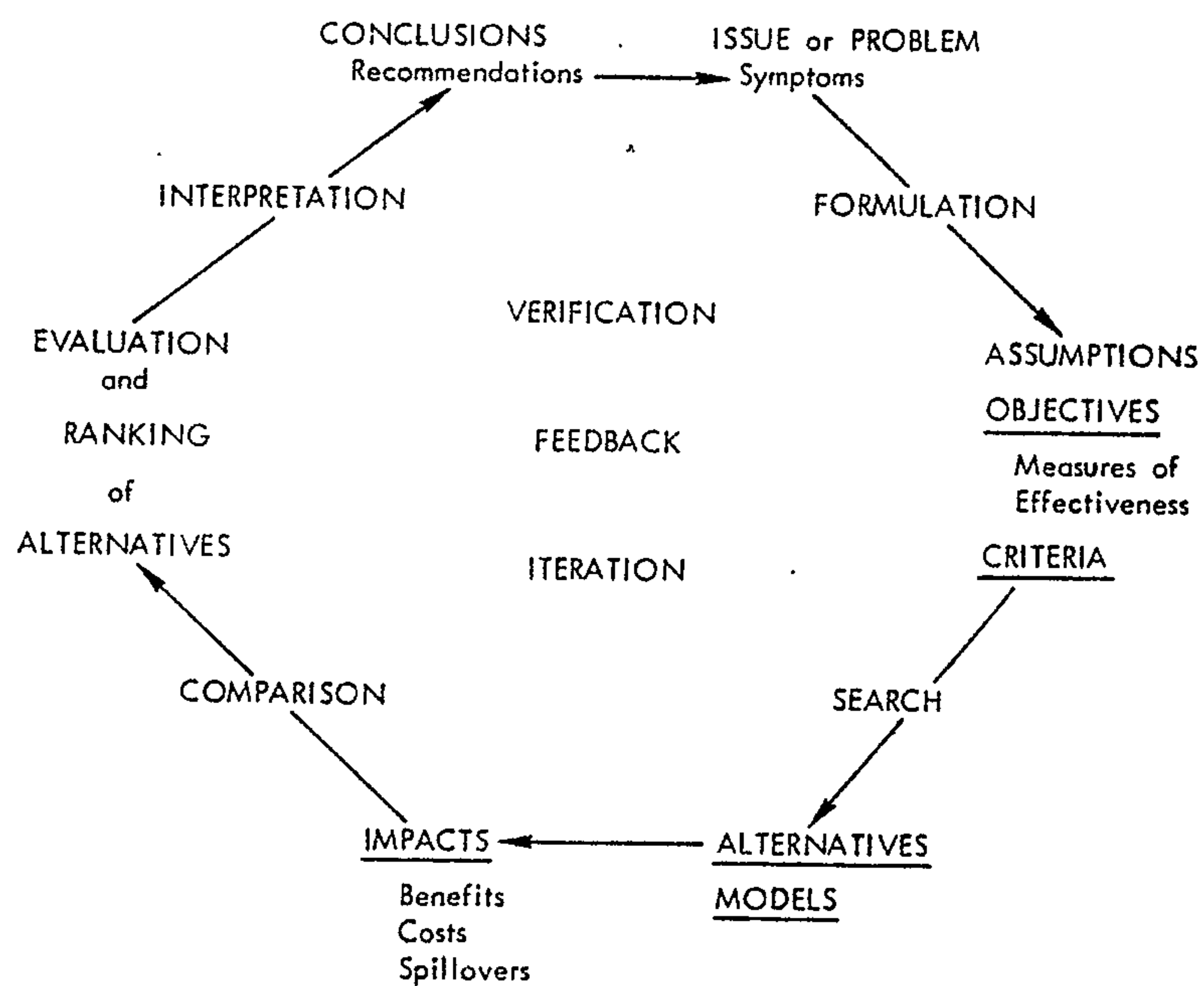
The best decision possible or at least a very good decision can be made by using the schematic model suggested by Quade (1975) (Fig 1). Quade (1975) claims that a successful analysis of public decisions depends upon a continuous cycle of formulating the problem, selecting objectives, designing alternative, building better models until one is satisfied.

Quade (1975) has proposed a system of public policy analysis (Fig 2). He claims that no matter what the problem, 5 activities are involved: Formulation, search, comparison, interpretation, and verification. An analysis starts with the process of formulation, an attempt to clarify the objectives and define the issues of concern and to limit the problem. In search one looks for data, relationships and new alternatives. In comparison one uses the probable impacts i.e. costs, benefits and other consequences likely to follow from each choice of alternatives to compare and rank, the alternatives by means of various criteria. Interpretation is a matter of judgement and intuition. Finally, one would like a verification of conclusions, this is not always easy for there are usually circumstances beyond ones control. Quade (1975) contends that using this model, the decision-maker would be in a better position to make the required decisions than he would be without analysis.

Quade is concerned that in most public policy decisions most time and resources are expended on comparison and interpretation. He challenges the decision-maker to spend more time on formulation and search in the first instance.

FIGURE 1

The iterative nature of analysis

FIGURE 2

A system of policy analysis

SOURCE: Quade - 1975

Can the strength of a hundred people
be greater than of 1 thousand people?

It can and is,
when the 1 hundred are organised.

- V.I. Lenin

SCHOOL ORAL HEALTH PROGRAMS

5. SCHOOL ORAL HEALTH PROGRAMS

There are considerable variations among countries throughout the world in the manner in which the oral health services are organised and delivered to school children. Traditionally, school oral health care in many countries has been and still is delivered by dentists (dental surgeons, stomatologists) (e.g. Denmark, Norway and Sweden). Some countries, including many developing countries, within the last few decades have developed the training and utilisation of operating and expanded duty auxiliaries to increase productivity (with minimum costs) and to meet the needs and demands of school children (World Dental Therapy Schools-1979).

It is clearly wasteful for dental graduates (after 4 or 5 years of tertiary education) to spend much of their professional life doing repetitive tasks that can be done by operating auxiliaries specifically trained (2 or 3 years) for that purpose.

In Australia and New Zealand operating auxiliaries are extensively utilised in the school oral health service.

ADVANTAGES OF SCHOOL-BASED ORAL HEALTH SERVICE

Some of the purest examples of school-based oral health services are to be found in Australia, New Zealand and Scandinavian countries. A list of the advantages of school-based dental service would include (modified from Dunning-1978):

- . The school-based clinics can bring comprehensive oral health care, including preventive measures to children, where they are gathered for non-dental reasons, in the largest

possible numbers. This is particularly advantageous in dentist-deprived areas. A combination of education and health facilities is sensible both ideologically and logistically. Higher utilization of oral health services has been obtained by this method than any other;

- . School-based oral health clinics are less threatening to children than are private clinics, since the children are in familiar surroundings;
 - . The system facilitates oral health education. Members of the oral health team can easily engage in classroom teaching, and then reinforce their messages by individual instruction at chairside;
 - . The value of public health care is greatest in the school years and should give way to a mechanism by which patients can be shifted to private practice during the adolescent years for all phases of oral care. This will prepare young people for receipt of private care during adult life;
 - . Because of the ease of carrying out routine oral inspection for all children on a regular basis, the demand usually promotes increased referral to private practitioners;
 - . School-based dental clinics can reduce costs for oral health care through control of both capital expenditure and operating expenses. Capital expenditures can be reduced because the government services have group purchasing power and less need to respond to style competition;
 - . School-based clinics provide an ideal setting for use of the oral health team.
-

5.1 THE NEW ZEALAND SCHOOL DENTAL SERVICE

The school dental service constitutes a distinctive feature of the New Zealand dental care delivery system but it does not exist in isolation. Rather, it is one aspect of an integrated pattern of services, public and private, that have been evolving over a period of 60 years (Logan-1978, Hunter-1980).

The first plan for a school dental service was adopted in 1919 (15 years after it was first proposed) following representations to the Government by the New Zealand Dental Association, which was concerned about the poor condition of the teeth of school children. Six dental officers were appointed initially. It soon became evident that the development of an adequate staff of dental officers would be a very slow process, and the idea of training young women as school dental nurses within Government service was accepted. The present school dental service was inaugurated in 1921 as a trial project (Hunter-1980). In 1935 the service was established as a permanent part of the public health program.

At present pre-school and primary school children between 2½ and 13 years of age receive free routine dental care from the school dental nurse, who works under the direction of a public health dentist in the school dental service of the Department of Health (Hunter-1980).

Children in both state and private schools without clinics, travel to the nearest clinic. Treatment beyond the scope of the school dental nurse is referred to private dental practitioners (Hunter-1980). An important feature of the 2 principal programs - the school dental service and general dental benefits - is

that the children are enrolled and receive regular dental care (Hollis-1980).

PRIVATE DENTAL PRACTITIONERS

Private dental practitioners provide dental services for children and adolescents in their own surgeries on fee-for-service basis in 3 broad categories (Hollis-1980):

- . Dental benefit program - diagnostic and treatment services for adolescents to age 15 years and dependent 16 and 17 year olds. This scheme was introduced in 1946.
- . Orthodontic services - provided by general dental practitioners and specialist orthodontists. Parents must meet the cost.
- . For children enrolled in the school dental service, dental care which school dental nurses do not undertake.

Central government meets the total cost of oral health care for this age group apart from some specialist services, such as orthodontics. Policy development, planning, evaluation and control of the school dental service is the responsibility of the Director, Division of Dental Health of the Department of Health.

ADMINISTRATION

New Zealand is divided into 15 dental districts each with a principal dental officer and a supervising dental nurse, who in addition to general dental public health duties, manage the school dental service in their district. In the larger dental districts there may also be a senior dental officer and another supervising dental nurse. Regular evaluations are made of the performance of each dental nurse and the dental officers are always

available for consultation and assistance. School dental clinics are situated within school grounds and the school dental nurses, although employed by the Health Department, are accepted as members of the school staff, with status similar to that of teachers (Hunter-1980).

SELECTION OF STUDENT DENTAL NURSES

A high standard of education, personality and health is required of all young women selected for training as student dental nurse. Candidates must be at least 17 years of age at date of entry for training. The minimum entrance qualification is School Certificate (4 years of High School). Preference is however, given to candidates who have passed the University Entrance (World Dental Therapy Schools-1979). All candidates who fulfill these requirements are interviewed by a selection committee. During the 2 year period students receive training in basic and dental subjects (Table 5).

EFFECTS ON PRIVATE PRACTITIONERS

In New Zealand many dentists were concerned initially with the effects of a school dental service on their economic and professional status (Leslie-1970). The same concerns are expressed by dentists in countries that are currently developing this type of program. The experience in New Zealand has demonstrated that the provision of dental care by auxiliary personnel within the restricted environment of school does not detract in any way from the dental profession. Quite the opposite - it should result in greater awareness amongst the general population of the necessity for regular oral health care, thereby increasing the demand for treatment by private practitioners (Public Dental Health in New Zealand-1967).

PRE-SCHOOL CHILDREN

The dental nurses serve both the school and the pre-school children. Parental consent is mandatory for the care of school children who come from the classroom for treatment (Logan-1978). Pre-schoolers are brought to the school dental clinics by parents on regularly scheduled appointments, in the same manner as they would visit private dentists.

NUMBER OF CHILDREN COVERED

In non-fluoridated areas, dental nurses provide regular care at 6 months intervals for 450 to 500 children. In fluoridated areas they can handle 650 to 1,000 children (Dunning-1972, Logan-1978).

DUTIES OF SCHOOL DENTAL NURSES

The duties (Table 6) of the school dental nurses are defined clearly and accurate records are maintained for all their activities, including the number of children treated and the types and number of services performed, as well as their additional duties such as classroom oral health education.

TABLE 5SCHOOL DENTAL NURSE - NEW ZEALANDSUBJECTS TAUGHT1ST YEAR

- . Orientation and Induction
- . Hygiene
- . Applied Art
- . General Anatomy, Histology and Phsiology
- . Dental Histology
- . Use and Care of Equipment
- . Clinic Hygiene and Chairside Observation
- . First Aid
- . General Patholgy
- . Dental Patholgy
- . Operative Dentistry
- . Pharmacology and Therapeutics
- . Clinical Records
- . Local Anaesthetics and Extractions
- . Public Health and Child Welfare
- . Orthodontics

2ND YEAR

- . Operative Dentistry (Clinical)
- . Organisation and Administration
- . Dental Health Education
- . New Zealand Primary School System

SOURCE: World Dental Therapy Schools-1979

TABLE 6SCHOOL DENTAL NURSE - NEW ZEALANDLIST OF DUTIESCLINICAL

- . Examination, the diagnosis of dental caries and marginal gingivitis, and the recognition of other conditions as abnormal.
- . Prophylaxis and scaling.
- . Preventive services, which are from time to time included in the school dental service procedures.
- . Dental health education.
- . Preparation of cavities in teeth in which the carious lesions have no greater depth than that for which pulp capping is indicated.
- . The filling of teeth with amalgam, silicate, zinc oxide and eugenol, and such linings and sublinings as are indicated.
- . Local anaesthesia.
- . The extraction of deciduous teeth which are cariously unsavable, over-retained or loose, or when advised to do so by the principal dental officer.

NON CLINICAL

- . Classroom dental health education.
- . Records.

THE IMPACT OF INTERNATIONAL COLLABORATIVE STUDY
ON THE SCHOOL DENTAL SERVICE

The significant results of the International Collaborative study have been reviewed by Hunter (1980) to place the school dental service response in perspective. Briefly these are as follows:

8 and 9 Year Old Children - in the primary dentition of Canterbury 8 and 9 year old children the dmf teeth score of 6.3 was the 3rd highest of the 7 regions, being slightly below the scores for Trondelag and Yamanashi.

The outstanding characteristic of the Canterbury dmf teeth score when compared with other regions was that 90% of the total was made up of filled teeth, whereas the next highest percentage of filled teeth, in Ontario, was 55%.

In the permanent dentition of 8 and 9 year olds there was a similar picture for the Canterbury sample, the 2nd highest DMF teeth score and with Trondelag, most of the DMFT score made up of filled teeth.

13 and 14 Year Old Students - Again, Canterbury 13 and 14 year old students had the 2nd highest DMF teeth score (10.7) and with Trondelag, had almost all of the DMF teeth score made up of filled teeth.

35-44 Year Old Adults - for the 35-44 year old group the DMF teeth index in Canterbury was one of the highest. The distinctive feature however, was the fact that $\frac{2}{3}$ of the DMF teeth index was made up of missing teeth.

In summary, for all 3 age groups, DMF teeth scores for Canterbury were amongst the highest in any of the surveyed regions. For students and children the F component of the DMF teeth index was consistently the highest in any of the surveyed regions, while for adults

the outstanding feature was the very high percentage who had lost all of their natural teeth.

