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AN OVERVIEW OF THE PLANNING PROCESS.
ITS APPLICATION TO THE DESIGN OF ORAL HEALTH SERVICES
AND IN PLANNING PREVENTIVE PROGRAMS

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A thesis submitted in partial requirement for the

MASTER of DENTAL SCIENCE
[ PUBLIC HEALTH DENTISTRY]

Public Health Dentistry
Faculty of Dentistry
University of Sydney
1996
SUMMARY

The need to plan and develop programs, that are directed to overcoming the most significant health problems, in the most effective manner is critically important to developing nations. Populations around the world have become more and more interested in health problems of all types and, therefore, ever larger proportions of valuable national resources are being spent on health, there is a growing awareness that things should be done in proper order. Thus the tool "planning" is important when evaluating health programs to determine whether they are in fact achieving their intended purposes within the allowable costs. In oral health care the tool of planning allows rational choices between alternative programs; it avoids incorrect selection of program strategies and methods; will not cause overoptimism about the infrastructure to carry out the plan, and will avoid major wastage or inadequacy of resources.

Oral health problems prevalence is changing. It remains true that virtually every adult in the world has experienced either dental caries or periodontal disease or both. Especially in developing countries oral health is difficult because of lack of preventive programs and complementary dental services and shortage of manpower and resources. It is therefore important to ensure that the health activities fit general health desires; hence the proportionate representation of consumers or the public should be great. For whatever program planned, care should be taken to see that it is realistic and based on the resources available both financial and other.

The value of planning in the health services takes priority as health personnel continue to plan in every facet of his/her career. Most of the activities that a dentist faces each day are assessment, forecasting, problem identification, goal setting, alternative interventions implementation and evaluations. Moreover the dentist is bombarded with data about his patients in his every day work and in this "thesis," one is enlightened on how to arrange these data or activities into system that could be utilised to improve understanding and the transmission of ideas to formulate an effective strategy for doing what is wanted.
Planning as we know is applied to improve health. There are purposes that it is supposed to achieve which are as follows: defining the desired improvements, achieving the aims, and getting the desired features. In this thesis the application of planning methods is highlighted; the concepts of planning design for preventive programs reviewed and an overview on various oral health plans highlighted. Examples of planning oral health showing the basic steps for planning that have been followed present data from imaginary situations based on most usual findings at the level of resources under consideration. Furthermore, examples are given of preventive programs which could be implemented within the standard framework of oral health situation analysis, goal setting, and coordinated planning with emphasis on prevention and monitoring/evaluation.
ACKNOWLEDGEMENTS

I wish to extend my sincere thanks and gratitude to the following for their assistance during the period of my studies.

Associate Professor PD Barnard MPH (Mich), MDS, DDSc, FICD, FRACDS, FAPHA, Associate Professor of Public Health Dentistry for his ever sacrifice to guide and encourage me during the period of my studies. His support and help in the preparation of this thesis is highly appreciated.

The World Health Organization for providing the fellowship which has enable me to undertake the MDSc course at the University of Sydney.

The Ministry of Health and the Public Service Commission of Fiji for releasing me from my duties to do this course.

The Assistant Director of Dental Services, Dr Pita Katia in his confidence in me, allowing and recommending me to do this course.

The Co-ordinator of Dental Studies, Fiji School of Medicine, Dr Jonacani Tuisuva for his insistence and true comradeship during difficult times when the decision to do the MDSc was at stake.
DEDICATION

To the six important people who had been a tower of strength during the two years of my studies

my loving wife
Bainato Tabokai Koroijuta
for being understanding and supportive and being both a mother
and father to our children during the period of my absence
undertaking the MDSc course.

my loving children
Alex Jeremiah; Tabokai Tabutoa; Ben Tomasi;
Esther Finau; and Michael Koroijuta
who never cease to forget me in their prayers
and who have been a source of inspiration to me
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INTRODUCTION

After the 1977 Thirtieth World Health Assembly the main social targets of governments and the World Health Organization in the coming years should be the “attainment by all citizens of the world by the year 2000 of a level of health that permit them to lead a socially and economically productive life” (WHO 1976).

A number of fundamental principles for health and development include: the responsibility of government to the health of their people; the right and duty of people individually and collectively to participate in the development of their health; the interdependence of individuals, communities and countries based on the common concern for health; equitable distribution of health resources within a country, including preferential allocation according to area of highest need; emphasis on preventive measures integrated with curative rehabilitative and environmental measures; the pursuit of relevant biomedical health service research and the application of its finding; the application of appropriate technology through well defined health programs integrated in country wide health systems based on primary health care and incorporating the above concepts (WHO 1976).

The Republic of Fiji as a participating member of the World Health Organization, has taken part in the formulation of these principles, and has been a signatory to the resolutions. Signatories to the World Health Assembly Resolution of Health for all by the year 2000 have enunciated a concomitant goal of oral health for all by the year 2000.

Fiji’s national goal is the same as any other developing nation. The crux of the matter is the formulation of constructive strategies to implement preventive programs which are: not ambitious; affordable; involve personnel already in the service; economically viable; and able to deliver the goods. For the above to happen there has to be proper planning.

Planning activities occur in response to some form of dissatisfaction with the end result of the operating process or as a response to exogenous forces which impinge on the operating system. Furthermore, in order to have a good plan it has to be established according to the oral
health problems in the communities, with strategies for the health care system to counteract the oral health problems, and more importantly the fulfilment of established goals to attain oral health for all by the year 2000.

The application of planning theory to health concerns, suggests a straightforward attempt to put the most appropriate available technology to work in the hope of preventing various states of ill health. From the broader view, the application of planning theory to overcome or prevent ill health is only one input to health. Heredity, environmental factors, and behaviour patterns have far greater influence on man’s well-being or health than medical care (Blum 1978).

As already stated, planning activities occur in response to some form of dissatisfaction with the end result of the operating process or as a response to exogenous forces which impinge on the operating system. This dissatisfaction is expressed as an inconsistency with the normative notions of the planner or as non-optimization of the objective function. (Blum 1978)

The dissatisfaction can take a number of forms, for example: the mix of outputs is wrong; the quantity is insufficient; the distribution of output is wrong; the quality is inadequate; wrong people are making the decisions; or the ratio of input to output is wrong. The dissatisfaction and rightness and wrongness will be influenced by one’s concept of how much social justice prevails.

If planning is to be based on the needs of a population rather than demand, and integrated at each level with social and political values and priorities, it requires concepts that will allow rational choices between alternatives to be made.

The purposes for which planning was meant to serve need to be defined. Although problems are substantially the same everywhere, the emphasis, quantity and mixture of resources, and specific arrangement differ. Each country has a unique historical, cultural, and political tradition, and has evolved a somewhat different pattern of health service arrangement. In general, where the decision making with respect to allocation of resources is centralised and unified, the resulting system is more formal and identifiable. Where the decision making is more diffuse and pluralistic, a less formal system results.
Neither approach guarantees higher quality or greater economy, but it is widely believed that whenever resources are scarce a more equitable system is likely to result from co-ordinated, even if not centralised decision making (Blackman 1969).

Planning is a tool which can be used to make adjustment as planning has its raison d'être, rationality and reasonableness, equality and fairness, in that it is formalised measurement of different concepts. These concepts will be discussed in their relevance to the field of health and health care.

1:1 AIMS OF THESIS

The aims of this thesis are:

i.   To review the concepts of planning and health planning;

ii.  To get an overview of various oral health plans; and

iii. To evaluate oral health preventive program methods and their design

The writer wishes to initially define and describe the concepts of planning and then try to formulate the actual process of developing a preventive program. Furthermore, the importance of following the basic logical steps on various oral health plans will be highlighted. The practical aspects of health planning in the design of preventive programs will also be highlighted. It is the writer’s desire that for any dental personnel who will read this thesis, they will be able to be guided in planning a preventive program if requested to do so.
HEALTH AND THE SYSTEM APPROACH

The assumption underlying the creation of health care services is that better health will result - that some improvement in health not otherwise attainable will result - from effectively applied health care services. From this, the confused conclusion has been drawn that good health is primarily dependent on good health services (Blum 1978).

2.1 INPUT TO HEALTH

The range of factors consequential for health (see Figure 2.1) suggested that interventions in areas such as education or employment may have to precede, or replace traditional health care services. These other approaches or inputs, may work effectively, cost less, be more desirable generally, and in additional serve other widely desired goals (Blum 1978). Moreover, the health of people, including those yet to be born, may be improved significantly if non health interventions are set in motion today to avoid many of the problems of ill health that otherwise will face the health care sector in the future.

Figure 2.1 Inputs to health
Source: Blum 1978
2.2 THE SYSTEM APPROACH

Health planning involves activities such as assessment, forecasting, problem definition, system analysis, goal setting, alternative interventions, cost benefit comparison, implementation and evaluation.

A planner needs to know how to arrange these activities into systems that could be utilised to improve understanding and the transmission of ideas and which could be used to formulate an effective strategy for doing what was wanted.

In medical and dental training a considerable part (traditionally) has been, taking case histories. Data about patients and body subsystems are supported by information about: his family tree (genetic); his life at work; his family; habits; education and culture. Starting with the patient’s immediate complaint, the physician puts together a model of full body system comprised of interacting subsystems built around a genetic constitution. This system is seen to be totally reactant to an environment of general cultural and social constraint. From these, a future state of potential well being is then projected, along with any threatening problems.

In defining a health problem, the physician must access its origins and its potential for damage. His prognosis for the whole patient must cover the probabilities of outcome without therapy, with therapy A or with therapy B, and so on. The cost and benefits of each alternative intervention are weighed, using the well documented, actual probabilities of specified outcomes whether or not they are formally expressed. A system approach as applied to one area of endeavour is portrayed in Figure 2.2 (Blum 1978) in which the medical care approach is compared step by step with the outline of developmental approach to health planning.
**Figure 2.2  The developmental health planning process.**
*A simultaneous comparison with patient care*
*Source: Blum 1978*

<table>
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<tr>
<th><strong>The Health Planning Process</strong></th>
<th><strong>The Patient Care Process</strong></th>
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<tr>
<td><strong>Values</strong></td>
<td><strong>Goals and Purposes including those of health</strong></td>
</tr>
<tr>
<td>1 General Policies And Aspiration Of Health</td>
<td>Accepted credo- one use the doctor to restore health</td>
</tr>
<tr>
<td>1a Via measurement, forecasting,&amp; assessment</td>
<td>history and examination given</td>
</tr>
<tr>
<td>2 Determine desired aspirations and problems, resources, values and political climates select goals</td>
<td>Manifestations described and most important needs specified</td>
</tr>
<tr>
<td>2a Via ecological &amp; epidemiological analysis</td>
<td>Deduction and further confirmatory tests</td>
</tr>
<tr>
<td>3 Determine nature of goals and origins of and inputs to problems, points of interventions; objectives and possible interventions</td>
<td>Etiology and nature of illness and prognosis determined. List possible treatments.</td>
</tr>
<tr>
<td>3a Via socio-economic and political analyses of possible interventions consider gains and loses &amp; prioritising.</td>
<td>Health and socioeconomic outcomes considered under each proposed treatment</td>
</tr>
<tr>
<td>4 Design better alternative plan suggest priorities for goals, objectives interventions and plans and lay out strategy for presentation and obtaining decision</td>
<td>Select better courses of therapy outline and layout strategy for presentation and obtaining decision</td>
</tr>
<tr>
<td>4a Via exposure to community and policy makers</td>
<td>Patient, doctor and family debates courses of action</td>
</tr>
<tr>
<td>5 Select plan, which is authorised, funded and implemented</td>
<td>Therapy of choice selected</td>
</tr>
<tr>
<td>5a Via administrative approaches and program planning, operational planning finalised</td>
<td>Other agents giving therapy activated</td>
</tr>
<tr>
<td>6 Program activities and method selected and put into operation</td>
<td>Procedures carried out</td>
</tr>
<tr>
<td>6a Via feedback and analysis of results on clients, institutions problems, situations</td>
<td>Results observed</td>
</tr>
<tr>
<td>7 Provider evaluation of the efforts and reassessment of the situation</td>
<td>Therapy evaluated and further needs reassessed</td>
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*The table indicates a theoretical flow of planning steps, each step by means of specified activity leads to the next step. Goals are used in the sense of aspirations and general directions. Objectives as more specific elements going to make up progress towards a goal.*
2.3 ROLE OF COMMUNITY HEALTH PLANNING BODY

The community for which health planning is to be undertaken may be a tiny neighbourhood, a village, a valley, a settlement, a state or even the nation itself. The community health planning body converts the general goals and the health aims of the community into the specific objectives and criteria for health and health services which the community operating or delivery system will be asked to meet (Bryte 1980).

Community level health planning becomes one of the primary specifiers of the outcomes of health achieving or maintaining activities, but not the designer of systems or organiser of these activities (Baranthium 1975). It is the institutional level planning that will result in actual outputs which produce the desired effects in the community. However, to plan on behalf of the whole community is much more difficult than to plan at the smaller system levels after the community has determined its objectives. One therefore concentrates on community level planning.

2.4 THE DEVELOPMENTAL APPROACH

If planning is to be applied for the improvement of health, we must know the set of purposes that planning is to serve. These can be summarised (Siegman 1984) as:

i) defining the desired improvements
ii) achieving the aim
iii) measuring this attainment

Because these purposes reflect a central concern for obtaining major social changes, the nature of social change is conceptualised and the constraints of obtaining it well defined and appended. The developmental approach permits us to focus simultaneously on planning for solving problems and planning for attainment of long range goals [desired features]. Fortunately, the planning techniques and strategies are different and need to be interrelated into a combined strategy; that of developmental planning (Siegman 1984).
2.5 JUSTIFICATION FOR INTERVENING BY PLANNING

The possibility of significantly altering future outcomes by using our desires as guides often raises questions (Meyerson 1978). The most common question being "What right do we have to intervene". We may oppose planning for health on the grounds that planners infringe on the rights of those to be made healthy, of those who pay major shares of the costs, and those who make a living selling health services. Intervention is okay as it makes it possible to avoid the too little and the too late measures that supposedly spare us the necessity for planning for anything but disasters.

A second question is "How can we be certain we are planning wisely, considering all reasonable options, and not prejudicing the future of various individuals and groups?". We can never be certain, because no group of planners could even conceive of all the options that might be offered to a community, nor, without extensive participation, could those involved understand the ramifications of the various options (Henrick 1974). Therefore it is strongly advocated that planning be undertaken at the community level. The greatest number of persons and viewpoints must be involved, so that deleterious options do not go unchallenged, nor desirable alternatives go uninvestigated. Speed is not the prime consideration, emphasis should be on the scope, effectiveness and equity. Timely and acceptable interventions in planning for health may allow us to make a more meaningful approach to good achievement and problem solving.

A third question is "Can health be planned for, if planning for public concerns is limited primarily to what goes on in the health sector?". Without significant interrelated planning, sector by sector, it is doubted that health can be planned for, even though isolated health sector activities might be carried out and might modestly improve health care delivery. (Henrick 1974).

However, a justification for undertaking such planning is that it is a beginning. If we use the systemic approach to problem solving and insist on guidance to normative goals, planning for health may allow us to make a more meaningful approach to goal achievement and problem solving; as health is an area of high political, social and individual interest.
3 Concepts of Planning

Administration is the process by which knowledge, energies and social structures are systemically meshed to achieve agreed-upon goals. In our society, government, community groups and individuals at various levels come together to try to achieve agreed upon goals, that is, they administer our social system (Blum 1978). This may be in a formal or informal way. "The lack of social planning at the national level and the differing rates of change in social institutions, has created social gaps between the purpose of some institutions and the degree to which they are effective in satisfying human needs". The overall goal of health care is to make a positive change in the health of an individual or community. This is a form of social intervention. (Blum 1978)

Since health programs are among the most useful, and expensive, investments a community can make in the well being of its members their expert administration is properly a matter of social concern. The administrative process has two functional components - a planning function and a management function (Blum 1978).

(i) The planning function analyses the problem to be dealt with, deciding on the appropriate solutions, determining the intervention technology, fixing program objectives and projecting future actions.

(ii) The management function consists of "procuring, arranging and applying human material and informational resources according to priorities derived from planning." Administration, in both planning and management functions, makes the process of communication and decision making, the latter being highly dependent on evaluation.

Planning is the administrative instrument that provides a rational basis for decision making (Taylor 1976). It is a process not a event. It is the first phase of the administrative process which also covers organisation, opinion and evaluation. The purpose of planning is to: "rationalise" the activities in which planning is imposed; also to make subject to calculation what was previously left to chance; to organise what was previously unorganised; to replace spontaneous adjustment with deliberate control.
Planning involves conceiving future state of affairs and ways to get there. It is therefore just one function in the process of decision making. (Arnold 1979)

The reasons for introducing the concept for planning into the service sector of the economy are to publicly change and oversee the provision of services to determine how resources are to be allocated and to establish responsibility for reorganisation and identification of a desired framework in order to ensure that social justice prevails (Arnold 1979). Increased use of scientific management has developed. Long range planning has emerged as a systematic formalised process in which organisational aims are defined and long term strategies are determined after considering alternatives. Strategies are expressed as long term plans with specified quantitative objectives and possible constraints. (Arnold 1979)

Responsibilities for implementing individual programs are assigned to organisational units with specified budgets, and predetermined standards are used as a basis for control. Continuous evaluation enables comparison of performance with standards, and periodic appraisal facilitates a revision of long term plans and appropriate future plans. (Arnold 1979)

Schaffer (1984), defines planning as "an orderly process of defining a problem through analyses identifying the unmet needs and demand that constitute the problem, establishing realistic and feasible goals, deciding on the priority, surveying the resources needed to achieve the goal, then administrative action based on the weighing of alternative intervention strategies for solving the problem". "Planning is a process, when successful it produces a product, a plan that can be put into effect."