THE SCHOOL DENTAL SERVICE RESPONSE AND PROGRAM MODIFICATION

These results provided cause for reflection and have been a major stimulus for modification of the school dental service program. Although the results of the study were for 1 area of New Zealand the school dental service response was a national one. It was recognised that the level of dental disease in young people is only one of the factors involved in tooth loss in adults but the adult tooth loss along with the high DMF teeth scores in children and adolescents resulted in the establishment of an initial objective defined as a need to reduce the mean number of decayed, missing and filled teeth for both primary and permanent dentitions (Hunter-1980).

The first step in program modification was to establish a national target for the school dental service for 1977. This was to reduce the need for fillings by 10% (Hunter-1980). Because of differences in caries prevalence in different areas, each dental district prepared its own program to meet the target. District planning was an innovation for the school dental service, which had previously been organised with uniform national policies. While each district prepared its own program, several suggestions were made to help districts in planning and other modifications were made to the national program.

Preventive Appointments

The first suggestion made was that of a preventive appointment. The purpose of the appointment was defined as education and motivation of the patient in personal practices conducive to oral health; the provision of clinical preventive measures; and detection

of disease. The concept of a preventive appointment has frequently been advocated in dentistry. Although the aims of the appointment were thought largely to be met by existing school dental service procedures, prevention needed to be given added emphasis, both for the patient and for the school dental nurse. This was attempted by concentrating the preventive care into 1 appointment, an appointment in which no curative treatment was carried out (Hunter-1980).

The activities for the suggested appointment were: oral prophylaxis; examination and diagnosis; topical application of fluoride for children whose homes were not serviced by fluoridated water; and oral health counselling.

It was emphasised, however, that prevention was not limited to the preventive appointment, that opportunities for reinforcement existed during a course of treatment and that classroom oral health education activities were not displaced (Hunter-1980).

Criteria for Diagnosis

The second suggestion was that criteria for diagnosis of caries be reviewed (Hunter-1980). In New Zealand in the past, both dentists and school dental nurses regarded a catch on an unfilled interproximal surface as proof of the presence of caries while similarly, on an occlusal surface, if the explorer caught in the crevice, the area was presumed to be decayed. There has been a gradual shift away from this approach over several years. Because of the widespread use of fluoride, there is now discouragement within the school dental service of early operative treatment of carious lesions. The carious process is usually irreversible when it reaches dentine and this is now taken as the point when a cavity should be prepared. The clinical problem is to decide when the carious process has reached the dentine and the need for a thorough and painstaking clinical examination is

highlighted. Questionable lesions receive topical fluoride treatment and are left without fillings for 3 to 6 months and then checked again for progression (Hunter-1980).

Other Modifications

Other modifications that have been made to the school dental service program include:

- . The approach to oral health education, by placing emphasis on individual counselling and also attempting to increase parental involvement;
- . Introduction of a personal prevention program for student dental nurses;
- . Intensification of continuing education courses for school dental nurses; and
- . Initiation of a continuing survey program to monitor child oral health.

Over the 1st year of target setting the mean number of fillings per child per year fell from 3.33 to 2.44, a reduction of 27% and well in excess of the target of a 10% reduction (Hunter-1980).

Further Modification

Despite the success of the program the experience of the 1st year suggested some further modifications. Because of differences between district and between clinics in the average number of fillings per child per year, a common target for all clinics was inappropriate. 1978 targets, therefore were set at 3 levels, a national target of a 10% reduction in the need for fillings and depending on local conditions, a district target and a target for each clinic. This modification required all staff to participate in target setting (Hunter-1980).

A second change was that the preventive

appointment which, for the 1st year was a recommendation only, became mandatory. Now every school dental service patient has preventive appointments at regular intervals, normally every 6 to 7 months.

During the 2nd year of target setting the mean number of fillings per child per year fell by 19% in the year to 1.97, an overall reduction in the 2 years of 41%.

PREVENTIVE PHILOSOPHY

Views put forward by Hunter (1980) have been supported by Nash (1980) who claims that since 1976 there has been a major reemphasis on preventive measures rather than restorative therapy in the school dental service. He cites the following examples:

- . All children enrolled (98% of the child population) receive personal and classroom home care instruction;
- . School dental nurses are being trained as preventive educators as well as restorative therapists;
- . There is a remarkable consistency in philosophy throughout the school dental service, a dedication to prevention and maintenance of oral health rather than the 'drill and fill' orientation of previous years;
- . Periodic topical fluoride prophylaxis is a norm;
- . Fluoride tablets are distributed in school districts that are not fluoridated (54% of the population has fluoridated water);
- . There has been a sharp decline in the number of fillings required by the average child - from 5 fillings per year in 1965 to 2 fillings per year in 1978.

The health authorities in New Zealand have recognised certain shortcomings in their system and have made a dramatic and effective change in direction.

INFLUENCE ON OTHER COUNTRIES

Starting with Malaysia in 1949 (Public Dental Health in N.Z. - 1967) many countries are currently developing and utilising New Zealand type auxiliary personnel to meet the demands and needs of the school children for oral health care. The duties of these auxiliaries are usually modified and adapted to meet the local conditions. These countries include: Australia, Canada, (Saskatchewan and Fort Smith), Great Britain, Indonesia, Papua New Guinea, Singapore, Sri Lanka, and Thailand (World Dental Therapy Schools-1979).

5.2 THE AUSTRALIAN SCHOOL DENTAL SCHEME

The school dental scheme was initiated in 1973 following agreement between the Commonwealth and the States concerning the Commonwealth's proposal to provide assistance in the development of an Australia-wide Scheme (School Dental Scheme, Evaluation and Statistical Data - 1977, Annual Report of Director-General of Health 1972/73, 1973/74).

The present aim of the Scheme is to provide free oral health care for school children up to the completion of primary education, and thereby in the long term improving the oral health and dental awareness of the community (Annual Report of Director-General of Health 1979/80). Prevention and oral health education are basic principles of the Scheme and these are integrated as far as possible with the treatment program (School Dental Scheme, Evaluation and Statistical Data - 1977). Included in the guidelines for the Scheme are:

- . The service is based on the training and employment of dental therapists working under the general direction and control of dentists;
- . Dental care is provided without direct cost to the parent;
- . The provision of treatment by dental specialists is not included in the treatment program;
- . Dental care is provided in clinics established either in or close to the primary school wherever possible; and
- . The scheme is subject to evaluation to assess its effectiveness in improving the oral health of children through treatment and prevention.

PROGRAM FORMULATION

Before the Australian Government initiated this national school dental scheme all States/Territories had small school dental services. The first school program using dental therapists was initiated in 1966 in Tasmania. This was followed by South Australia in 1967 (Logan-1978). In 1971 a dental therapy course was established at the Western Australian Institute of Technology (World Dental Therapy Schools - 1979).

In March 1973, the Australian Government announced initiatives in the field of school dental services. The Government acted rapidly in this area and announced the proposal, 'to provide a free school dental service to every primary school child in Australia'. It was emphasised that the Government was not just providing a service for children with bad teeth, the program was a 'preventive program to prevent and completely eradicate dental disease' (Hansard, G.G. Speech - 1973). In his speech the Governor-General (Hansard-1973) also stressed that, 'it was not unreal to expect that within a few years under this scheme dental caries will become a scarcity in Australia'. He also announced that as the 1st step towards establishing a national school dental scheme the Government had decided 'to send some girls to New Zealand for training as dental therapists'. This was not to be taken to mean that the New Zealand Scheme was the answer to everything. The Governor-General stressed that the scheme which had operated in South Australia for some years was the best of all schemes and he hoped it would become the prototype for all school dental schemes which were operating throughout Australia. He further commented that 'rather than follow the New Zealand Scheme too closely, I hope that the scheme to be introduced throughout Australia will become one of our own and will closely follow that of South Australia' (Hansard-1973).

PROGRAM ADOPTION

A meeting was held in Canberra in March 1973 to present the Commonwealth's proposals for the development of school dental services throughout Australia (The Annual Report of the Director-General of Health - 1972/1973). The meeting included representatives of Commonwealth, States and Territory Health Departments, Commission on Advanced Education, Commonwealth Department of Education and an observer from the New Zealand Department of Health. The meeting aimed at reaching consensus on a wide range of aspects of the proposed services and to agree on a possible plan for their development. Under the agreed arrangement, the relevant State authorities are responsible for the actual implementation and the administration of the services and the Federal Government, in addition to providing part of the funds to implement and continue the scheme, is responsible for providing overall leadership and co-ordination of the scheme through the Commonwealth Department of Health (Annual Report of Director-General-1972/1973).

PROGRAM IMPLEMENTATION

Once the guidelines were clearly formulated and adopted, the next step was to implement the broad policies. The financial support to the States for the implementation and operation of the new Scheme commenced in July 1973 and States undertook to develop the services along the guidelines agreed between the State and the Commonwealth Governments (Annual Report of Director-General of Health-1973/1974). Initially, priority was given to the establishment of training facilities for dental therapists. In 1981, there are 9 dental therapy schools (total graduating capacity of 390) situated in various States each providing a 2 year course. With this development more manpower has become available leading to expansion in school dental clinics, both mobile and static.

In most States the regional dental officer performs annual oral examinations for children in the 1st grade and in alternate grades (3, 5 and 7). He must approve all treatment plans, but the therapist performs screening at such mid-year recalls as seem necessary, and annually for children in grades 2, 4 and 6. The dental officer performs any dental treatment for children that is beyond the scope of the therapist. He makes a quality control check and counsels the therapists at the 3rd, 5th and 7th grade recall examinations and sees their work on many other occasions as well.

In school dental clinics reclining chairs are used and the operators are seated for every aspect of work except extractions. Dental units with high speed equipment are used routinely by dental therapists. The typical deployment within a given area usually involves a regional dental officer, who works with 2 dental therapists and 2 chairside assistants in a 3 chair clinic. He supervises 2 satellite clinics, at which 2 therapists and 1 dental assistant work. Many regional and satellite clinics have been established. The service is basically staffed by dental therapists, who work under the supervision of a dental officer.

The scope of activity and course of training of the dental therapists in Australia has been modified in several respects from that of school dental nurses in New Zealand (Tables 5, 6, 7 and 8). Duties of dental therapists within Australia may vary slightly from State to State (Table 8). The Australian dental therapists (except those trained by the Western Australian Institute of Technology) work only for the Government. This limitation is written into statutes (World Dental Therapy Schools-1979).

The Western Australian Institute of Technology trains dental therapists, who are permitted by law to work for a private dental practitioner as well as in

government service in Western Australia (Logan-1978, World Dental Therapy Schools-1979). Whether such an auxiliary should be permitted to work in private practice has long been a matter of dispute. Most Australian States and the Australian Dental Association (along with other countries) have shown a reluctance to extend the work of the therapist into private practice (Logan-1978).

The Australian School Dental Scheme is now operating in all the States/Territory and in 1981 about 43% of the primary school children are covered by the scheme.

PROGRAM EVALUATION

The evaluation and assessment of the Scheme is in 3 general areas (School Dental Scheme, Evaluation and Statistical Data-1977).

- . Dental health of children under the care of the Scheme. Included in this aspect of the study are details concerning the number of children covered by the scheme.
- . Studies concerning dental therapy manpower have been planned to provide information on matters such as the rate of resignation of therapists, the length of service of therapists, the numbers of therapists resuming employment in the school dental service after a period of resignation, and related matters.
- . An overview of the scheme is maintained with regard to expenditure. Apart from presenting information showing the actual expenditure from year to year on the various aspects of the scheme (for example, capital costs, costs of training therapists, cost of operating the school dental clinics), monitoring of the

program includes matters such as the cost per year for each child covered by scheme on a State and national basis.

The first year for which full statistical data is available is 1977, and in that sense will provide the base-line against which future changes may be measured. While the evaluation program was planned in 1975, it was not until 1977 that all States and Territories were submitting statistical data (School Dental Scheme, Evaluation and Statistical Data-1977).

The greater part of the work of the school dental scheme is related to dental caries prevention and oral health education. Clinical evaluation is directed primarily at observing changes in caries incidence, the number of teeth extracted, the number requiring extraction and the number of teeth filled. Oral hygiene and calculus are also included as a means of measuring changes resulting from the oral health education and oral hygiene programs.

The criteria for evaluation is based on the World Health Organisation (WHO-1971) document 'Oral Health Surveys'. This basic protocol was considered and agreed to by the Australian Dental Services Advisory (ADSAC) on which the Commonwealth, States, Northern Territory, the Australian Capital Territory and the Australian Dental Association are represented (Annual Report of D.G.-1973/1974).

A basic principle in the design of the program is that the evaluation should not be time-consuming at the clinic level; furthermore, the evaluation and treatment programs are integrated as closely as possible (School Dental Scheme, Evaluation and Statistical Data-1977).

The statistical data is provided from the normal examinations carried out in the school dental clinics. This material is transferred to statistical collection sheets which are forwarded by the State and Territorial Health Authorities for computer processing by the Automatic Data Processing (ADP) Branch of the Commonwealth Department of Health (School Dental Scheme, Evaluation and Statistical Data-1977).

AUSTRALIAN DENTAL SERVICES ADVISORY COUNCIL (ADSAC)

In order to facilitate the most effective development and co-ordination of the school dental services, an advisory body, the Australian Dental Services Advisory Council, has been established with representation from the Commonwealth Government, the States, the Australian Capital Territory and the Australian Dental Association. The Council advises the Federal Minister for Health on all aspects of the school dental scheme and related matters (Annual Report of DGH-1973/1974). In the initial stages the Council had 4 specialist Committees:

- . Equipment, Materials and Building Committee;
- . Auxiliary Dental Personnel Training Committee;
- . Field Operations Committee; and
- . Evaluation and Review Committee.

As the school dental service is now substantially developed and the general aspects of the scheme has been well defined and accepted, the Council has now reduced the Committees to 2. The reconstituted standing Committees are (Annual Report of DGH-1977/1978):

- . Field Operations and Training Committee;
- and
- . Evaluation and Review Committee.

The Council and its committees provide a valuable forum for discussion, overall planning and general co-ordination which have contributed to the harmonious and rapid development of a unified service (Annual Report of DGH-1974/1975). The Dental Health Branch provides secretarial support in the preparation of reports for the Council and its committees.

CONTRACT FOR MAJOR DENTAL EQUIPMENT

The Commonwealth Department of Health, (through the office of the Purchasing Commission), negotiates with manufacturers for the bulk supply of major items of dental equipment for school dental services. Each State authority purchases its own supplies at the negotiated prices (Annual Report of DGH-1974/1975 and 1975/1976).

CLINICAL CONFERENCE

The Annual Clinical Conference of the school dental scheme is held regularly as arranged jointly by the Commonwealth Department of Health and the State Department of Health. The aim of the Conference is to provide an opportunity for the free exchange of knowledge, opinion and experience, thus enhancing the work and development of the school dental services (Report of the 2nd and 3rd Annual Clinical Conference of the Australian School Dental Scheme, 1979 and 1980). The Conference has no specific planning role. Participants, including dental therapists, are drawn from Commonwealth State/Territory/and the Australian Dental Association.