If one defines planning as the administrative instrument that provides a rational basis for decision making, it can be an optimising process. Hall and Mejia (1978) state that formal techniques achieve their real impact by helping people to perceive their problems more adequately; by facilitating exact communication, and by providing a basic structure of rationality and objectivity as a background to the interplay of personality and power groups in management. Planning can help rationalise decisions, reduce waste, provide a fair distribution of resources and contribute to social justice.
The role of the planner is seen as that of a catalyst, able to demonstrate the disadvantage of the status quo and the need to set out new directions.

Planning without political support, however, is more than an academic exercise and politics without planning is usually irrelevant to needs and aspiration of society. Planning explores the uncertainty of how the best can be made of limited resources to meet priority need. (Palmer 1979) It is a dynamic process, an unending spiral of incremental efforts toward improvements. It is also an education process, in that it modifies public attitudes and demonstrates areas of deficiency requiring attention.

Some problems encountered with health planning include unclear and conflicting expectation held for planning, the involvement of political power as well as technical expertise. Another problem is that powerful incentives or sanctions are needed to overcome resistance to planned change. The way in which planning decisions are made and the outcome depends upon characteristics of the system being planned for, the socio-political environment, the type of problem to be solved and the “decision making style of the country or the community”.

3.1 THEORIES OF PLANNING

Schaffer (1984) elaborates on four styles of planning

3.1.1 Centralised National Economic Planning

This is found in countries with highly integrated political systems, and with limited distribution of power to non government institutions. The value system is orientated to the development of the community as a whole, rather than particular individual groups or organisations.
3.1.2 Economic Allocation Planning

This seeks to achieve the best use of resources that can be used in countries where there are diverse and numerous socio-economic interests which are strongly influenced and motivated by government, but not fully controlled by it. This type of planning makes choices among policy makers.

3.1.3 Ideological or Advocacy Planning

This is concerned with improving the position of certain groups and their needs and interest. Usually reliable information for basing decisions on is lacking, and goals are vague and usually evolve, rather than are set.

3.1.4 Interest Adjudicative Planning

This has prevailed in countries with plurality of interest groups who organise on a "market" basis. The central or sectional planning mechanism is weak. Observable planning is short range and is divided among many organisations. Planning usually consists of resolving conflicts and differences among value preferences and goals of various interest groups. Different planning systems imply different planning procedures and techniques as well as differences of how the problems are identified and how analyses are organised.

3.1.5 Deductive Planning

The broad policies are set out by a central authority (e.g. ministry) and details are also worked out centrally and standards are accordingly normative. That is, they are developed by experts derived from the current experience. (Blum 1978)
3.1.6 Inductive Planning

Local experiences, services and practices are identified and efforts are made to co-ordinate and consolidate so that greater benefits are more widely available on what is already available, so that overall services will be improved. One must know the overall goals and detailed actions, otherwise the planning can be aimless. (Blum 1978)

3.1.7 Impressionistic Planning

This is ad hoc professional and institutional decision making. Decisions are made on the basis of experience, pressures, minimal information and rough estimate of needs and possibilities, both intuitive and political. Idealistic planning aims are stated in ideal action by exhortation. There are no precise objectives or programs.

3.2 PLANNING MODES

Most planning is a combination of different concepts already discussed. Eight different modes has been discussed by (Blum 1988). The modes are as follows;

3.2.1 Laissez faire - No Planning

The core of this approach is the competitive market, which is supposed to provide the consumer with the number of alternative from which to choose and to encourage greater efficiency and consumer orientation on the part of the suppliers. The question one can ask about this approach is whether there is a true competitive market and how competitive is the consumer to choose, or do they really choose between alternatives.
3.2.2 Disjointed Incrementation - Minimal Planning

This approach is pragmatic one which involves making relatively small improvements based on a comparison of a limited number of concrete program alternatives. By taking only small steps, decision makers have an opportunity to evaluate program results and test political acceptance. Goal decisions are resolved in the pluralistic competition among private interests and the pressure they put on public decisions. (Blum 1978)

Blum (1988) comments as follows;

a) an individual has limited problem solving capabilities
b) there is lack of comprehensive information on which to base decisions on cost comparison
c) the unlimited nature of alternatives
d) the inability to construct a satisfactory method of evaluating values and goals.

3.2.3 Allocative Mode

Minimal planning for the present or the future. A maximal marginal gain is to be achieved with the given resources available and the limitations perceived. There is continuous overview of the problem, so that its current status can be compared with the problems and with that of its past and decisions can be made at the margins.

3.2.4 Articulated and Guided Incrementation with Problem Solving

Planning for present and near future. This involves an analysis of the problem as systems and then interventions are designed which are then selected for efficacy and compatibility with large sectoral goals. Small steps are taken on a resources allocation basis with continued updating. This approach tries to avoid undesigned side effects, and also tries to modify the larger system enough to control them.
3.2.5 Exploitive Mode - Planning the Future

This takes advantage of forecastable situations in a way that allow goals to be reached at a level of cost not otherwise possible. The evidence of some problems and the cashing-in on others without major concern for the emergence of few problems. This is only concerned with the probability of prophesies and is not alert to system implications. (Blum 1978)

3.2.6 Normative Modes

This approach is entirely based on forecasting and works back from chosen goals of what ought to be. It tries to match outcome to desires. There is generally widespread involvement and hence it is slow moving. The mode is output orientated in an innovative way.

3.2.7 Explorative Mode

This approach involves the exploration of possible future trends from current trends, capacities and expectation and resources. Resources are allocated according to what is seen as the feasible future. It is adaptive and output orientated. There is a need for predictive technique and it is generally slow-moving and costly. It works from what could be done, by extending the present.

3.2.8 Total Planning Mode

Planning for all activities, present and future. Decisions are made on the future according to the specific goals desired and all resources are organised. It is directed to output and forces actions to fit the proposed systems. Usually it is fairly prompt and direct effects are widespread and fairly controlled.
Blum (1978) outlines the terms in current usage to compare the planning modes under the dominant themes as follows:

a) Adaptation: is there balance of present and/or past orientation?
b) What is the future interventive orientation?
c) Is it idealistic or valuing promoting, as well as having a future orientation?
d) What client or participative orientation is present?
e) How is control orientated?
f) What time span is mooted?
g) How is the implementation to be achieved?
h) What are the boundaries used?

By looking at the planning mode under these orientations, one can attempt to formulate an evaluation of different planning modes. In analysing a problem one can take four different approaches.

i) Reference projection (where one continues on as in the past)
ii) Advance reference projection (exploratory)
iii) Wishful projection (normative)
iv) Planning projection (estimation of how far our planning can take us toward (iii) and from (i) and (ii)). The size of the gaps between (iii) and (ii) or (i) provide a quick review of what are likely to be the largest and most painful problems.

Another relevant dimension to consider when planning, is that of time scale which is typified by the distinction between long, medium and short term planning. This can be defined (WHO 1978) as follows:

**short term** - concerned with using resources currently available to meet problems already in evidence.
**medium range** - concerned with trends and problem that can be foreseen, and with resources likely to be available in the light of these trends.

**Long term** - concerned with deliberate attempts to intervene to alter such trends as can be modified and with finding acceptable means for the achievement of broadly desired goals.

The significant difference between short and long term planning, lies not in the time scale involved, but in the extent to which presently foreseeable trends can be modified. The time dimension also relates to uncertainty and hence to the extent to which it is sensible to think in terms of optimization (in the short term) or the adoption of robust policies (in view of long term uncertainties). *(Bloomfield 1992)*

### 3.3 REASONS FOR PLANNING

Health services are essentially social services and society accepts some responsibility for their availability and performance. They serve the needs of the ill, seek to prevent disease and set goals for the maintenance and promotion of health. They can be defined as purposeful processes in which health care personnel and other resources are organised and financed with varying degrees of formality and they strive to meet the health needs of the community. *(Bloomfield 1992)*

In modern societies these concerns have developed recognisable relationships which have been described as a health service system *(Beach 1982)*. The health system is one of the many service systems which have emerged to facilitate the attainment of health and quality of life in the individual and in the community. There is widespread belief that better management of health care is essential if social justice is to prevail and high standards of health care and, concomitantly, health care are to be achieved.
The following are typical of symptoms demonstrating the need for better management and the use of the tools for planning within the health service sector of the community (WHO 1978).

a) overlapping conflicting and competing organisation within the “health system”
b) widely scattered funding mechanisms with little control over costs
c) decisions on the mixture of facilities and services without references to population needs and no information about those who do not use the service - management being based currently met demand, not need.
d) No formal description and measurement of community needs, resources, expectation or priorities of concern.

There is a “need for a health plan within the context of, and in harmony with, national socio-economic development, with stated policies and definition of aims and objectives with established priorities inside the health system which take into account the essential needs of the population and the available resources (human material and financial) and for provision for public acceptance and participation and political endorsement. This need for planning is a response to increasing evidence of the effect of one being upon another. (WHO 1978)

3.3 APPLICATION TO THE HEALTH CARE SYSTEM

The health care system has been defined as “the mechanism that transforms a societies resources (knowledge, personnel, capital) into special services aimed at meeting the society health problems (WHO 1972). It includes all of the society’s institution, activities and efforts related to the health of its people.

If we take the existence of the health care system for granted and concentrate on the problem of adapting and changing this system in order to improve its performance, we are trying to “manage” the system( Purola 1978). This involves planning, as planning formalises the managerial process. It is necessary in planning to determine the characteristics for the values, goals and objectives underlying the political setting of the health system.
One can consider these characteristics \textbf{(Purola 1972)} as follows:

Firstly- health as a societal value. This is maximal when society takes full financial and organisational responsibility for promoting health care services.

Secondly- collectivism as opposed to individualism. The extent of individual and group tolerance to regulation and guidance. This is minimal when health and health care are viewed as problems of the individual unless they pose a direct threat to society.

Thirdly- the distribution of responsibilities. This is maximal when every citizen is eligible, in theory and practice, to the same standards of health care and health promotion and there are no barriers to utilization of services. Alternatively, this is negligible when no influence is exerted on the distribution of resources and services.

The health care system has both static and dynamic elements \textbf{(WHO 1972)}. Previously, the tendency has been to concentrate on the static material elements (e.g. dentist:population ratio, numbers of decayed teeth) because they are tangible and can be easily expressed in terms of numbers to the detriment of the dynamic elements (e.g. policy making, decision making processes, standards of performance, outcomes) and their relationship to social and political theory.

As planning is the tool that provides a rational basis for decision making, its application to the health care system is such that it can facilitate analysis of the dynamic elements which make up this system.

By analysing both the static and dynamic elements of the system (previously / traditionally only the static elements were studied), there will be a more accurate analyses of the totality of the factors acting on the health of individual and community. There are complex relationships between decision makers at political and administrative levels which are: central regulatory mechanisms at the macro level; regulation at the micro level by providers of services; and then there are the individual decision makers in their search for health care.
Health and its relative value to the individual and to the community is a dynamic concept. The intervention by society in this dynamic process to achieve positive change occurs by many pathways and decision are continually being made into which pathway to take (WHO 1976). This "choice between alternatives" is variously made using methods ranging from scientific research to individual subjective judgement. The appropriate mixture depends upon the difficulty of reaching a decision in the particular case and this is synonymous with uncertainty. (Cohen 1980)

1. Uncertainty regarding the effects likely to result from the alternatives under consideration (leading to demands for surveys or research)

2. Uncertainty as to values to be attached to effects of the alternatives (leading to requests for policies, guidance or political procedures)

3. Uncertainty regarding their decisions that will have to be made now or at some future time (leading to demand for planning)

Techniques available for reducing the first kind of uncertainties are a statistical analysis of data and forecasting, epidemiological and sociological surveys, field experiments and controlled trials, simulation studies, and input/output techniques (WHO 1976).

The second type of techniques include cost benefit analysis and cost effectiveness linear programming. However, the real pressure in the managerial environment is with the relationship with other decisions. This is where coordination and planning is important. Formal coordination procedures are PPBS (planning programing and budgeting system) and network analyses. As the health care system has been defined as a "transforming mechanism" it necessarily has a large component of decision making involving uncertainties. Hence one can understand that formal, techniques for reducing uncertainties can achieve there real impact by helping people to perceive their problems more adequately, by facilitating exact communication and by providing a basic structure of rationality and objectivity as a background to the interplay of transforming mechanisms which make up the health care system. (Cohen 1980)
4 HEALTH PLANNING IN PERSPECTIVE

As populations around the world become more and more interested in health problems of all types and search for appropriate solutions, ever larger proportions of valuable national resources are being spent on health (Bonnet 1992). There is a growing awareness that the ability of people to utilize health resources is almost limitless and yet there is a limit to the resources that can be devoted to health (Williams 1972).

Therefore, the need to plan and develop programs, that are directed to overcoming the most significant health problems, in the most efficient and effective manner, is critically important to the developed as well as to the developing nations. It is especially important to evaluate health programs to determine whether they are in fact achieving their intended purposes within the allowable costs.

This planning and evaluation process, to be effective, must be on a continuing basis and must feed back into and guide the decision on management and resources allocation (Reinke 1972). In dentistry, the need for planning to achieve wise utilisation of scarce resources is particularly important. Virtually every one needs access to dental health services, yet the amount of services that can be provided is grossly inadequate for this need.

4.1 HEALTH PLANNING LEVELS

Health planning within a country occurs at three levels (WHO 1972):

- national health policy formulation,
- national (or provincial/ regional) health program planning,
- health project formulation.

Planning at these levels takes place in all countries, sometimes explicitly as part of a continuous process of allocation of resources to health and related purposes by governments, organisations, or individuals.
4.1.1 National Health Policy Formulation

National health policies, either explicit or implicit, should provide guidance to non-health planners on the importance of health factors to national socio-economic development, and also to national or provincial health planners. Such policies provide long term political and socio-economic objectives and programs should adhere. When explicit, comprehensive, national health policies do not exist decisions are made nationally that implies the philosophies and policies of the decision-making bodies (WHO 1976).

4.1.2 National Health Program Planning

National health program planning is a process used to: identify priority health problems of prime concern to countries in the context of their development plan; to specify targets in these problem areas; to translate targets into health development programs to be accomplished during a plan period, through the identification of the activities, resource needs, and organisation required to attain those targets; to implement, evaluate and reformulate such programs on a continuing basis (WHO 1976). The purposes of National Health Programming are to:

- clarify the nature of existing health problems, as influenced by such factors such as technology, urbanisation, industrialisation, within the total social, economic, and political context;
- identify the important interrelationships between the health sector and the various social and economic sectors, and between the various components of the health sector;
- help to elaborate alternative strategies in a format that constitutes a basis for choice and that is useful to decision makers;
- promote and facilitate implementation of health development programs in high priority problem areas;
- identify program areas requiring well managed development projects: such areas could include existing programs, whether or not they need revision, and areas that are not yet covered by existing or planned programs;
- encourage improvements in health planning, project formulation, management and conduct of evaluation;
- improve national health plans for more effective allocation of resources. (WHO 1976)
4.2 ORAL HEALTH POLICY FORMULATION

National governments have policies that guide their actions regarding health issues. These policies may be complementary or disjointed and conflicting. They may be clearly stated and comprehensive, or they may not be stated at all. While comprehensive general health policy statements for nations are uncommon, precise statements of national policies regarding oral health are even more rare. Often national action or inaction is the only, or clearest, indication of an oral health policy (WHO 1976).

A National Oral Health Policy should reflect the national:

- commitment to the improvement of oral health;
- view of oral health program in relation to general health;
- view of the relative roles of the private and public sectors in delivery of dental services, including roles of indigenous practitioners;
- attitudes towards development, deployment, and utilization of all types of manpower involved in the health sector;
- relative priorities for receipt of services among age groups or other specific categories;
- attitudes towards the relative priorities of prevention and evaluation;
- willingness to invest in research and evaluation;
- expectation in terms of results from the use of public funds for dental programs;
- view of cultural practices that are harmful to oral health.

The more precise and understandable the policy statements, the more helpful they will be. Oral health policies must be formulated so that allowance is made for future modification to avoid such situations. One such possible change, in line with the interrelation of oral health policies, and in anticipation of oral disease control, is the integration in appropriate situations of dental and medical education, dentistry being one of the specialities of health care. (WHO 1976)
5 STAGES IN THE PLANNING PROCESS

Planning can be defined as "Basically a process of projecting and selecting alternatives for the future." (WHO 1971). The logical approach to planning requires the following steps:

i) Situation Analysis
ii) Problem Identification and Establishing Measurable Goals
iii) Strategy Selection and Choice of Programs to Achieve Goals
iv) Manpower Production Goals
v) Monitoring Evaluation
vi) Costing
vii) Documentation and Implementation of Plan
viii) Evaluation

5.1 SITUATION ANALYSIS

An analysis of the situation in which program planning and subsequent implementation will take place is essential to obtain an idea of the current health situation, to gauge the performance of the Health Service Delivery System, and to document the development of, and possible future changes in, these features. Without a thorough understanding of the milieu in which people obtain oral health care, attempts to improve oral health may be misdirected and wasteful. (WHO 1980)

Data required includes: epidemiological data; clinical record data; demographic data; selected socio-economic indicators; availability & accessibility of care facilities provided should be described; consumer attitude & behaviour towards the system; aetiological or predisposing factors relating to oral health problems- should be described if known; resources available; cost of financing, cost effectiveness of alternative methods & procedures.
5.1.1 Epidemiological Data

Epidemiological data from which inferences can be made for the whole or most of the population may be either available or unavailable. If they are available, it is necessary to consider whether they are recent enough (within 5 years) and if the data on age groups suitable for the planning are included. Provided the answers to the questions are in the affirmative there is no need to collect further data immediately. If there has been more than one survey, so that information exists on trends rather than on point prevalence only, the plan will have a sounder basis (WHO 1980).