TABLE 7

DENTAL THERAPY - AUSTRALIA

SUBJECTS TAUGHT*

- . Community Dentistry
- . Art
- . Histology
- . Anatomy and Physiology
- . General Pathology and Microbiology
- . Oral Pathology
- . First Aid
- . Dental Medicine
- . Dental Anatomy
- . Operative Dentistry
- . Radiography
- . Orthodontics
- . Clinical Dentistry for Children
- . Clinical Duties

Note* Based on South Australia
Subjects can vary slightly from
State to State.

SOURCE: World Dental Therapy Schools
1979

TABLE 8DENTAL THERAPY - AUSTRALIALIST OF DUTIES*

- . Examination of the patient, including the exposure of bite-wing radiographs.
Recording of dental caries and gingivitis and the planning of treatment appropriate to these conditions. Consultation with the dentist regarding other abnormal conditions that are observed.
- . Control of dental caries by the excavation of softened dentine and insertion of temporary fillings.
- . Dental prophylaxis and topical application of fluoride.
- . Instruction of patients in diet, oral hygiene and other matters that are related to dental health.
- . Exposure and processing of intra-oral radiographs on request from the dentist.
- . Injection of local anaesthetics using the inferior dental nerve block and supra-periosteal infiltration techniques.
- . Preparation of cavities in primary and permanent teeth and the restoration of those teeth with composite resin or silver amalgam, using retentive pins in posterior teeth when necessary.
- . Mummification treatment of the exposed vital pulp in a primary tooth.

- . Provision of emergency treatment for the exposed pulp in a permanent tooth by pulp capping and placement of a sedative temporary filling. The patient must be referred to the dentist.
- . Application of rubber dam for all composite resin restorations and pulpotomy operations; and for amalgam restorations whenever the dam can be applied readily.
- . Polishing of restorations.
- . Extraction of primary teeth at the direction of the dentist.
- . Impressions and study casts of the teeth.
- . Application of fissure sealants.
- . The fabrication and fitting of mouth guards.
- . Other duties include:-
 - Accurate maintenance of clinical records.
 - Requisitioning and receipt of clinical stores.
 - Instruction of dental nurses in their responsibilities and duties; for example, cleansing, sterilization and maintenance of instruments, manipulation of dental materials and care of equipment.
- . Dental health education is a fundamental component of school dental care. Therapists must endeavour to prevent dental disease by encouraging behaviour more favourable to health. Education may be directed towards children in groups and on an individual basis; programs should include parents, teachers, canteen supervisors, and other community groups.

- . Therapists should inform parents of the plans for treatment and prevention of dental caries and gingivitis in their children.
- . Appointments should be made to discuss these matters, and to explain to parents the importance of their role in maintaining their children's oral health.
- . When parents need information concerning standards of oral hygiene and diet for their children, therapists should be ready and willing to advise them.
- . When parents inquire about other matters concerning children's oral and general health, e.g. malocclusion, oral development or general systemic disorders, their inquiries should be directed to the dentist.
- . In making an appointment for parents with the dentist concerning such matters, a brief note on the reason(s) for the consultation should be entered in the patient's record book.

Note* Based on South Australia
Duties can vary slightly from
State to State.

SOURCE: South Australian Health Commission,
Dental Health Branch-1980
(Personal Communications)

TABLE 9WESTERN AUSTRALIAN INSTITUTE OF TECHNOLOGY (WAIT)LIST OF DUTIES OF DENTAL THERAPISTS

The duties of the Western Australian Institute of Technology trained dental therapist are not restricted to the treatment of children. The therapist is permitted to carry out treatment on adult patients in accordance with the list of duties, with the exception of cavity preparation. However, the therapist may complete the restoration of teeth in which the cavities have been previously prepared by the dentist.

The therapist works under the direction of a dentist who is responsible for the diagnosis and treatment planning for every patient and who delegates by prescription the work to be carried out by the dental therapist. Duties include:

- . Dental health education;
- . Pre-operative and post-operative instruction;
- . Dental radiography;
- . Application of rubber dam;
- . Irrigation of the mouth and removal of sutures;
- . Topical application of solutions;
- . Scaling and polishing of teeth;
- . The control of haemorrhage;
- . Taking of impressions for study casts;
- . Administration of infiltration and inferior dental nerve block local analgesia;

- . Extraction of loosened deciduous teeth;
- . Preparation of cavities in deciduous and permanent teeth in children up to school leaving age;
- . Restoration of prepared cavities in deciduous and permanent teeth in both child and adult patients, with amalgam, cement and plastic material;
- . Emergency treatment of pulp exposure, including pulpotomy in deciduous teeth.

NOTE: The training of therapists is carried out on school children who are transported to the clinic by bus. Adult patients may seek treatment at the clinic by appointment.

SOURCE: World Dental Therapy Schools-
1979.

TABLE 10WESTERN AUSTRALIAN INSTITUTE OF TECHNOLOGY (WAIT)SUBJECTS TAUGHT - DENTAL THERAPY

- . Histology
- . Oral Histology
- . Human Biology - Physiology
 - Anatomy of the Head and Neck
- . Microbiology
- . Oral Microbiology
- . Clinical Chemistry
- . Psychology
- . Pathology
- . Oral Pathology
- . Health Sciences Communication
- . Dental Technology - Dental Materials and Dental Anatomy
- . Preventive Dentistry
- . Clinical Dentistry - Restorative
 - Periodontics
 - Radiography
 - Exodontia (deciduous teeth)
 - Local Anaesthesia

SOURCE: World Dental Therapy Schools
1979

THE IMPACT OF WHO INTERNATIONAL COLLABORATIVE STUDY

The results of WHO International Collaborative Study in Sydney showed that the DMF rate of Sydney 13-14 year old children had fallen from 10.8 (in 1954) to 6.7 (in 1973) (Barmes-1977), showing that prevention and oral health education can be effective in the oral health care program (Woolley-1980).

A working party has been established by the Australian Dental Association (ADA) to consider the impact on oral health and oral health services of this study. It appears that as dental caries is controlled through prevention and treatment there would be a need for change in emphasis in planning and the duties performed by dental therapists within the school dental service. This survey would provide stimulus for modification of the school dental service program. Likely changes would include, reconsideration of the criteria used for diagnosis of caries, review of manpower planning; particularly in relation to training and utilisation of dental therapists.

Fluoridation was introduced in Sydney's reticulated water supplies in 1968 (Woolley-1980, Fluoridation of water in Australia 1980). Woolley (1980) claims that up to the establishment (in 1962) of the Dental Health Education and Research Foundation, the philosophy and practice of preventive dentistry was almost unknown in Australia.

COMPARISON BETWEEN AUSTRALIAN AND NEW ZEALAND PROGRAMS

- . School dental clinics as have been built in Australia reflect a somewhat different philosophy than those in New Zealand. Clinics are on a larger scale and often include operating facilities for a dentist who is assigned clinical, teaching, and supervisory functions in a cluster of clinics.
- . In contrast to New Zealand, Australian dental therapists are trained to work with assistants (Logan-1978).
- . In New Zealand all primary and intermediate schools built for 450 or more pupils have a small permanent field clinic that are either free standing or attached to the main school building. They are designed to accommodate 2 school dental nurses and are usually equipped with some fixed installations and some portable equipment. Schools for 250-400 pupils have smaller clinics, designed for part-time use by a single nurse. There are also mobile clinics by the New Zealand service has found it more economical to work with static clinics (Logan-1978).
- . In New Zealand the dental officers are primarily concerned with continuing training and quality control of clinical work. As dental nurse supervisors they visit the clinics periodically to advise on clinic maintenance, work organisation and recording procedures (Logan-1978).

- . The scope of activity of the dental therapist in Australia broadly resembles that of school dental nurse in New Zealand, except that Australian therapists are trained to take and interpret x-rays. The Australian auxiliary is under much closer dentist control than her New Zealand counterpart, however, as can be seen from the ratio of 1 dentist to 8 therapists in Australia compared with 1 dentist to 60 nurses in New Zealand (Logan-1978). School dental nurses work under remote supervision of district dentists and dental nurse supervisors.
- . For the great majority of Australians, comprehensive dental services is offered only through private practice, on a direct fee for service basis. Government involvement has not been as extensive as in New Zealand (Logan-1978). Federal Government's involvement in the delivery of oral health care increased in 1973 with the election of a Labor Government, Australia followed the lead set by New Zealand in developing an operating auxiliary service for primary school children. In this year an Australia-wide school dental scheme was initiated through Commonwealth of State Co-operation. From July 1981 the Liberal Federal Government involvement in the Australian School Dental Scheme has ceased with the discontinuation of specific purpose grants to the States for their school dental services. In New Zealand basic oral health services are provided for the majority of population. They are the school

dental service for the children, the social security (Dental Benefits) program for adolescents and private practitioners for adults (Logan-1978).

NOTE ON THE FUTURE OF SCHOOL DENTAL SERVICE

From 1 July 1981 the Commonwealth Government has decided to transfer the school dental scheme to the States. From this date there are no specific purpose grant to the States for the school dental service. These are now absorbed in general revenue grants.

These changes are likely to affect ADSAC and its Committees, but the details are not yet finalised. In effect this means that the State Health Authorities will have to compete with other areas for funds. Similarly, the dental services will have to compete with other health services for funds.

These events would lead one to believe that the future of school dental services in Australia does not auger well.

5.3 THE ORAL HEALTH TEAM

The concept of oral health team is the most significant step put forward in recent years to overcome the shortage of dental manpower and to increase productivity.

The dentist is the head and director of the team. He is the most highly trained and skilled person in the team and his abilities must be reserved for those tasks for which he alone is fitted. He is then less concerned with routine replacing of lost teeth or of portions of teeth, and more with oral diagnosis, being also trained in specialised technical skills and the ability to assess medical problems concerning the oral health and to keep abreast of modern advances in science by continuing and post-graduate education. Around him is centred a team of auxiliaries which can attend to the less exacting and repetitive oral and dental care requirements of the child patients, and has the time for prevention and oral health education, both at individual and a community level. An interesting by-product of this approach is the increasing number of dentists who undergo post-graduate training in public dental health measures to enable them to plan and supervise such activities.

The difficulty however, remains in developing countries, of producing dental auxiliary personnel of the right type/s and in adequate numbers to make the 'oral health team' a practical reality.

GENERAL PRINCIPLES

If the dentist is to delegate some aspects of patient care to members of the oral health team

then certain principles must be observed (Newbury-1970):

- . Auxiliary personnel are complementary to and not a substitute for the dentist. By the word 'auxiliary' is meant all forms of subsidiary dental personnel who are of assistance to the dentist. Such persons have less than full professional qualifications.
- . The direction and supervision of auxiliary personnel must be vested in the dentist. In the team concept a ratio of 1 dentist to about 5 operating auxiliaries is considered reasonable.
- . Auxiliary personnel must be accorded proper recognition, status and conditions of employment.
- . The dentist must be responsible for all the activities carried out by auxiliary personnel under his direction and/or supervision.

MEMBERS OF THE TEAM

At this point it would be appropriate to describe each member of the oral health team in a little more detail. Many papers have been written on this subject (Barnes-1969, Newbury-1970&1975, Craig, J.W.-1970, Trainer-1973, Elderton-1974, Roder-1978, Dunning-1979, Bezroukov-1979, Torres and Ehrlich-1980).

DENTAL ASSISTANT

These auxiliaries, mostly females, have a role in dentistry similar to the Operating Theatre Assistant in Medicine and the duties they perform are essential for the efficiency of the dentist. A list of their duties includes:

- . Established procedures associated with chairside assisting and practice or clinic management.

- . Oral Health Education.
- . Dental Radiography for intra-oral dental examinations.
- . Application of rubber dam.
- . Irrigation of the mouth and removal of sutures.
- . Pre- and post-operative instructions.

The general consensus of opinion seems to suggest 12 months full time training in a dental hospital, a technical college, or a general hospital, where dental treatment is routinely given (Newbury-1970). However, some training still continues to be given at a private practice level.

DENTAL (ORAL) HYGIENIST

These are skilled technicians and health teachers. The majority are females, but opportunities do exist for male hygienists in specific areas such as the armed services and in some countries in government service. A listing of their duties includes:

- . Established procedures associated with chairside assisting and practice or clinic management.
- . Application of rubber dam.
- . Irrigation of the mouth and removal of sutures.
- . Pre- and post-operative instruction.
- . Topical application of fluoride solutions.
- . Scaling and polishing of teeth and restorations.
- . Impressions for study casts.
- . Insertion and removal of surgical packs.
- . Removal of orthodontic bands by hand instruments.
- . Dental radiography for intra-oral dental examinations.
- . Oral Health Education.

The hygienist is trained basically for use in private dental practice, although many are employed in government hospitals, clinics and similar institutions. The period of training seems to vary from 1 year, as in United Kingdom and India, to a more general period of 2 years as in the United States of America (Newbury-1970). Davies (1980) contends that in many parts of the world - dental hygienists are over-trained and over-educated for the limited procedures they are permitted to undertake. This view is supported by Lobene (1979). Training is usually undertaken in Junior or technical colleges and occasionally in the universities.

SCHOOL DENTAL NURSE/DENTAL THERAPIST

These are usually female personnel confined to government employment and working under the supervision of a dentist (Newbury-1970). Their training and range of duties have already been described.

THE EXPANDED-DUTY DENTAL AUXILIARY (TECHNOTHERAPISTS) (EDDA)

For some time now (with the New Zealand school dental nurse plan as an example), experimental efforts have been made in USA to train dental auxiliaries to perform operations of a limited nature in the mouths of patients as a member of oral health team. Dental assistants have been chosen for these trials, and the duties have involved those procedures which were generally agreed to be reversible - that is; they could be either corrected or redone without undue harm to the patient's health (Dunning-1979). The assistants would not prepare cavities or make decisions as to pulp protection after caries had been excavated, as do the New Zealand school dental nurses, and the Australian dental therapists, but would work alongside the dentist and take over routine restorative procedures as soon as the cavity preparation and base had been completed by the dentist (Dunning-1979).

THE DENTIST (DENTAL SURGEON, STOMATOLOGIST)

The philosophy of the oral health team necessarily requires that the education and training of all types of auxiliaries and ancillary personnel is also borne in mind whenever dental education planning is considered (Horsnell-1976). He argues that:

--- thoughtful consideration of the dental team makes it clear that variations in composition of the teams will be required to cater for the varying needs of different communities. Also, when the dental status of a community has changed there will be a need for a change in the make-up of the teams servicing that community. Therefore, future calculations of dental manpower must be made on the basis of 'teams' rather than on the number of dentists.