If no data is available or there are serious gaps, it is necessary to collect sufficient data to make planning possible. The scope of a survey will depend on the level and detail of planning required. Most demanding situations and planning procedures can be satisfied by the use of WHO’s manuals of basic methods for oral health surveys (WHO 1971, 1977, 1987). The Combined Oral Health Status and Treatment Form from the manual is suitable for any level of planning. However a simplified extract may suffice in some cases (Figures 5.1 and 5.2) with measurement either being limited to dental caries, periodontal disease and fluorosis status, or including treatment requirements as well. (WHO 1980)

Sample number should be minimal. The use of a pathfinder survey methodology will help. According to this methodology, limitation of age groups and a judicious selection of a few cities and rural areas provides adequate data for planning from a survey of 240-250 subjects per age group. Collection of data can be completed within two weeks and processed by hand for immediate planning. There will be complex situation that call for more comprehensive sampling using a rigorous probability method, but it cannot be overemphasised that almost every planning situation in the oral health sector will save time and expense by the use of the pathfinder survey.
Figure 5.1 Simplified WHO Basic Oral Health Assessment Form  
Source: WHO 1980

<table>
<thead>
<tr>
<th>FLUOROSIS</th>
<th>DENTAL CARIES STATUS</th>
</tr>
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<tbody>
<tr>
<td>(22)</td>
<td>55 54 53 52 51 61 62 63 64 65</td>
</tr>
<tr>
<td></td>
<td>18 17 16 15 14 13 12 11 22 23 24 25 26 27 28</td>
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</tr>
<tr>
<td></td>
<td>48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38</td>
</tr>
<tr>
<td>PERIODONTAL STATUS</td>
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</tr>
<tr>
<td>Absent = 0</td>
<td>PERM.</td>
</tr>
<tr>
<td>Present = 1</td>
<td></td>
</tr>
<tr>
<td>SOFT DEPOSITS</td>
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</tr>
<tr>
<td>max. (30)</td>
<td>A 0</td>
</tr>
<tr>
<td>mand. (33)</td>
<td>DECAYED</td>
</tr>
<tr>
<td>(35)</td>
<td>B 1</td>
</tr>
<tr>
<td>CALCULUS</td>
<td>Filled &amp; Caries Free</td>
</tr>
<tr>
<td>max. (36)</td>
<td>C 2</td>
</tr>
<tr>
<td>mand. (39)</td>
<td>Filled with Primary Decay</td>
</tr>
<tr>
<td>(41)</td>
<td>D 3</td>
</tr>
<tr>
<td>INTENSE GINGIVITIS</td>
<td>Filled with Secondary Decay</td>
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<tr>
<td>max. (42)</td>
<td>E 4</td>
</tr>
<tr>
<td>mand. (45)</td>
<td>PERMANENT TEETH MISSING DUE TO齒 CARIES</td>
</tr>
<tr>
<td>(47)</td>
<td>(UNDER 30 YRS ONLY)</td>
</tr>
<tr>
<td>ADVANCED PERIODONTAL INVOLVEMENT</td>
<td>PRIMARY</td>
</tr>
<tr>
<td>max. (48)</td>
<td>PERMANENT TEETH MISSING DUE TO CARIES</td>
</tr>
<tr>
<td>mand. (51)</td>
<td>OTHER THAN CARIES (UNDER 30 YRS ONLY)</td>
</tr>
<tr>
<td>(53)</td>
<td>PERMANENT TEETH MISSING DUE TO CARIES</td>
</tr>
<tr>
<td>NB. Central segments include cusps and incisors, left and right segments include molars and premolars</td>
<td></td>
</tr>
</tbody>
</table>

CARD No. (80) 1  
CARD No. (80) 2
Figure 5.2  WHO Basic Oral Health Assessment Form
Source: WHO 1980

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

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<tr>
<th>Study Number</th>
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<th>Registration Number</th>
<th>Other</th>
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<td>(1) J 2 (5)</td>
<td>(6) (7) (8) (11)</td>
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</tr>
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</table>

### PERSONAL AND DEMOGRAPHIC INFORMATION
- Sex: M = 1  F = 2  Other (13)
- Age in years (14) (15)  Geographic location (18) (19)

### PERIODONTAL STATUS
- Absent = 0  Present = 1

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<thead>
<tr>
<th>SOFT DEPOSITS</th>
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<th>Max.</th>
<th>Mand.</th>
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<td>(47)</td>
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<td>(50)</td>
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<td></td>
<td>(57)</td>
<td>(59)</td>
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<table>
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<th>ADVANCED PERIODONTAL INVOLVEMENT</th>
<th>Max.</th>
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<td>(60)</td>
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</table>

NB. Central segments include cuspids and incisors left and right segments include molars and premolars

CARD No. (80) 3

### FLUOROSIS
- Present = (29)

### PERIODONTAL TREATMENT
- None = 0
- Oral Hygiene Instruction = 1
- Prophylaxis and OHI = 2
- Periodontal therapy (no extractions) = 3
- Therapy with one or more extractions = 4
- Full extraction = 5

### DENTAL CARIES STATUS AND TREATMENT OF TEETH

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<th>CARIES (44)</th>
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<table>
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### DENTAL CARIES

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<tr>
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<th>FILLED &amp; CARIES FREE</th>
<th>FILLED WITH PRIMARY DECAY</th>
<th>FILLED WITH SECONDARY DECAY</th>
<th>PERMANENT TEETH MISSING DUE CARIES</th>
<th>PERMANENT TEETH MISSING ANY REASON OTHER THAN CARIES</th>
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### PERMANENT TREATMENT

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</tr>
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<td>periodontal disease</td>
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<tr>
<td>dentures</td>
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<td>other reason</td>
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OTHER (specify) (9)

CARD No. (80) 4
5.1.2 Records Data

Records data are vital for the planning of oral health services at every level, but more especially where little or nothing else can be done but meet the demand for care. Records naturally tend to be fewer or less complete when resources are scarce, which is precisely when the records are most needed (WHO 1980). However, there are always some records available and crude estimates can usually be derived from them of the demand for oral health care that has been met at health or oral health facilities by dental or other health and non health personnel. What are required are estimates of the population demanding care, if possible according to age groups, type of facility, type of care, and type of personnel.

5.1.3 Other Data

The minimum statistical data required are (WHO 1979):

a) Population estimates subdivided into urban, rural, school age, and enrolment categories. Other groups specially relevant to planning in some countries e.g religious groups, group with special life style, customs, habits. The population increase per annum is essential together with at least a 10 year projection

b) School enrolment statistics subdivided into primary, junior secondary and senior secondary categories

c) Per capita income, gross domestic product, total government resources or similar criteria of the country economic potential

d) The health budget and statistics relating to health manpower and facilities and health training institutions

5.2 MEASURABLE GOALS

There are two main types of measurable goal that relate to disease measurement and to coverage of the population. Common pitfalls in goal setting are vagueness and over-optimism or excessive ambition, the former leading to confusion, the later to abandonment of plan. Goals give an opportunity to see how the plan is being carried out and to adjust it accordingly to what has been achieved and what is required. Goals for oral health can be precise and should therefore be soundly based and capable of attainment. An indicative planning figure for the availability of manpower and of funding is an essential prerequisite in planning and must be established following the situation analysis and as a prelude to goal setting.
5.3 MANPOWER PRODUCTION GOALS

The basis of integrated planning is interdependence of all parts of the plan. Integration most often fails in relation to manpower (WHO 1982). Planners and administrators set goals and start programs without due regard to what numbers and type of staff are available or can be trained within the life of the plan. When setting service goals the manpower needs must be calculated and the goals constantly modified in the light of practical possibilities (Barmes 1976).

The sequence of steps is (WHO 1982):

1) to calculate the total manpower requirement to achieve the goals;

2) to consider how the manpower is to be distributed among professionals (dentist) operating auxiliaries (e.g. dental therapist or dental hygienist), non-operating auxiliaries (e.g. dental assistants or dental technicians) and other supporting staff (e.g. health auxiliaries, school teachers, and parents);

3) to assess what is actually possible with the manpower available and the training programs that are in operation or can be developed in time;

4) to modify the goals according to the assessment in step (3) if there is no combination that can satisfy the numerical requirement of step (1);

5) to recalculate the total manpower requirement.