--- Therefore the future dentist will need to be a competent diagnostician, a capable operator, an effective team leader and, importantly, a good health counsellor. As leader of the team he will, of course, require well developed skills in dental matters such as diagnosis and treatment planning and particular expertise in some area(s) of dental treatment, but he will also need to be a mature person with knowledge of management and training.

CHANGES IN UNDERGRADUATE DENTAL COURSE

In the past the student has been taught a great deal about dentistry but almost nothing about people (Warren-1977), as quoted by Davies-1980). The introduction of subjects such as Sociology and Psychology would do much to improve the students

understanding of people and their environment and will assist towards meeting the dentists need as a team leader as well as helping him in his relationship with his patients and the community.

The curriculum of many dental schools is constantly under review and in most schools adjustments and re-arrangements are frequently made (Horsnell-1976). Nevertheless, with the advent of the oral health team, the introduction of private health insurance schemes and the development of community health centres, and with the foreseen increased responsibilities which the future dentist will have to accept, it is inevitable there must be changes made in the undergraduate dental course, as well as the provision for continuing education of the dental surgeon and his supporting staff (auxiliaries) Davies (1976) points out that:

Professions exist to satisfy social needs or aspirations. They need to readjust themselves continually to changes in technology, in professional outlook and in the needs and demands of society. Any comprehensive aim of dental education should reflect the interests of both the profession and society. But society is a community of individual people.

Whenever possible there should be early student-patient contact. One of the very great weaknesses in the conventional dental curriculum is that students do not come to grips with what they regard as the real business of dentistry until the 3rd or 4th year. Yet dentistry's major task is caring for people. Given the opportunity, students greatly appreciate early patient contact (Davies-1976).

Other subjects such as dental materials science may be dealt with later than at present. It is conventional for this to be taught to 2nd year

students. However, Allred and Slack (1968) point out that at the University of London it forms part of the 4th year curriculum. Clinical experience of all the materials studied has already been gained with certain principles of use dependent on their properties. Thus the scientific study of these materials at this stage becomes more than just an academic exercise.

Community dentistry or dental public health is still a neglected subject in some dental curriculum. If we believe that the ultimate test of dental education is the extent to which the dental profession improves the oral health status of the population as a whole then we need to give it greater recognition (Davies-1976).

Diefenback (1973) has proposed the following changes:

- . The concepts of preventive dentistry should permeate the entire curriculum;
- . The efficient utilisation of auxiliaries performing expanded functions should be an extensive feature of dental education;
- . Repetitious piece-work and procedures rarely used in private practice should be reduced or eliminated;
- . Dental Schools should provide clinical experience for students in the community by operating extensive clinics outside the school.

The provision of regular oral health care, the effect of fluoridation and oral health education is likely to result in a substantial increase in the demand for orthodontic treatment and periodontal care as people retain their natural teeth for a longer period. Therefore, there will be greater need for specialist training in these fields as well as more emphasis on these aspects in the undergraduate course.

Prevention is cheaper than restorative care.

It is not enough to take steps
which may some day lead to a goal
each step must be itself
a goal and a step likewise.

- Goethe.

PREVENTIVE PROGRAMS

6. PREVENTIVE PROGRAMS

6.1 METHODS OF PREVENTION OF DENTAL CARIES

Studies have shown that routine dental treatment, although it may reduce the loss of teeth, does not reduce the occurrence of oral diseases (WHO - 1980). Moreover, dental treatment exposes patients to possible iatrogenic harm. Further, a tooth with a restoration is still at risk to additional attacks of dental caries and to inflammation of its supporting tissues.

Moller (1979) has suggested a categorization strategy for prevention of oral diseases based upon disease levels (Table 11) as they have been identified in various countries. The application of these general proposals must be adjusted according to local conditions.

At present there is little doubt that dietary carbohydrates, especially sucrose, play a key role in caries etiology. Of all the diseases of the mouth, dental caries is at present the most preventable.

COMMUNITY WATER FLUORIDATION

Communal water fluoridation ranks with vaccination, pasteurization of milk and chlorination of water supplies as a tremendous step forward in promoting public health (Newbrun - 1980). Fluoridation entails the adjustment of natural levels of fluoride in a water supply to the concentration shown by epidemiological and laboratory studies to be optimal for a particular climatic zone (Craig - 1980). For temperate zones the optimal fluoride level is 1.0ppm. Today the most feasible way to prevent dental caries is to increase the tooth's resistance to decay. The best individual and public health defence against dental decay is the proper use of fluorides. Fluoridation of community water supplies is the least expensive (Melbourne about 40c, USA - 13 to 18c: annual cost per capita) and most effective way to provide

TABLE 11PREVENTION OF ORAL DISEASES BASED UPON DISEASE LEVEL

DISEASE LEVEL	TREND	PREVENTIVE APPROACH
Very low to low	Stable	. None (surveillance);
	Increasing	. Dental health education; . Improvement of oral hygiene; . Dietary counselling.
Moderate	Decreasing	. Dental health education; . Improvement of oral hygiene;
	Stable	. Dietary counselling; . Community programs;
	Increasing	. School programs.
High to Very High	Decreasing	. Reinforcement or supplementation of existing preventive programs;
	Stable	. Dental health education; . Improvement of oral hygiene;
	Increasing	. Dietary counselling; . Community programs; . School programs; . Individual approach; . Combination programs.

SOURCE: Moller, I. - 1979

fluoride to large groups of people (NH & MRC-1979, Report of the Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980, Newbrun-1980). In these days of escalating health costs, water fluoridation remains one of the few bargains. To cost conscious politicians the cost must be an effective argument in favour of fluoridation.

There is 'massive evidence' to show that fluoridation at recommended levels has no harmful effects on the health of the community, and assertions that toxic, carcinogenic, mutagenic, teratogenic or allergenic effects on humans are not supported by sound scientific evidence (Report of the Committee of Inquiry into the Fluoridation of Victorian Water Supplies-1980).

Optimal adjustment of the fluoride concentration of community water supplies should be the foundation for all national programs of oral health because this public health method is nearly ideal (Newbrun-1979, Horowitz-1980). First and foremost, community fluoridation is highly effective (Newbrun-1979); many studies throughout the world have shown that children who consume optimally fluoridated water from birth have from 50-60% less dental decay than they would have experienced without fluoridation (WHO-1980, Report of the Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980. Newbrun-1980). Consumption of fluoridated water is eminently safe when practiced at 1 ppm of fluoride (Royal College of Physicians of London-1976, NH & MRC-1979, Newbrun-1980, Report of the Committee of Inquiry into Fluoridation of Victorian Water Supplies-1980).

No other health measure has been the target of more critical analysis than fluoridation of water supplies (Horowitz-1980). Fluoridation of communal water supplies is based upon extensive and thorough epidemiological studies in many parts of the world. Concomitant with a reduction in tooth decay is a dramatic drop in tooth mortality.

The entire community benefits from the procedure, regardless of socio-economic level, educational achievement, individual motivation or the availability of dentists. No co-operative effort or direct action need be taken by those who will benefit. Moreover, the improvement in dental health continues for life if consumption of fluoridated water continues (Murray - 1976, Report of the Committee of Inquiry into the Fluoridation of Victorian Water Supplies - 1980). A recent report shows that the life-long consumption of fluoridated water also significantly lowers the prevalence of root surface caries (Horowitz - 1980).

Although the benefits of community fluoridation are impressive, the procedure is not a panacea for dental caries. Unfortunately, its implementation is limited to areas with reticulated water supplies. Obviously, the existence of fluoridated water is not a license for unrestricted consumption of sweet, sticky foods between meals or for abandoning oral hygiene procedures.

SCHOOL WATER FLUORIDATION

In areas without fluoridated community water supplies it is possible to fluoridate school water supplies, which lowers the prevalence of dental caries by approximately 40% (Table 12) (Newbrun - 1979, Horowitz - 1980). This method, like community fluoridation, does not require individual action. Because children consume only part of their drinking water while at school, higher concentrations of fluorides are used for school fluoridation than for community fluoridation. A fluoride concentration of 4.5 times that appropriate for community fluoridation in the same geographic area is currently recommended for school fluoridation (Horowitz - 1980). More than 400 schools in 14 USA States are now fluoridating their water supplies (Horowitz - 1980).

Fluoridation of school water is almost as economical as communal water fluoridation, but has the disadvantages that children begin drinking it too late and are exposed intermittently, and that regular, conscientious surveillance is required (Report of the Committee of Inquiry into Fluoridation of Victorian Water Supplies - 1980).

FLUORIDE TABLETS

In communities where the water is fluoride-deficient, dietary fluoride supplementation, beginning shortly after birth, can provide caries protection approximating that achieved with fluoridated water (Murray - 1976, Horowitz - 1980). However, few parents and children conscientiously follow the stringent, daily regimen necessary for maximal caries prevention (Newbrun - 1980, Fanning, Cellier and Somerville - 1980). Therefore, supplying fluoride tablets for children's use at home cannot be considered as effective a public health method as community water fluoridation. Because fluoride tablets purchased in large quantities are inexpensive, a school-based fluoride tablet procedure supervised by volunteers can cost very little. Several studies have shown that dental caries can be reduced by approximately 30%-35% (Table 12) when children use fluoride tablets daily in a school-based program. (Horowitz - 1980).

The National Health and Medical Research Council (NH & MRC - October 1976) in Australia has recommended that in non-fluoridated areas the following dietary fluoride supplements should be taken:

- . At age 0-12 months - 0.25 mg fluoride as fluoride ion daily.
- . At age 12-24 months - 0.5 mg fluoride as fluoride ion daily.
- . At age 24 months and over - 1 mg fluoride as fluoride ion daily.
- . Ideally these supplements should be taken until the age of 18 years.

The Council also recommended that these doses of fluoride be stated on manufacturer's labels and included in their descriptive literature.

PROFESSIONALLY APPLIED TOPICAL FLUORIDES

Hundreds of studies have shown that the incidence of dental caries in children who live where water is fluoride-deficient can be reduced about 30-40% (Table 12) by the application of solutions of 2% sodium fluoride (NaF) and 8% stannous fluoride (SnF_2), solutions or gels of acidulated phosphate-fluoride (APF) containing 1.23% fluoride ion, or varnishes that contain fluoride. Semi-annual applications of stannous fluoride, APF and varnishes are recommended in caries susceptible patients. (Horowitz-1980).

Professionally applied fluoride procedures are inherently too expensive for public health programs because they require a 1-to-1 relation between the provider of the service and the recipient (Horowitz-1980). The shortage of dental personnel in many countries only accentuates the shortcomings of this method of caries prevention.

SELF-APPLICATIONS OF FLUORIDE

In the last decade, several methods of self-applying fluorides have been developed to avoid the drawbacks of professionally administered procedures (Murray-1976, Horowitz-1980). These fall into 6 categories:

- . Solutions or gels applied with a toothbrush;
- . Prophylaxis pastes applied with a toothbrush;
- . Gels applied in trays;
- . Dentifrices;
- . Mouthrinses; and
- . Dietary supplements, such as tablets or lozenges.

Self-application of fluorides may also be carried out at home, as with dentifrices or mouthrinses, or as recommended in the case of dietary fluoride supplements or gel-trays for children with rampant caries. Two of the

procedures, dietary fluoride supplements and fluoride mouthrinsing, are eminently suitable for school-based caries-preventive program (Horowitz - 1980). These preventive methods are carried out in school by children and are supervised, after appropriate training, by non-dental personnel, such as teachers, nurses, teachers' aides or volunteers.

More than 30 clinical trials have shown that mouthrinsing fortnightly, weekly or daily with dilute solutions of fluoride will reduce the incidence of dental caries in children by about 35% (Table 12) (Horowitz - 1980). Fluoride mouthrinsing is not usually recommended for pre-school children because children of this age usually do not have good control of their swallowing reflexes (Horowitz - 1980).

FLUORIDE DENTIFRICES

Many studies have shown that the incidence of dental caries may be reduced by about 20-30% by the use of dentifrices containing fluorides (Murray - 1976, Newbrun - 1979, Horowitz - 1980). Because most people use a dentifrice in conjunction with toothbrushing, everyone should be encouraged to use a fluoride dentifrice with demonstrated anticariogenic effects. The Council on Dental Therapeutics of the American Dental Association currently recognises such dentifrices, namely: Crest, Colgate, Macleans, Aquafresh and Aim. All contain 1,000 parts per million fluoride, although their fluoride compounds and abrasives differ (Horowitz - 1980). Fluoride containing dentifrices, 0.4% stannous fluoride, 0.76% sodium monofluorophosphate or 0.22% sodium fluoride are available (Newbrun - 1979). Australian fluoride toothpastes are listed on Table 13.

PIT AND FISSURE SEALANTS

Adhesive sealants for preventing dental caries in occlusal pits and fissures of teeth fill a special need in caries prevention because fluorides prevent decay less

TABLE 12

EFFECTIVENESS OF VARIOUS METHODS OF
ADMINISTERING FLUORIDES

METHOD	CONCENTRATION OR DOSE	% REDUCTIONS IN DENTAL CARIES
Community water fluoridation	0.7-1.2 ppm	50-65
School water fluoridation	4.5 x's optimum	40
Dietary Fluoride supplements	Depends on age of child and F concentration of water.	50-65
. Home		
. School	2.2 mg NaF	30-35
	0.05% NaF (daily)	20-50
Mouthrinses	0.20% NaF (weekly)	
Dentifrices	0.40% SnF ₂	
	0.76% MFP	20-30
	0.22% NaF	
Professionally applied applications	2.0% NaF	
	8.0% SnF ₂	30-40
	APF (1.2%F)	

SOURCE: Horowitz, H. - 1980

TABLE 13
FLUORIDE TOOTHPASTES AVAILABLE IN AUSTRALIA

BRAND	MASS (G)	LOWEST PRICE PAID (CENTS)	SOLUBLE ^O FLUORIDE (P P M.) +
AQUAFRESH fluoride	95	53	850
CEDEL with fluoride	110	63	790
CHECK fluoride	110	53	820
COLGATE plus MFP fluoride	110	55	710
COLGATE Fluoriguard	110	66	670
EMBASSY fluoride	110	39	720
FLORAN stannous fluoride	85	89	940
IPANA fluoride Mint	100	58	750
IPANA fluoride Double Mint	100	55	680
JACK 'N JILL fluoride (pineapple) *	75	72	700
K-MART Fluoride	140	53	690
KOLYNOS fluoride	100**	49	170
MACLEANS fluoride freshmint	110	66	920
MACLEANS fluoride mildmint	110	56	900
MACLEANS fluoride spearmint	110	69	970
NYAL fluoride	110	52	650
PEPSODENT fluoride	110	58	840
RIGHT START fluoride	90	56	890
SOULS fluoride plus	110	35	760
SOULS stannous fluoride	85	75	840
UNCLE SAM Gleaming Teeth fluoride	100	65	680
WOOLWORTHS fluoride	110	40	790

* also available in banana and raspberry flavours.

** marked 3.5 oz.

^O in the case of toothpaste containing MFP this value includes total P03F2 and F.

+ P P M parts per million (10 000 p.p.m. = 1 per cent)

SOURCE: Choice (Australian Consumers Association) - March 1978. p101.

effectively in pits and fissures than in smooth surfaces (Horowitz - 1980). Various organic polymers that mechanically bond to acid-etched enamel have been widely studied since the first report in 1967 and, so far the reaction products of bisphenol-A and glycidyl methacrylate, or bis-GMA have shown the best retention and caries prevention e.g. Nuva-Seal and Delton (Horowitz - 1980). These 2 products are recognised by the Council on Dental Materials and Devices of the American Dental Association. Adhesive sealants when fully retained form a physical barrier to decalcification by acids.

Regardless of who applies sealants, (dentists or auxiliaries) the procedure is relatively expensive for public health programs because only 1 child can be treated at a time. The consensus to-date, therefore, is that sealants are not cost-effective for public health programs, and may be more expensive than restoring decayed occlusal surface of teeth (Horowitz - 1980). However, this ignores the tangible benefits of avoiding operative dental procedures and preserving the natural structure of teeth.

6.2 METHODS OF PREVENTION OF PERIODONTAL DISEASES

Periodontal disease is a worldwide public health problem. Virtually all adults with teeth show signs of this disease (Sheiham - 1974 and 1979, Barmes - 1977, WHO - 1980). Periodontal diseases, which may begin in childhood, often progresses insidiously without pain, unrecognised by the affected persons and frequently undetected by dentists.

Many studies have shown that periodontal diseases are closely associated with accumulations of plaque (Horowitz - 1980) and reducing accumulations of plaque is at present the best way to prevent the disease or retard its progression.

Unfortunately, no preventive method for periodontal diseases exist that is analogous to fluoridation of water for preventing dental caries (Horowitz - 1980, WHO - 1980).

CHEMICAL METHODS

Various chemical agents and antibiotics have been tested for their ability to remove, disperse or prevent accumulations of plaque. The chemotherapeutic agents include enzymes, quarternary ammonium compounds, chlorhexidine compounds, organophosphorus chemicals, ascorbic acid, oxidising agents, solvents and chelating agents, alcohols and phenol derivatives. Some of these substances have been ingested, and others, applied topically in chewing gum, dentifrices, lozenges and mouthwashes (Horowitz - 1980).

These preparations have weak therapeutic effects, undesirable side effects, or both. Many of the agents are cleared from the mouth too rapidly to be effective, produce transient damage to oral mucosa, stain oral tissues or elicit aberrant perceptions of taste (Horowitz - 1980).

Chlorhexidine digluconate has been studied extensively for the past 15 years. In short term well-controlled studies, its daily use inhibits supragingival dental plaque and gingivitis. Chlorhexidine shows promise as a plaque-control agent but requires full investigation of its undesirable staining and microflora-suppressing effects before it can be considered for long-term plaque control.

Some recent research clearly indicates that fluoride may help to prevent periodontal disease, as well as dental caries, by inhibiting bacterial growth and the polysaccharide formation of acid-production (Horowitz-1980).

Further research is needed to clarify the role of fluorides in preventing periodontal disease.

MECHANICAL METHODS

Because agents that are both safe and effective for routine use are as yet unavailable to control plaque, mechanical removal must be resorted to for control of periodontal diseases. Studies have shown that efforts to control plaque by daily toothbrushing up to 3 years have failed to reduce the incidence of dental caries in children (Horowitz-1980).

The programs upon which any goals for the control of periodontal disease will be based are those promoting or supervising oral hygiene practices or providing routine services such as scaling and prophylaxis, closely linked to health education activities (WHO - 1978 and 1980).

Most public health attempts to prevent periodontal disease have focused on educating the public or instructing individuals to maintain good oral hygiene practices. However, teaching the skills is time-consuming and expensive and so is motivating the people to make the personal daily effort necessary for thorough, mechanical removal of plaque.

6.3 ORAL HEALTH EDUCATION

Oral health education has been described as an integral part of any public oral health program for it is generally accepted as a means of influencing consumer attitudes towards the service being provided (Davies C. - 1974). No matter how comprehensive and efficient the oral health care program for a community may be, it cannot achieve its full potential unless it is based on mutual understanding between those who provide it and those to whom it is directed. The objective of oral health education is to enhance this mutual understanding, for community oral health care is only of significance in the context of a community that cares (Davies C.-1974).

PRIMARY FUNCTION

The primary function of oral health education has been defined as: 'the provision of dental health information to a total population in such a way that people will apply it in everyday living' (Young and Striffler-1969); i.e. 'a person will change his behaviour only when he sees the action as a means to an end which he himself desires' (WHO-1954 as quoted by Davies C.-1974).

Education for oral health has as its first function to transmit information, which will lead to a better understanding of the problems of oral disease, of possibilities of early preventive action and of the advances that are being made in oral and dental research and clinical practice (Davies C - 1974). An informed public can then be instrumental in furthering public health measures such as fluoridation and dietary modifications whether by manufacturers or outlets such as school tuck-shops.

PRACTICAL APPLICATIONS OF RESEARCH

Community oral health education is important to enable the community to reap the full benefit of the services and also the benefit of advances in science and technology all of which depend on active participation of the individual. School children should be given information and knowledge (on fluorides, oral hygiene, diet, dental visits) and taught skills that will enable them to achieve and maintain optimal oral health throughout life. They should actively participate in the program. The knowledge necessary to combat oral diseases is already available. However, the major problem confronting the dental profession is the translation of existing scientific results into action programs. Practical applications of research achievements must be the goal of a public health service. Oral health education is one way of achieving this. Social and behavioural science knowledge is therefore, of vital importance in creating a more positive attitude towards oral health. However, Roder and Burt (1978) have pointed out difficulties of evaluation of oral health education programs which are an important aspect of oral health care delivery system.

METHOD

Technically correct and socially and culturally relevant materials are essential for oral health education. If the members of oral health team really believe that it's not what people know about health, but what they do about what they know that matters, they must move forward as the teaching profession has to accept the 2 way conceptual model in which the professional and the client are co-operative and equal partners in a joint enterprise. In the nursery and junior school systems, where it is easier to instil habits in childhood rather than change them in adolescence, learning should be a creative process in which the role of the teacher has been aptly described as 'learning with each child instead of instructing a passive class, to be a well of clear water into which the children can dip all the time

rather than a hosepipe dowsing them with facts' (Marshall-1966 as quoted by Davies C. - 1974).

NEW APPROACHES

There have, however, been few instances where the traditional type of oral health education has been shown to significantly influence attitudes or behaviour, and fresh approaches to the subject are now being sought (Davies C. - 1974). Dental health campaigns which fail to take into account social and economic circumstances of their target group have been criticised in a monograph published in February 1981 by the Health Education Council of U.K. (BDJ News and Notes - 1981). The report challenges the view that people should be blamed for failing to change behaviour and lists a number of factors which have to be taken into account, these include: a low priority placed on oral health in many families, ignorance of dangers of sugar, mass media advertising which encourages parents to buy sweets and products containing sugar for their children, the public view of snacks, an uneven distribution of health services and contradictory or inappropriate oral health messages given by health educators. The study found that for some deprived groups, 'oral health pales into insignificance compared to pressing problems like finance, employment, child-rearing and housing' (BDJ, News and Notes - 1981).

ORAL HEALTH UNIT

One of the vital steps towards developing a more effective oral health education program is the setting up of a unit with full responsibility for oral health education for the community within the oral health service provided by the government (Wong, H.D.-1973). The oral health education unit should be responsible for planning, directing, co-ordinating and evaluating all oral health educational activities, the training of personnel in oral health, the regular production of oral health educational materials for general distribution, the construction and production of the much needed audio-visual aids for teaching purposes in schools.

Singapore (Wong, H.D.-1973) and South Australia (Mary Inger-1977) have established oral health units to intensify oral health educational activities.

Each Country must make its OWN Plans and Programs.

- WHO, 1980

Children may be Victims of FATE
But they must never become Victims of NEGLECT.

- J.F. Kennedy

FIJI SCHOOL ORAL HEALTH PROGRAM

7. FIJI ORAL HEALTH PROGRAM7.1 FACTORS CONSIDERED IN PLANNING7.1.1 GEOGRAPHICAL AND ECOLOGICAL FACTORSThe Environment

Fiji is a relatively young country, which gained independence from Great Britain on the 10th October, 1970 after 96 years of British rule (Fiji was ceded to Queen Victoria in 1874 by the Fijian Chiefs) (Fiji Today-1980). The country comprises 332 islands, all part of a developing and fast growing nation. The islands vary in size from 10,000 sq. km. to tiny islets a few metres in circumference. These islands spread over thousands of kilometres of ocean in the heart of the South Pacific. The total land area of Fiji is 18,333 sq. km. The largest island, Viti Levu, is 10,429 sq.km. and the second largest, Vanua Levu, is 5,556 sq.km (Figure 3) (Fiji Today-1980). Approximately 100 of these islands are inhabited, some only temporarily, while people are engaged with fishing or collecting activities (Kerr and Donnelly-1969).

Fiji lies between 15° and 22° south of the equator and straddles the 180th meridian of longitude (174°E - 177°W), of the International Dateline, and so becomes the gateway of a new day (Fiji Today-1980) (Figure 3).

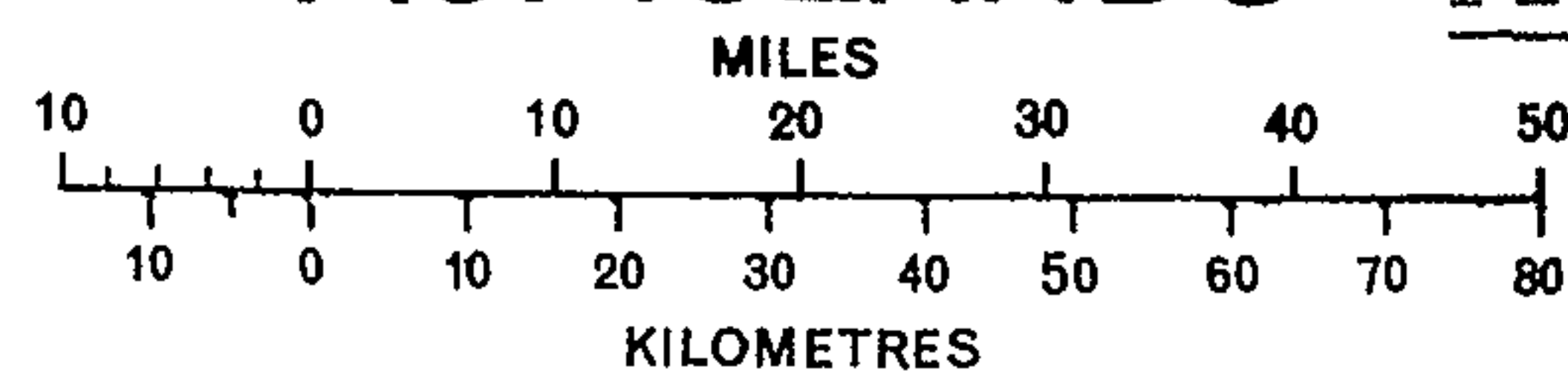
Situated in the hub of the Southwest Pacific, (Figure 4) Fiji has become the crossroads of air and shipping services between Australia, New Zealand and North America. Travellers and international vessels enter the country via the international airport at Nadi or the natural harbours at Lautoka and Suva (Fiji Today-1980).

The great distance of some of the smaller islands from the capital Suva, poses difficulties in administration, communication and transportation. One of Fiji's major development priorities of the government in the

FIJI ISLANDS

FIGURE 3

111.