5.4 MONITORING AND EVALUATION

The aim of monitoring and evaluation is to assess the relevance of the programs of a particular plan to the set goals. The assessment may be quantitative, concerned with population coverage and disease levels, or qualitative, concerned, for example with the proportion of acceptable restorations. An appropriate time for assessment in a ten year plan is the fifth year, to see if the plan should be modified within its duration, and again then no later than the ninth year, to be able to replan for the next ten years (WHO 1979). The aim in monitoring and evaluation is to produce, by the fifth and ninth years of a ten year plan, an assessment of achievement for all the goals and an indication of the modification and extension of programs needed.
5.5 BUILDING EQUIPMENT AND SUPPLIES

No plan will be viable, let alone a plan for oral health, unless it contains an inbuilt plan for buildings, equipment, and supplies meeting the requirements of the various service and manpower development goals. This part of the plan will play a very important role in the costing and have great influence on the adjustment of the service and manpower goals to the financial resources available. Here it suffices to stress the need to provide specific clinical and office facilities for each type of manpower and each service planned, facilities that must keep pace with manpower production and expansion plans (WHO 1982).

5.6 COSTING OF THE PLAN

An indicative planning figure for manpower and funds is a prerequisite for planning otherwise the whole process of planning may have to be repeated because the cost of the programs may far exceed the financial resources available (WHO 1982). However the use of an indicative planning figure does not guarantee that some trimming of a plan will not be necessary during costing.

Costing of the plan should show the real cost of oral health services to the community. In the past, not only have private sector costs been ignored, but considerable expenditure on oral health not specifically labelled as such have also been omitted. For example, the cost of fluoridation plant and its operation has been absorbed in water authority budgets, the administrative costs of oral health services are concealed in a general health budget, and health education and manpower production often appear under other headings. Each main activity or subprogram should be costed for salaries, buildings, equipments, materials, and administrative (including travel) and other costs.
6 PLANNING DESIGN FOR PREVENTIVE PROGRAM

Oral health problems arise mainly as a result of two oral diseases: dental caries and periodontal disease. Although the prevalence of these two diseases is changing, it remains true that virtually every adult in the world has an experience of either dental caries or periodontal disease, or both (WHO 1982).

Satisfactory oral health is difficult to achieve throughout the developing world not only because of increase of oral disease but also the lack of preventive programs and complementary dental services and shortage of manpower and other resources. In developing countries it is common to have only one out of every hundred teeth filled, in some the score is virtually zero.

In most countries oral health services were developed initially on the restorative/rehabilitative approach. That approach was enormously expensive and did not cope adequately with the problems, (on average fifty percent of the elderly were toothless) until the focus on prevention. It is clear that combating oral disease mainly by increasing manpower and by improving the treatment system has not achieved the desired levels of oral health despite ever increasing expenditure.

The three most important preventive approaches which can be implemented in countries at all levels of development are oral hygiene, optimal use of fluorides, and dietary control of sugars. Personal oral hygiene is the single most effective measure for periodontal disease prevention, and it also has an important role in caries prevention since fluorides can also be applied through personal care. Whereas community water fluoridation programs require a certain technological sophistication, self care is effective, available to all, and thus of great importance globally to improved oral health. The whole area of health education and promotion aimed at optimising self care and minimising intervention is of prime importance in planning a preventive program. (WHO 1987)
6.1 DEVELOPING PLANNING COMPETENCE

It is particularly important to ensure that the health activities fit general health desires and hence the proportionate representation of consumers should be great. In many types of program planning and project planning, which should themselves fit in with general comprehensive plan, the particular competence required is more technical in nature; thus, representation on the policy making group can be weighed more toward the health professional. Effective planning, however, requires the ability to move easily at all administrative and organisational levels and lines of communication. The planning and implementation of oral health programs - both curative and preventive - can be complex and confusing unless certain steps are followed at logical sequence. Competency in planning also means to be logical and sequential in the steps to be taken as previously discussed. (WHO 1982)

6.2 A COMMON APPROACH IN PLAN DEVELOPMENT.

The common steps in plan development are (WHO 1982):
- Problem identification
- Setting of objectives
- Selecting preventive measures
- Implementation of programs
- Evaluation of preventive programs.

The interaction of these processes is illustrated in Figure 6.1. Running throughout the planning process described, and all preventive programs, there is an educational component which is of concern to both the organisers and recipients of different programs (WHO 1987). All preventive programs also have implications regarding manpower of different types.
It is important to know that a preventive measure can be empirically conceived and successfully implemented without knowing how it operates (WHO 1980).

This may be by:

a) controlling or eradicating the causative agents, or what are sometimes called etiological factors;

b) controlling or eradicating any contributory factors, which of themselves do not cause the disease but either allow other agents to initiate the disease or contribute to its severity;

c) increasing resistance to attack by the causative agent

Another important aspect of the prevention of disease is the stage at which preventive measures are instituted. For example, it is sensible to initiate preventive measures before any signs of disease have developed. This is called primary prevention. However, once the disease has developed, intervention is required to promote recovery and thus to shorten the illness and avoid terminal consequences. This is called secondary prevention and by definition includes all clinical treatment. If the illness has progressed to a conclusion that results in loss or impairment of function in one way or another then intervention is required at an appropriate stage during the illness, or at the end, to limit the amount of functional impairment or to restore function in the damaged area or system. This is called tertiary prevention. (WHO 1980)

Preventive programs may be implemented by oral health administrators at national, district or local levels. The preventive program may be large or small, comprehensive or restricted, focusing on total population or specific target groups. The choice depends on needs, resources, and program goals. It describes the most important preventive measures and the planning process itself.
Figure 6.1  Preventive program design
Source: WHO 1987

These mechanisms are well illustrated in the prevention of dental decay and are discussed fully in Annexes 1 and 2.
6.3 PROBLEM IDENTIFICATION

Before any preventive program can be designed for a particular oral disease or condition, the problem must be clearly recognised and understood. This process of recognition and understanding will involve the study of each specific oral disease or condition in its social context. To do this, data must be collected concerning the following variables (WHO 1980).

- demography and population dynamics
- environmental conditions
- manpower and physical resources available
- oral health status

To facilitate the collection of these data and to avoid omissions and inaccuracies as far as possible, WHO has developed a simple recording sheet (Figure 6.2 WHO 1980). It should be stressed, however, that the particular emphasis adopted during the collection of these data will be dependent upon the specific problem under investigation.

In addition to collecting demographic and related data, such as information about population size, age structure (in broad standard age groups where available), school-age population attending school, and population distribution (rural, peri-urban, urban), it is important to assess:

- general disease levels (assessed using statistics such as the mortality rate)
- prevalence of other diseases in the country or community
- per capita income
- degree of literacy in the population
- trends in living standards
- level of use of substances harmful to oral health.

These data are not only important in defining the extent of the problem and its effects on the population, but are also useful when planning the manpower needed for preventive programs.
6.4 SETTING OBJECTIVES

Objectives should be selected following careful consideration of the data gathered during the analysis of the national or local situation. The objectives of a preventive program should be realistic and based on the resources available both financial and others. They must also be compatible with the objectives of other sectors of the health service. During program development and the selection of preventive measures, at any level, the following questions need to be answered (WHO 1976):

a) which oral health problems should be prevented?

b) which oral health problems can be effectively prevented?

c) which are the (target) groups for the planned program?

d) how quickly can the objectives be achieved?

(e) what resources (financial, physical, and manpower) are, or could be made, available to the program?

The objectives for preventive programs should be defined in measurable terms. They should form the basis for the listing and execution of specific preventive tasks and should be used to evaluate the effectiveness of the program, including the cost involved and the benefits obtained. As an illustration, general long term objectives could relate to (WHO 1976):

- increasing the number of teeth present, on average, in a specific age group

- decreasing the percentage of the population who are edentulous in a specific age group.

Specific goals or objectives should be set for the prevention of dental caries, periodontal disease, and other diseases and conditions. The achievement of goals for prevention must be considered on the basis of reaching, and then maintaining, the low level of disease set out in the objectives. The duration of the initial phase will vary according to the particular preventive method used, for example whether fluoride use is mainly systemic or topical. (WHO 1976)
Figure 6.2  Oral health situation analysis: WHO record sheet
Source: WHO 1980

1. Demographic and related facts

Population estimates

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
<th>Projected</th>
<th>Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URBAN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RURAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCHOOL AGE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCHOOL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Increase</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of schools and schoolchildren

<table>
<thead>
<tr>
<th>Age Range</th>
<th>PRIMARY</th>
<th>INTERMEDIATE</th>
<th>SECONDARY</th>
</tr>
</thead>
</table>

Per capita income:  
GNP:  
Health expenditure: % of total Government resources  
Total Government resources:  
Education expenditure: % of total Government resources

2. Health manpower and facilities
Figure 6.2  Oral health situation analysis: WHO record sheet (continued)
Source: WHO 1980

3. Oral disease data

<table>
<thead>
<tr>
<th>Caries</th>
<th>12 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>None</th>
<th>Slight</th>
<th>Moderate</th>
<th>Severe</th>
<th>Edentulous</th>
</tr>
</thead>
</table>

4. Oral health services

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Fillings</th>
<th>Extractions</th>
<th>Scaling and prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital dental service</td>
<td>School dental service</td>
<td>Private practice: Average number of patients/dentists/year:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prosthetics</th>
<th>Orthodontics</th>
<th>Fractures, minor surgery and root canal treatment</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full dentures</td>
<td>Partial dentures</td>
<td>Crown and bridge</td>
<td>Repairs and relining</td>
</tr>
<tr>
<td>Estimate of population receiving care</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