REFERENCE

Divisional Boundaries ————+———
Provincial Boundaries ————+———

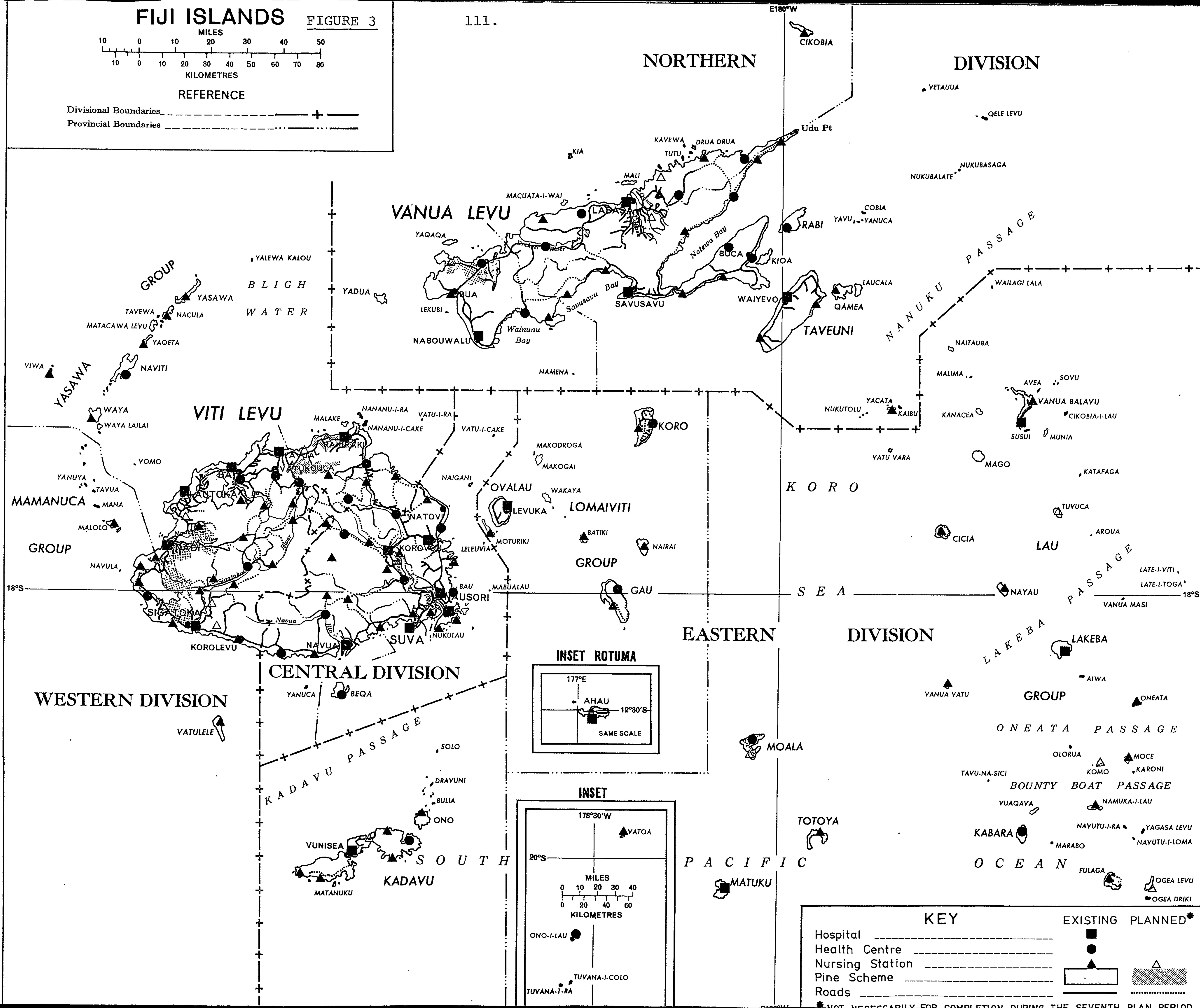
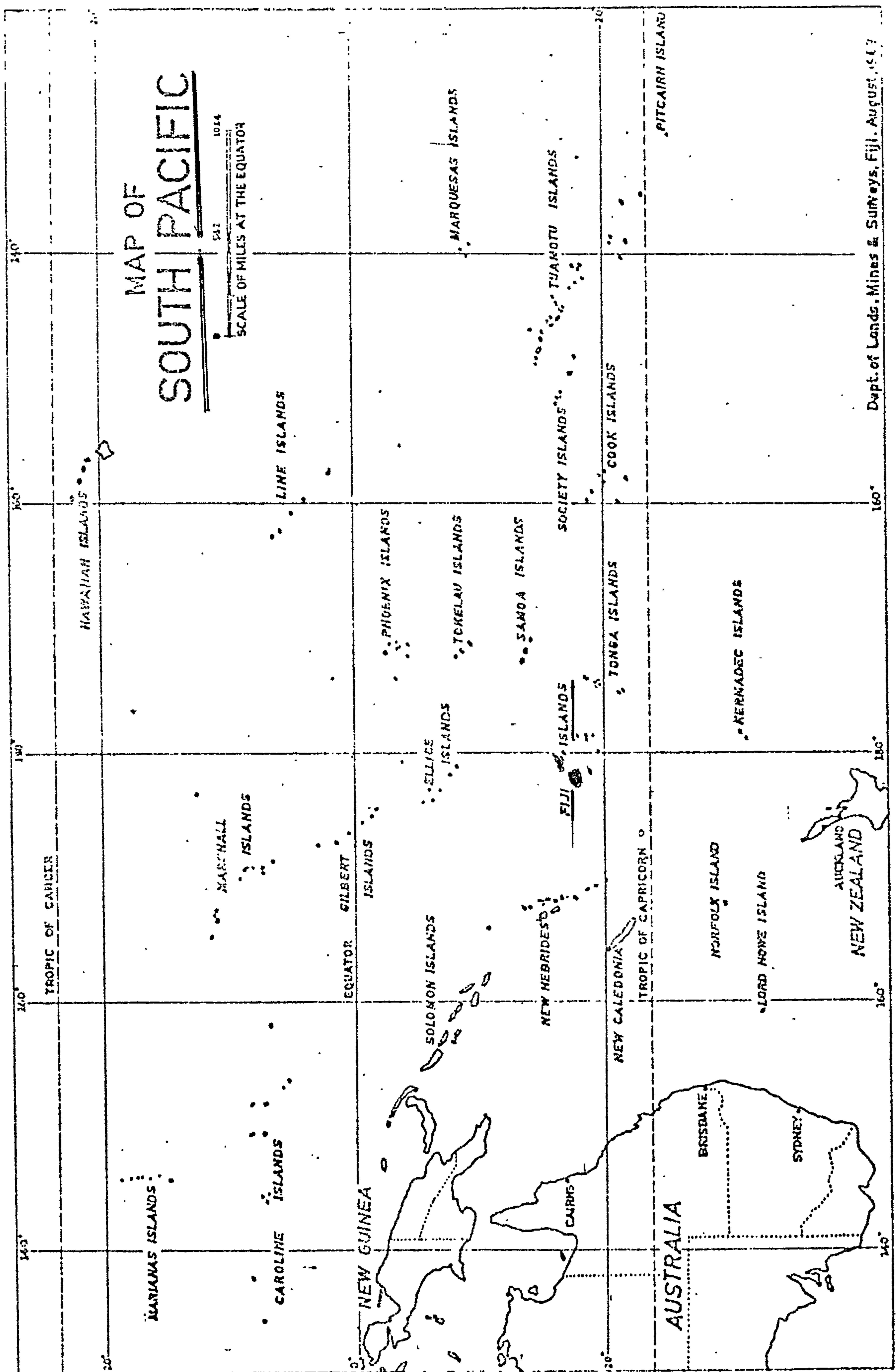


FIGURE 4



FIJI IN THE CENTRE OF SOUTH-WEST PACIFIC

7th development plan (1976-1980) was the provision of airstrips to facilitate communication links between outlying islands and the country's main centres (Fiji's 7th Development Plan-1976). Major constraints in providing oral health care include difficulties with transport, long distances and low population densities in rural areas. To overcome this, the government has embarked on a program of rural development.

Because of its central position, Fiji has become the centre of a number of institutions to which students from many parts of the South Pacific come for training - the Fiji College of Agriculture, Fiji School of Medicine, Pacific Theological College and the University of the South Pacific. The World Health Organisation (WHO) also operates its South Pacific Office from Fiji.

Fiji has accepted many nationalities to its shores and today is rich in diverse cultural backgrounds.

Administrative Divisions

Fiji is split into 4 divisions for administrative purposes. Each division has a Commissioner and there are District Officers in the main centres (Figure 3). The Western Division is the largest and covers the western side of Viti Levu and the islands to the north and west, notably the Yasawa and Mamanuca groups. The Central Division covers the eastern half of Viti Levu and includes the capital, Suva. The Northern Division includes the second largest island, Vanua Levu, and Taveuni and other smaller islands nearby. The Eastern Division includes: Lomaiviti, the Lau group, Kadavu and Rotuma (Figure 3) (Fiji Today-1980).

Local Government

The country has a well-developed system of local government. City and town councils fall under

the general supervision of the Ministry of Urban Development and Housing. Suva and Lautoka have city councils; whereas Nadi, Ba, Sigatoka, Labasa, Nausori, Levuka, Savusavu and Lami have town councils.

Local residents elect their councillors, who then have the power to levy rates in order to fund operating and capital development costs. The Central Government helps the local bodies with technical services, town planning, grants and loans. Local authorities for the rural areas are appointed by the Minister for Health, because they are mainly concerned with public health (Fiji Today-1980). People pay taxes to the central Government at the end of each calendar year, which is also the fiscal year.

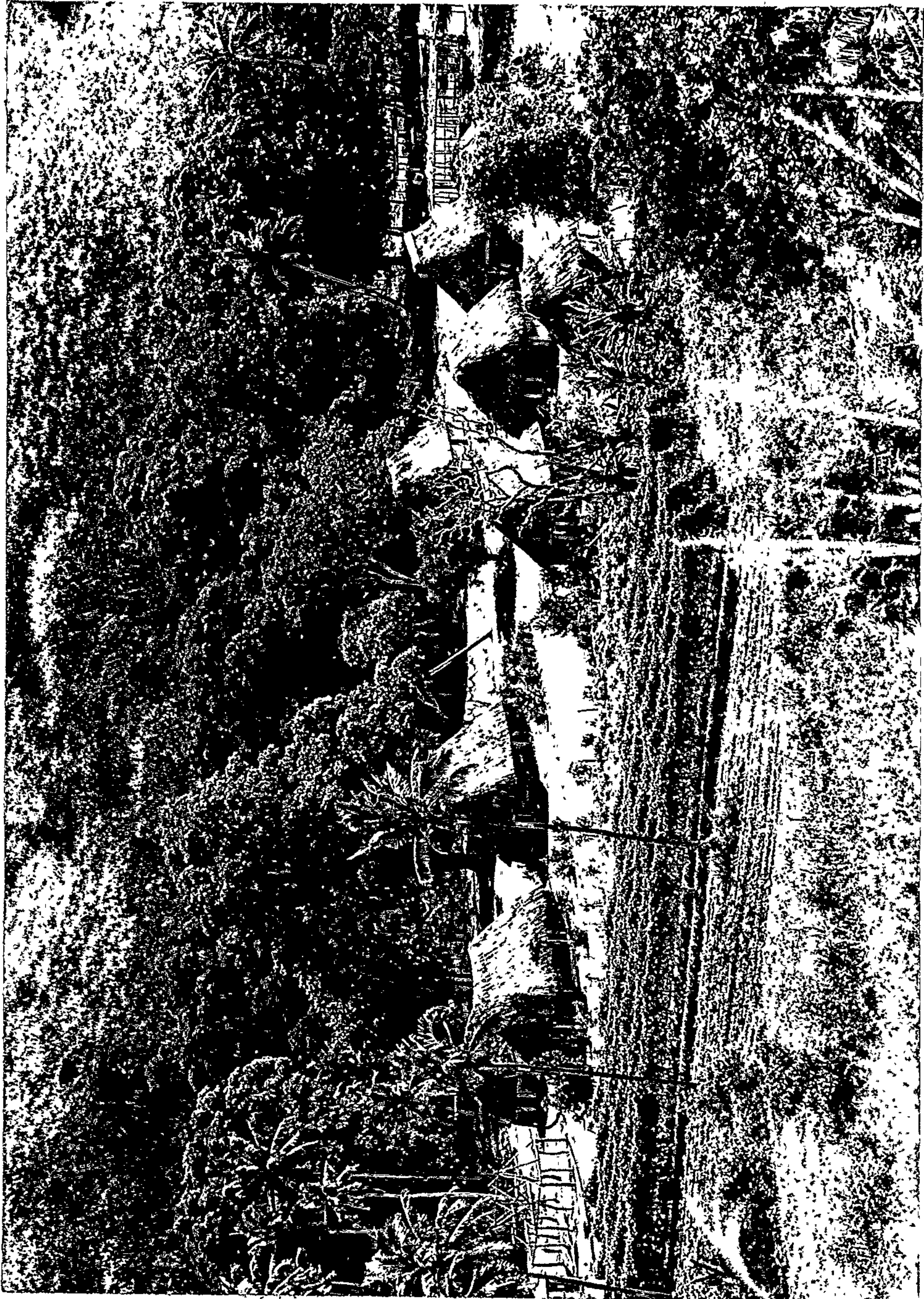
At the village level (Figure 5) more traditional type of administration involving native chiefs and local councils of chiefs exist.

Education

The last 20 years has seen great improvements both in the quality and quantity of education. The aim is to keep at least 98% of children aged 6-11 years attending school full-time and to raise this age to include children up to 13 years of age. The Government is continuing its efforts to reduce financial burden on parents by extending free education in primary schools (Fiji's 7th Development Plan-1976).

There are 648 primary schools, 134 secondary schools and 28 technical-vocational schools in the country (Bureau of Statistics-1980, Ministry of Education-1980). High school students appear for New Zealand School Certificate and University Entrance examinations. Limited number of High Schools also prepare students for New Zealand Higher School Certificate (HSC) examination. The University of South Pacific, a regional institution established in 1968 offers 6 degree courses and a Diploma of Education.

FIGURE 5



Village scene in Rural Area

Health

Fiji is a healthy country, free from many tropical diseases, including malaria. Public health services are of high standard and infectious diseases are not a public health problem (Fiji Today-1980). Immunisations of children against tetanus, tuberculosis, whooping cough, diphtheria and polio myelitis is carried out routinely. Leprosy is a declining menace and the Government hopes to eradicate this disease. Anaemia, diabetes, cancer, malnutrition and heart diseases are monitored through active registration program. Filariasis and dengue fever are other conditions seen in the country. There is a general shift in emphasis towards prevention in the Government policies (Fiji's 7th Development Plan-1976). There is water-borne sewerage disposal and good refuse services in urban areas. Water supplies are modern and carefully supervised; tap water is drinkable in all the urban and town areas.

The government provides most of the medical care facilities in the country. There are 25 hospitals (3 major), 45 health centres and 86 nursing stations (Figure 3). The legislation dealing with health is similar to that in the United Kingdom. It is designed to protect the public against health hazards and poor standards (Fiji Today-1980). There are private medical and dental practitioner in Fiji, practicing mainly in urban areas.

The Permanent Secretary for Health is responsible to the Minister for Health for the administration of Health Services. The Permanent Secretary is assisted at the central office by Directors and Assistant Directors of various services and a staff of paramedical and lay personnel (Table 14). The Departmental administration is decentralised, the country being divided into 4 divisions. The 4 Divisional Medical Officers control and correlate the work of the medical, dental and nursing staff as well as health inspectorate and lay personnel within their Division. The highest dental position is the

MINISTER OF HEALTH

Permanent Secretary for Health

Assistant Director Planning

Principal
Fiji School of Medicine

Director of Hosp. Services

Asst. Director of Hosp. Services

Pharmacy Services

Hospitals
Medical Superintendent

Controller of
Nursing Services

Director of Preventive
and Primary Health Services

Asst. Director
Prev. & Primary
Health Services

Asst. Director
Dental Health
Services

Chief Dental
Officer

Chief
Health
Inspector

Divisional
Medical Officers

Principal Assistant
Secretary

Principal Accountant

117
TABLE 14

Assistant Director, Dental Services (Created in 1981). He is directly responsible to Director of Preventive and Primary Health Services.

The Divisions are again divided into Sub-Divisions (17) each under the administrative care of a sub-divisional medical officer, who is assisted by dental officer, health sister and a health inspector. A Sub-Division is typically divided into 4 or more areas, each in the charge of a medical officer. Finally, areas are sub-divided into 2 or more nursing districts, which are in the care of a public health nurse (Fiji Annual Report-1972).

The whole structure provides a comprehensive health service covering every part of the country in which curative and preventive services are closely integrated (Fiji Annual Report-1972).

Economy

Fiji's economic situation has long been dominated by 3 major problems:

- . dependence on 1 crop (sugar);
- . dependence upon the outside world for trade, capital and expertise;
- . rigidity of economic and ethnic divisions.

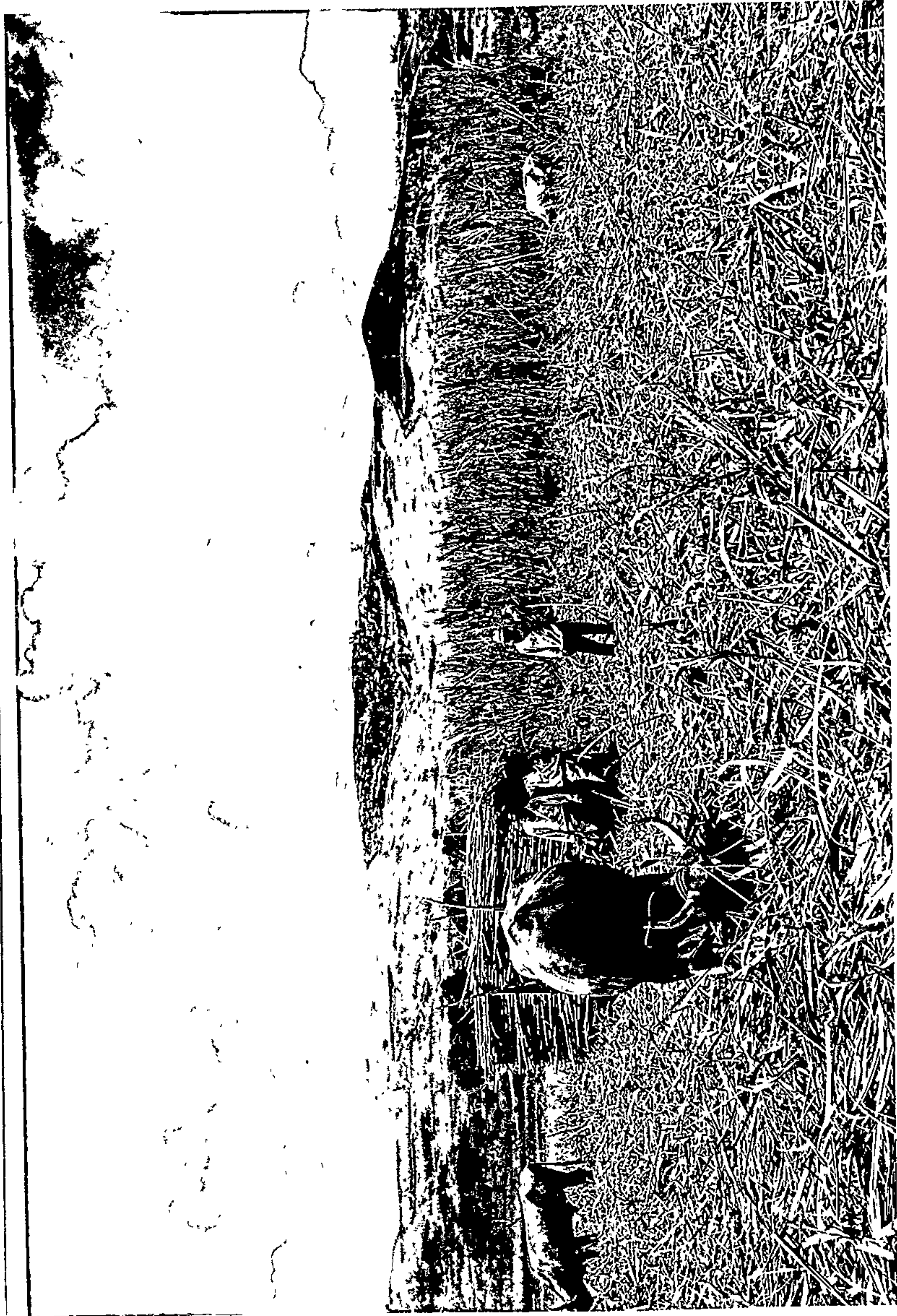
The story of Fiji's economic development is largely a story of her efforts to overcome these problems (Fiji's 7th Development Plan-1976).

The economy of Fiji is primarily agrarian and sugar is its backbone (Figure 6). Grown mainly on small holdings, the sugarcane is crushed and partly-refined by the Government-owned Fiji Sugar Corporation and remains the country's major export (Fiji Today-1980). It accounts for over 80% of country's export revenue. The main economic aim of the present Government is to break away from the country's dependence on sugar. It is attempting to diversify into broader agricultural products and greater secondary industries (Fiji Today-1980). Other high export earners are copra, coconut oil and fish (Figure 7). Rising export earners are timber, ginger and food products. Tourism is another key economic factor.

Pine is expected to be of primary importance in the 1980s. Indigenous timber is becoming a high export item and it is hoped that lumber will match sugar in export revenue. Beef production is gaining momentum as more cattle schemes are implemented.

Through diversification, Government expects to reduce its trade gap. Essential imports, like food stuffs and medical supplies, cannot be stopped, but Government does impose duty on those imports the country can produce locally. These include garments, cosmetics and footwear.

FIGURE 6



Sugar Cane Harvesting

FIGURE 7



Coconut Palms near the Beach

Government is placing great emphasis in developing those areas that have lagged behind in the country's contemporary development. This entails channelling government resources to mainly rural regions that do not necessarily show the greatest growth potential (Fiji Today-1980).

Industries

The processing of sugarcane and copra, along with gold mining and timber production, are the nation's main industries.

In recent years, there has been a considerable increase in the number of new industries, besides the expansion of existing ones. Products manufactured are intended for both home consumption and export. These include aluminium products, agricultural equipment, boats, beverages, building materials, cement, cigarettes, concrete products, footwear, handicrafts, ice cream, jewellery, matches, meat products, plastics, plywood, packaging materials, soup products, sugar (castor and icing), tea packing, wood products and wrought iron products (Fiji Today-1980).

In addition there is a fisheries base which includes a freezing plant and cannery; there are rice and timber mills; and there are servicing industries that include general engineering, civil engineering, electroplating, printing, marine engineering and slip way management, real estate and advertising agencies, and data processing by computer system (Fiji Today-1980).

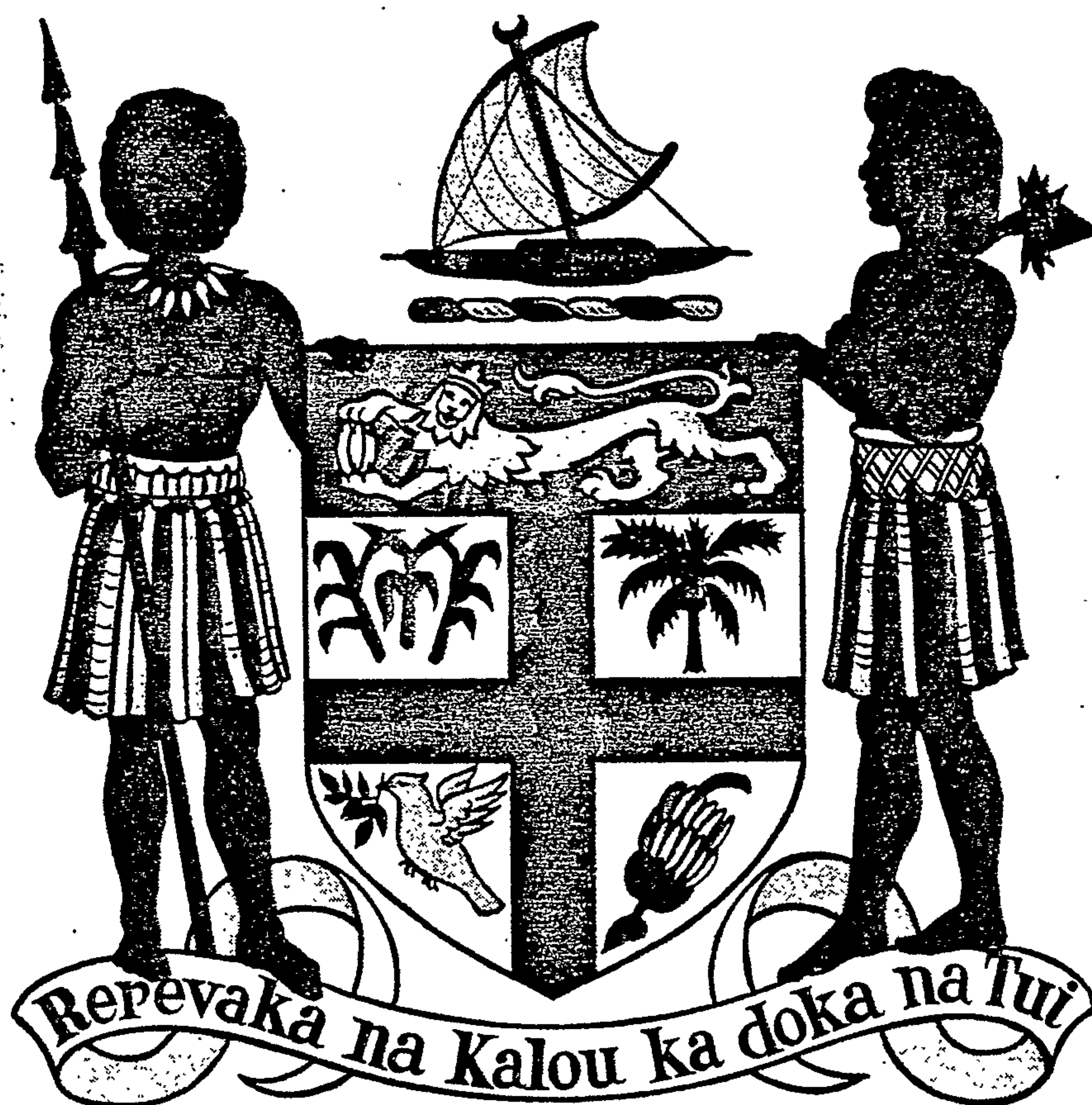
7.1.2 DIETARY FACTORS

The staple diet for the Fijians consists mainly of dalo, yam and cassava. Yam can be found easily in the bushes while seasonal and tropical fruits and various kinds of sea food are plentiful (Figures 8, 9, 10 and 11). Small co-operative stores are found in many villages so that rural people do have access to refined foods.

Bread and biscuits (Breakfast Crackers) constitutes the main items of breakfast. Lunch is usually a casual meal. The main meal of the day is dinner which is usually well-prepared with a variety of dishes. The mode of life of the Fijians has been subjected to economic changes. The old hand-to-mouth practices, particularly in rural areas, are gradually being replaced by a modern dependent economy.

The Indians, although many of them were born and lived in Fiji for many years, still adhere to their traditional rice and curried dishes. However, due to their association with the Fijians, many of them have acquired the taste of some Fijian dishes. Unlike in India, Fiji-Indians are not practising the habit of chewing betel nuts (Wong-1965).

In rural areas in addition to the sugarcane, they have mixed farms of rice, vegetables and raise poultry, goats and cows. So basic necessities are usually available at home. Sugarcane, a coconut palm and a bunch of bananas are represented in 3 of the shield's section of the Coat of Arms. The 4th contains the reproduction of a dove of peace (Figure 8).

FIGURE 8THE FIJI COAT OF ARMS

The shield from the Coat of Arms has the image of a heraldic lion holding a cocoa pod across the top. Sugarcane, a coconut palm and a bunch of bananas are represented in 3 of the shield's sections. The 4th contains the reproduction of a dove of peace, the main feature of the Cakobau Government's flag before Cession.