38
Outlined below are examples of specific objectives that can be established for preventive programs.

a) **Prevention of dental caries**

A reduction in the incidence or prevalence of dental caries can be specified either in terms of an increase in the number of persons, by age group (or percentage of a population) free of caries, or by a decrease in the mean number of decayed, missing, and filled permanent teeth (DMF). A secondary goal might be to reduce the unmet need by specifying the size of the filled component of DMF.

b) **Periodontal disease**

Goals may be stated in terms of the percentage of the population, or mean number of sextants, with gingival bleeding, calculus and pocketing at a given age, or in a standard age group, and according to the Community Periodontal Index of Treatment Needs (CPITN index) (Barmes 1977). Related to such goals are those for oral hygiene that are expressed either according to accepted indices measuring debris or plaque, or as the percentage of the population practising specific oral hygiene activities.

c) **Oral cancer and mucosal conditions**

Objectives may be expressed in terms of the elimination of habits or agents predisposing to these conditions, or as a reduction in the number of persons or percentage of the population with specific conditions.
6.5 SELECTING PREVENTIVE MEASURES

The selection of a specific method of oral disease prevention depends upon the factors already discussed (in 6.3 & 6.4), (WHO 1980). The selection of a specific method will depend upon the identification of oral health problems, the setting of goals or objectives to be achieved by the program, and by analysis of the advantage and disadvantages of alternative method of prevention. The actual processes of problem identification, goal setting, and the selection of methods of prevention and program design must, as far as possible, involve both oral health workers and representatives of the community, i.e. those who have the oral health problems.

At the national level, relevant data (listed in 6.3) should first be reviewed and national goals for oral health should be set. Secondly, broad preventive strategies have to be identified that are consistent with attainment of the set goals. Thirdly, oral health personnel and health planners need to be informed about goals and strategies and to understand how they were derived. The goals and strategies adopted at the national level must be consistent with the development of preventive oral health initiatives at the local level. At the national level, all policies should, as far as possible, enhance local initiatives, particularly with respect to the allocation of resources and materials. (WHO 1980)

At the local community level, health personnel must work within the community assisting local populations to identify their particular oral health problems. The local community can participate in both the setting of realistic objectives for the preventive programs and the identification of appropriate methods of achieving them with the resources and materials available (Howard 1972). Naturally, the approach adopted will reflect local levels of development. The local oral health goals and preventive programs selected should be consistent with the national goals and strategies that have been set in so far as is possible and appropriate.
The following factors should influence the way in which measures for a preventive program are selected (WHO 1980).

a) Prevalence of oral disease and oral health care status.
b) The type of manpower to be involved in the preventive program.
c) Funds (available and expected budget allocation).
d) Systems of health care.
e) Perceived need to reduce the disease and conditions.
f) General health of the population, including nutritional status.
g) Diet, particularly sugar consumption.
h) Chemical composition of drinking water.

The most common preventive measures recommended by WHO (1980) can be grouped into the following areas:
- diet control
- oral hygiene instruction
- systemic use of fluoride
- topical or surface application of fluorides, sealants, and varnishes
- secondary prevention

Health education and promotion should accompany the introduction of preventive measures in all of these areas. When selecting preventive measures, their cost and the availability of personnel should be considered (Table 1 WHO 1987).
6.6 IMPLEMENTATION OF PREVENTIVE PROGRAMS

Oral health administrators should make a preliminary outline of the whole oral disease prevention program, prior to preparing detailed planning measures. (WHO 1980) This preliminary plan is based on the results of the situation analysis of oral health problems and related data, and its form will also depend on the resources available. Objectives for prevention can be defined and appropriate strategies based on scope and feasibility can be selected. At this stage, it may become apparent that the manpower and financial resources available are not sufficient for the implementation of the preliminary program design. If this is the case, it will be necessary to:

a) reconsider the strategy and make new decisions that are compatible with the resources available and the development of manpower; and to

b) design a detailed plan.

6.6.1 Organisation and Administration

The planning and implementation of preventive programs are the responsibility of oral health administrators (chief dental officer, of a country, district etc) who are usually dentists by education and have experience in administration work. Planning procedures should, in any case, be in agreement with the policies of the government, ministry of health or other relevant ministries, such as the ministry of education, and local authorities. Local health services, planners, economists, and statisticians should also be encouraged to help.

An administrator should include the following activities in his/her checklist
- approval of a program for oral disease prevention by local authorities.
- provision of funds
- appointment and training, as necessary, of the staff concerned
- identification of community activities
- development of the program schedule
- delivery of the preventive procedures
- monitoring evaluation of the program.
Table 1 Preventive measures: mass measures and limited measures for specific population Source: WHO 1987

<table>
<thead>
<tr>
<th>Mass measures</th>
<th>Personnel involved</th>
<th>Cost per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoridation of water</td>
<td>Water plant engineer or operator</td>
<td>low</td>
</tr>
<tr>
<td>Fluoridation of salt</td>
<td>Salt plant engineer</td>
<td>low</td>
</tr>
<tr>
<td>Fluoride toothpaste</td>
<td>Individual/ family</td>
<td>low</td>
</tr>
</tbody>
</table>

LIMITED MEASURES FOR SPECIFIC POPULATIONS (e.g., children or institutionalised population)

<table>
<thead>
<tr>
<th>Mass measures</th>
<th>Personnel involved</th>
<th>Cost per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride tablets</td>
<td>Dental auxiliary/ family</td>
<td>medium</td>
</tr>
<tr>
<td>Fluoride mouth rinses</td>
<td>Dental auxiliary/ family</td>
<td>medium</td>
</tr>
<tr>
<td>Fluoride gels</td>
<td>Professional</td>
<td>high</td>
</tr>
<tr>
<td>Fluoride gel</td>
<td>Dental auxiliary/ family</td>
<td>medium</td>
</tr>
<tr>
<td>Fluoride vanishes</td>
<td>Dental auxiliary/ family</td>
<td>medium</td>
</tr>
<tr>
<td>Topical fluoride</td>
<td>Dental auxiliary</td>
<td>high</td>
</tr>
<tr>
<td>Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fissure sealants</td>
<td>Dental auxiliary or professional</td>
<td>medium</td>
</tr>
</tbody>
</table>
6.6.2 Target Group

Groups of people who are at high risk of developing oral disease should be identified for special attention, eg; children, pregnant woman, or factory workers. WHO and the International Dental Federation have established global goals for the year 2000 for certain index ages 5-6, 12, 18, 35-44 and more than 65 years. The first two index ages represent the preschool and primary school target groups. At 18 years and for some years afterwards, programs can be developed through the armed services, the workplace, and maternal and child health facilities. At 35-44 and 65 years and over invaluable assessment of the efficacy of the program can be made of services on demand and in the workplace, and of services for the elderly (including domiciliary services). In developing countries, 15 may replace 18 years as an index age because adolescents leave school at an early age. In such cases, the early adulthood target age group is advanced by three years.

If it is not possible for the preventive program to cover all children, efforts should be concentrated on the group aged 6-7 years since their first molars will have just erupted and will need protection.

In large countries where there is a marked differences in the prevalence of dental caries and other oral diseases in different areas, the target groups are those that have the highest disease prevalence level or evidence of high risk. (Canvin and Boldy 1986)

6.6.3 Manpower Needs

The implementation of a preventive program in a community could be organised by the same personnel who are involved in the provision of oral care services: dentists, operating auxiliary, nonoperating auxiliaries, and oral hygienists. In addition, non-dental manpower such as health educators, teachers, nurses, and water services personnel should also be involved. (Mahler 1979)

The type and number of personnel needed to implement a preventive program depend on its structure and scale. Table 2 (WHO 1987) shows the estimated manpower needed for different preventive measures and activities.
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Manpower type</th>
<th>Manpower calculation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and management of</td>
<td>Health administrator</td>
<td>One part time for whole</td>
<td>Time requirement for planning: 2 weeks first</td>
</tr>
<tr>
<td>program</td>
<td></td>
<td>country</td>
<td>year; 1 week a year for 5 years</td>
</tr>
<tr>
<td>Consultant (as required)</td>
<td>Oral health administrators</td>
<td>One part time for whole</td>
<td>Time requirement: quarter time during six</td>
</tr>
<tr>
<td></td>
<td></td>
<td>country</td>
<td>months of first year; 2 weeks for replanning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and evaluation</td>
</tr>
<tr>
<td>Statistician</td>
<td>One quarter- time per</td>
<td>One quarter- time per</td>
<td>These times can vary considerably depending</td>
</tr>
<tr>
<td></td>
<td>oral health care system</td>
<td>oral health care system</td>
<td>on experience and efficiency of the persons</td>
</tr>
<tr>
<td></td>
<td>Or 1 per 1000 personnel</td>
<td>or 1 per 1000 personnel</td>
<td>and authorities concerned</td>
</tr>
<tr>
<td></td>
<td>of all kinds involved in</td>
<td>of all kinds involved in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>preventive program</td>
<td>preventive program</td>
<td></td>
</tr>
<tr>
<td>Secretary</td>
<td>One to every planner</td>
<td>One to every planner</td>
<td></td>
</tr>
</tbody>
</table>