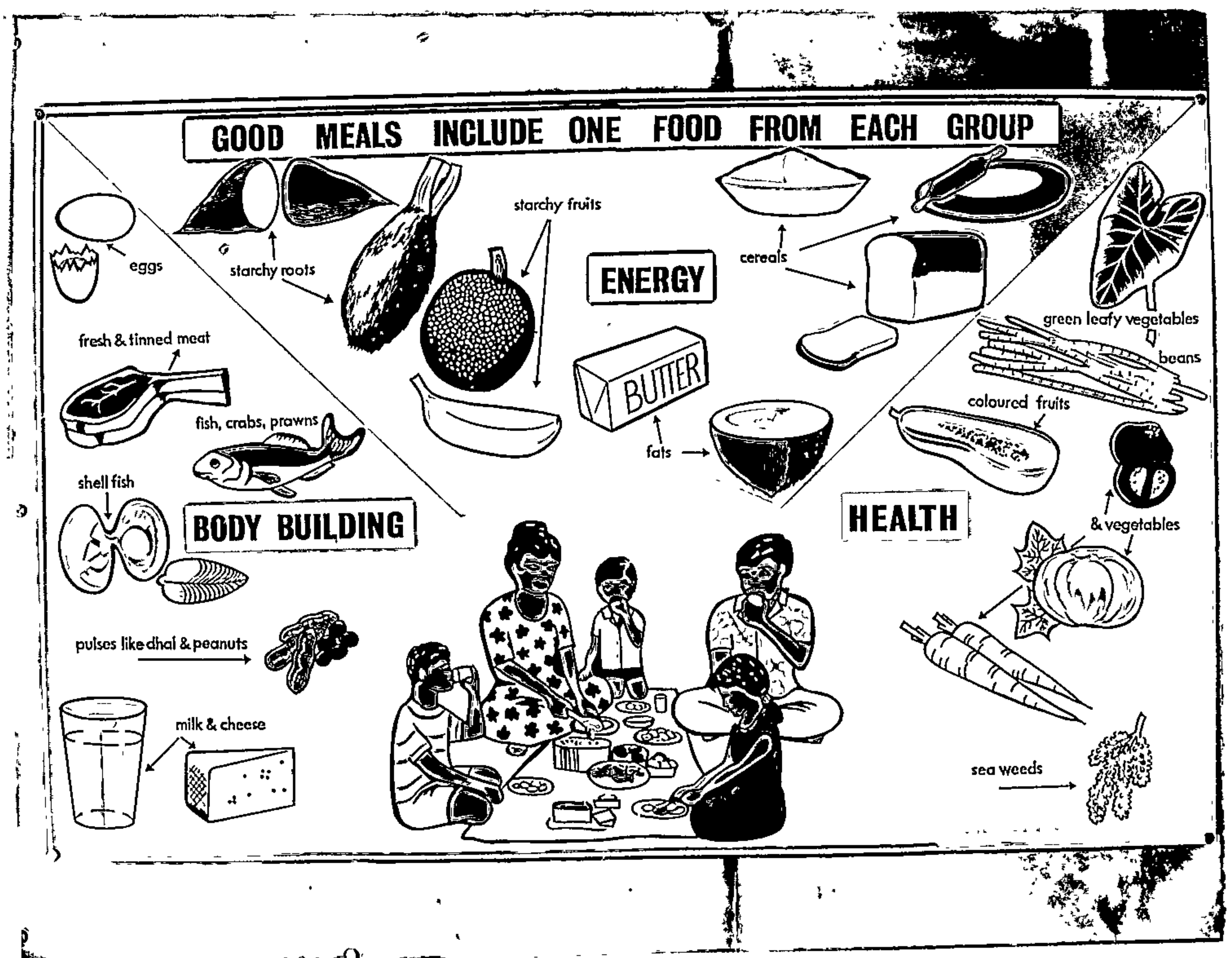
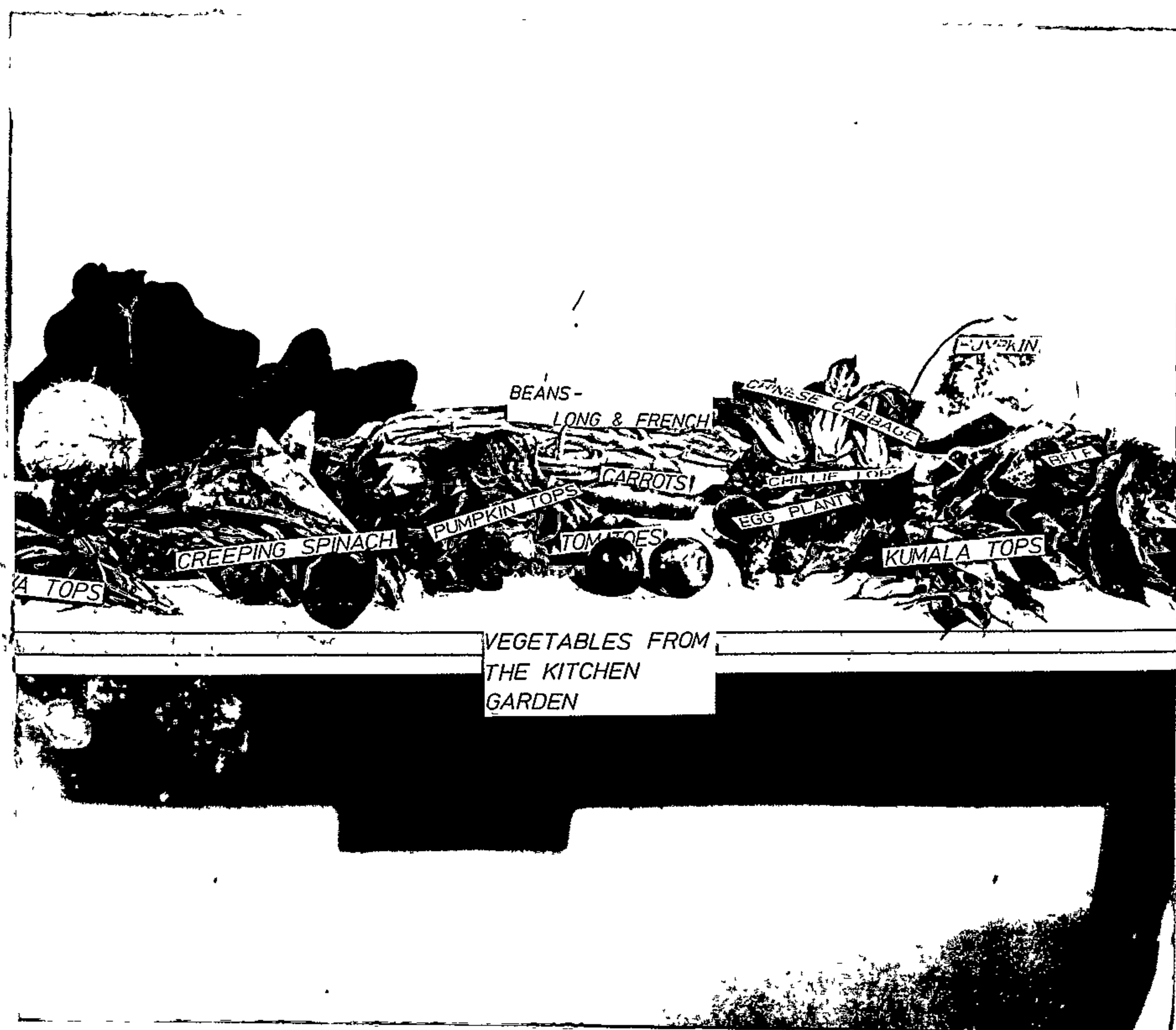
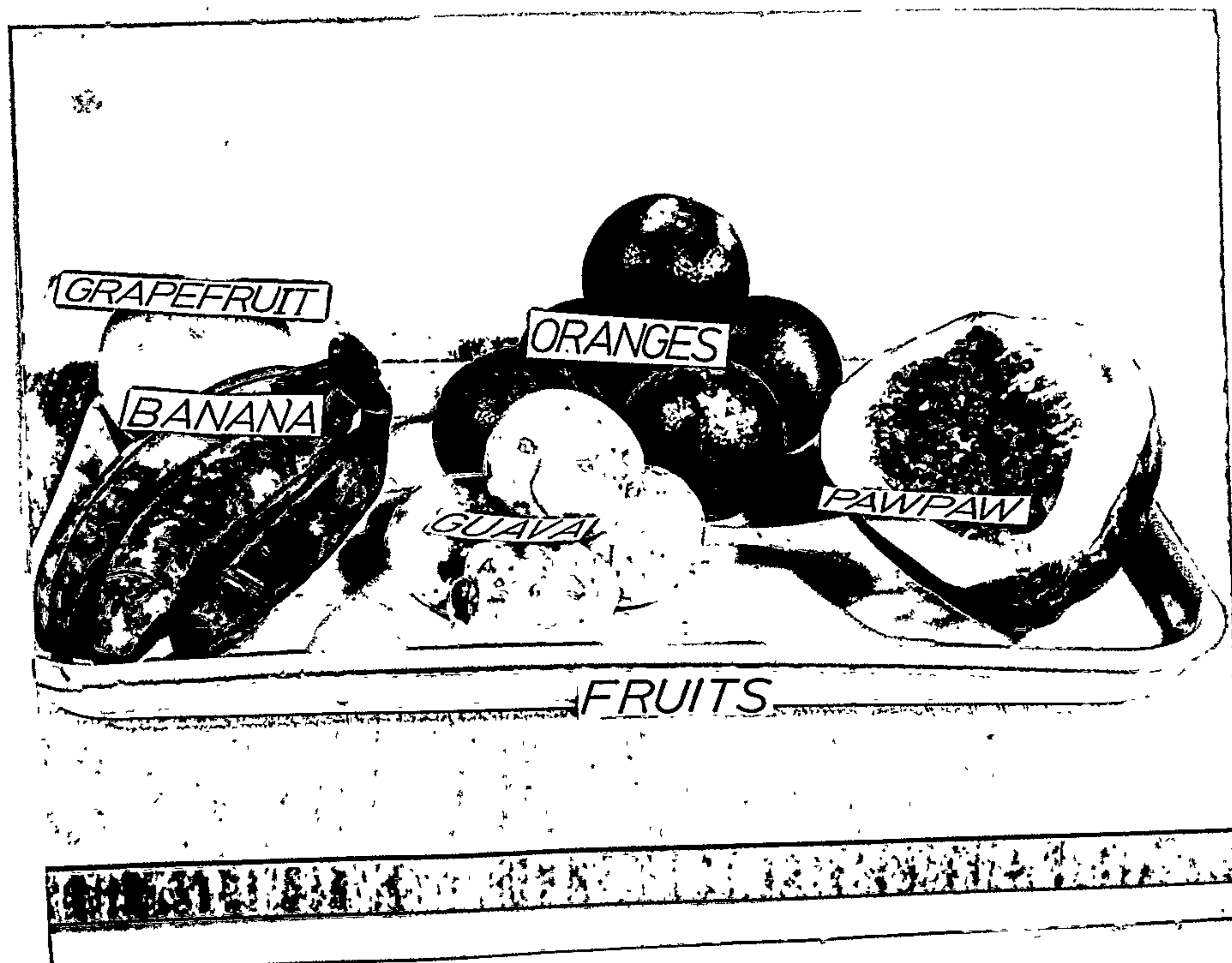
FIGURE 9Varieties of Foods used in Fiji

FIGURE 10



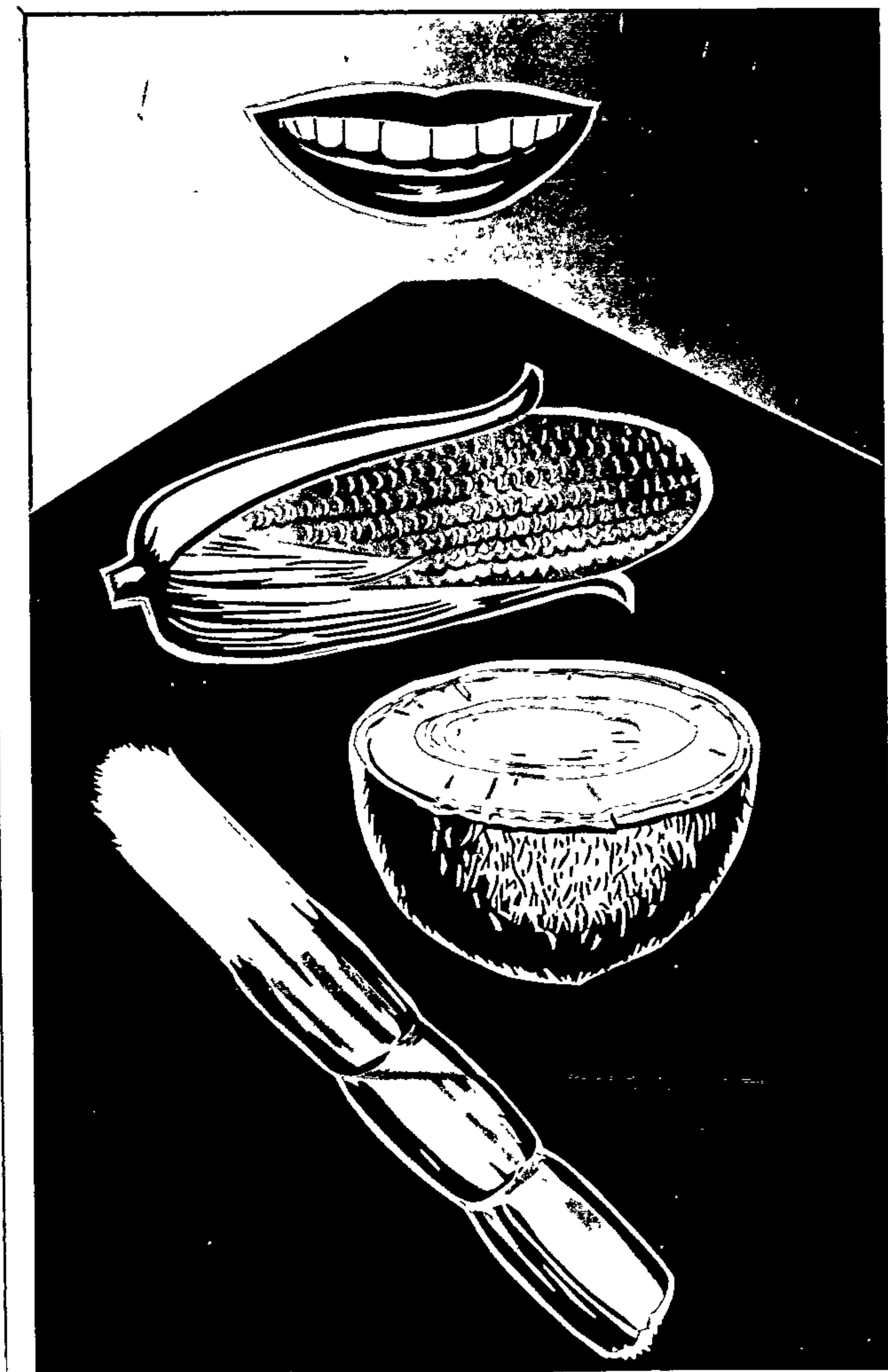
Green and Yellow Vegetables Grown in Fiji



Some Fruits Grown in Fiji

(Photo by Courtesy of Nutrition Section-Fiji)

FIGURE 11



"Detergent Foods" - Fiji

The diet of the Europeans in Fiji contains an admixture of European dishes and traditional Fijian foods, as well as spicy foods of Indian origin e.g. Dalo, cassava, rice, curry and dhal (split peas) as well as many tropical fruits in season.

Trends

In Fiji during the last few decades, there has been a distinct growth of the urban centres. Unfortunately urbanisation results in the break-up of traditional way of life, changes in family structure and of course the loss of land on which to grow food. In some towns it is still possible for people to have enough land on which to grow some proportion of their vegetable and root crop requirements.

Housewives newly arrived in an urban environment are suddenly confronted with a wide range of foods from supermarkets and other shops. Without health education and guidance, there is generally a tendency for the people, particularly children and housewives to regard certain foods for their prestige value alone, which may be out of all proportions to their nutritional value. However, there appears little doubt that ultimately, foods are selected for their qualities of taste and ease of preparation, rather than health.

Traditionally the people follow a semi-vegetarian diet, low in animal protein and fat, and high in carbohydrate (mainly of starchy nature). This diet, if followed as tradition dictates, is probably superior to Western type diet in most instances. The Western type diet consists of excessive saturated fat, animal protein and carbohydrate in the form of sucrose (Goldstein-1979).

However, the carefully balanced nutritional status of many people have been endangered by introduction of refined foreign foods. It is unlikely that

the present trends in the consumption of cereal or processed foods from abroad can be reversed. Besides being easier to store and prepare, many foods of western origin enjoy a high prestige value.

Most of the island diet was once based on taro (dalo), but in some areas these are being superseded by other root crops. In Fiji the cassava is becoming progressively more important. These changes alone are not significant and the predominance of cassava in the diet of some Fijians could become a cause of concern since it contains about half the protein content of taro and has a low Vitamin B to calorie ratio (Wilmot-1971). Taro also contains a certain amount of fluoride.

In general the greatest trend in the islands is a move away from staple root crops towards a diet based more and more on cereals, particularly rice and flour (Wilmot-1971). The latter is frequently eaten as bread and biscuits (mainly cabin cracker), the consumption of which by the Fijians, increases as income rise.

Sugar Consumption

It appears that through invasion of civilisation, changes in dietary habits of the people have brought about health problems; including loss of natural teeth. Sugar consumption is relatively high at over 41.57 Kg per capita annually (Table 15) and is likely to increase. Since sugar cane is a major crop this trend is unlikely to be reversed. In Australia the sugar consumption is 53.8 Kg per capita annually (Australian Bureau of Statistics-1978/79). Indications are that per capita sugar consumption is approximately the same in Fiji and the Cook Islands, but dental caries prevalence is high in Cook Islands and low in Fiji. Perhaps the frequency and form of sugar consumption varies (SPC/Dental Health Report-1978). Taxing of sugar

TABLE 15ESTIMATED SUGAR CONSUMPTION IN SOME PACIFIC ISLANDS

COUNTRY	REFINED SUGAR Kg/HEAD	YEAR	REFINED SUGAR & CONFECTION- ARY
Solomon Is.	6.49	1975	6.92
Tonga	12.18	1976	13.77
Gilbert Islands	27.07	1976	27.66
Fiji	41.57	1976	N/A
Cook Islands	40.80	1973	42.52
French Polynesia	40.28	1975	46.38
Nauru	59.42	1975	59.80

SOURCE: Regional Technical Meeting of Chief
Dental Officers. Noumea SPC-1978
(p.14-15).

or reducing local availability of this product may be one way of keeping the consumption under control. The other is through health education of the community in the wise use of sugar and sugar products. It is stressed that sugar accounts for over 80% of Fiji's export revenue.