Source: WHO 1987
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Manpower type</th>
<th>Manpower calculation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral health education</td>
<td>Dentists Auxiliaries</td>
<td>One per 100 000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School teachers Public</td>
<td>Population for each</td>
<td></td>
</tr>
<tr>
<td></td>
<td>health personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School health</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary health care workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral hygiene instruction</td>
<td>Oral hygienist</td>
<td>One from this list per 2400</td>
<td>Time requirement</td>
</tr>
<tr>
<td></td>
<td>Other auxiliaries</td>
<td>People for each category in</td>
<td>6 min tooth</td>
</tr>
<tr>
<td>(tooth-brushing)</td>
<td>School teachers Kindergarten</td>
<td>the list</td>
<td>brushing per</td>
</tr>
<tr>
<td></td>
<td>Nurses, primary Health care workers</td>
<td>30 min per wk</td>
<td>for a teacher</td>
</tr>
<tr>
<td>Water/salt fluoridation</td>
<td>Engineers</td>
<td>Quarter time worker per</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technician</td>
<td>100 000 people</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health personnel</td>
<td>One or two people of this</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School teachers</td>
<td>per 100 000 people</td>
<td></td>
</tr>
<tr>
<td>Topical fluoride rinsing or toothpaste</td>
<td>Therapists, dentists</td>
<td>One per 14 400 people</td>
<td>Time requirement:</td>
</tr>
<tr>
<td></td>
<td>Public health care Workers</td>
<td></td>
<td>5 min per 30 children, per</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>weekday</td>
</tr>
</tbody>
</table>
Table 2  Personnel for a preventive program (continued)
Source: WHO 1987

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Manpower type</th>
<th>Manpower calculation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling</td>
<td>Dentist, oral hygienist</td>
<td>One per 3000 patients</td>
<td>Time requirement</td>
</tr>
<tr>
<td></td>
<td>Operating auxiliaries</td>
<td></td>
<td>Average of 30 min per person depend upon amount of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Calculus; Heavy deposits require</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>More time in adults</td>
</tr>
<tr>
<td>Diet control</td>
<td>Dentists, health workers doctors, community dieticians health educators</td>
<td>One part time (quarter-time) per 100 000 people</td>
<td>Calculation of manpower requirement is done</td>
</tr>
<tr>
<td>Systematic school oral health services</td>
<td>Dentists operating auxiliaries</td>
<td>Depending on oral disease prevalence and type of care</td>
<td></td>
</tr>
</tbody>
</table>
6.6.4 Cost Estimation

The costs involved depend on the type and scale of the preventive program; they include the staff salaries, equipment and material costs, transport, and travel expenses. The main cost component of different preventive measures are summarised in Table 3 (WHO 1987). Among all preventive measures the most expensive procedures are those that are professionally applied.

The following information will be needed by a planner to calculate the overall cost of the program:

- number of people to be covered by the program,
- preventive procedures employed,
- price of selected preventive materials,
- salaries of personnel,
- cost of equipment / facilities,
- transport,
- other costs.
<table>
<thead>
<tr>
<th>Activities and Measures</th>
<th>Cost Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning administrative management</td>
<td>Salaries, duty travel, transport</td>
</tr>
<tr>
<td>Oral health instruction</td>
<td>Salaries, aids for education</td>
</tr>
<tr>
<td>Oral hygiene education</td>
<td>Salaries, oral hygiene aids</td>
</tr>
<tr>
<td><em>Local preventive procedures:</em></td>
<td></td>
</tr>
<tr>
<td>- scaling</td>
<td>Salaries, instruments</td>
</tr>
<tr>
<td>- mouth rinsing</td>
<td>Salaries, materials</td>
</tr>
<tr>
<td>- tooth brushing, toothpaste</td>
<td>Toothbrushes, oral hygiene aids</td>
</tr>
<tr>
<td></td>
<td>toothpaste, salaries</td>
</tr>
<tr>
<td>- varnishing, sealants, gels</td>
<td>Materials, salaries</td>
</tr>
<tr>
<td>Fluoride tablets</td>
<td>Tablets, salaries</td>
</tr>
<tr>
<td>School water fluoridation</td>
<td>Facilities for fluoridation, pay</td>
</tr>
<tr>
<td>Central water fluoridation, salt fluoridation</td>
<td>Facilities/ fluoride, salaries</td>
</tr>
<tr>
<td>Diet control</td>
<td>Sugar substitutes</td>
</tr>
<tr>
<td>Comprehensive oral health care</td>
<td>Salaries, equipment/ materials</td>
</tr>
</tbody>
</table>
7 EVALUATION PROCEDURES

Evaluation should include the following levels (WHO 1987):

I) the content (validity and appropriateness). Is the content of the educational age consistent with available scientific evidence and also appropriate to the resources of the people?

ii) the process (acceptance by provider and target population). Do people make use of the preventive measures available to them?

iii) the outcome (behavioural and other changes). Effective oral education should result, at best, in improved levels of oral health and, at worst, in no deterioration. The levels of oral health can be determined quite simply using various indices that measure, for example, the amount of dental decay or gum or other disease that has been experienced by individuals and/or the whole population. However, any changes in these indices will reflect not only the impact of the oral health education program but also all preventive measures directed at improving oral health, and they are therefore not as specific as might be desired.

7.1 ORAL HYGIENE INSTRUCTION

To a certain extent, progress in the appropriate use of oral hygiene practices in a community could be evaluated on a short term basis using simple criteria. Indicators that may be used to assess the effectiveness of the hygiene methods used and the impact on oral health are indices of oral plaque and debris that can be recorded before and after oral hygiene activities (WHO 1987). The following additional indicators could also be of use:

a) statistics showing how many lectures, booklets and other oral hygiene educational materials were made available to the population.

b) figures showing how many people, or groups of people, are involved in oral hygiene education programs at different levels.

c) number of toothbrushes, amount of toothpaste, etc, used per person in a given community.

d) trends in oral health or disease in relation to improvements in oral hygiene.
7.2 DENTAL CARIES

Specific evaluation of the effectiveness of preventive programs for dental caries can be obtained by assessing DMF scores in each age group, or by calculating the percentage of the population that is caries-free. In addition, evaluation of the effectiveness of preventive intervention can be made by (Forester and Schultz 1974):

- measuring fluoride levels in the water supply
- monitoring the fluoride concentration in the urine of persons consuming systemic fluorides
- assessing the retention of sealants.

This type of evaluation can be carried out at any time, whereas it has been suggested that an evaluation be made every 5 years after the start of the program.

7.3 PERIODONTAL DISEASE

The effect of preventive program for periodontal disease may be calculated using the mean number of sextants affected by disease using the Community Periodontal Index of Treatment Needs (CPITN). (Forester and Schultz 1974)

Initial evaluation of school- or group-based oral hygiene program may take place after 4-6 weeks of oral hygiene practice using the mean number of sextants with plaque per person. Subsequent evaluation should be carried out at three-monthly intervals to determine whether the observed changes are sustained.

The percentage reduction in tooth loss and changes in prevalence of periodontal disease can be used for general evaluation. Precise results are available only after long-term evaluation. The effectiveness of oral health education and oral hygiene instruction can be evaluated using short- and mid-term evaluation periods.
7.4 EVALUATION SCHEDULE

Periodic evaluation is most important. It is recommended that dental plaque indices are used for short-term (up to 2 years) evaluation, and the DMFT/DMFS and the CPITN indices for long-term (more than 2 years) evaluation. (WHO 1987)

Preliminary evaluation should include an assessment of public acceptability of the preventive program as well as the degree of participation of the population involved.

Medium term evaluation may reveal some drawbacks and unexpected problems related to funds and manpower. At this stage it may be necessary to modify the program or to set new goals and objectives.

Final evaluation of a preventive program is possible only after a period of 5-10 years or more. Programs must be monitored regularly to determine compliance and correct usage. In order to be able to make any necessary alterations to an ongoing project, some components of a program may need to be reviewed yearly; for example, the effect (if any) of oral hygiene instruction given to children.

Final evaluation should include a cost-effectiveness analysis. The cost effectiveness ratio is defined as the cost of program implementation divided by the savings made in the cost of treatment.

The following Tables 3, 4 and 5 summarise, respectively, the goals, possible manpower types for various services, and items of costing. (WHO 1980)
<table>
<thead>
<tr>
<th>Table 3</th>
<th>Summary of planning steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: WHO 1980</td>
<td></td>
</tr>
</tbody>
</table>

**PREVENTION**

i) *Caries*: DMF figure at 12 years of age. Percentage of 12-year old children free of caries.

ii) *Periodontal disease*: Percentage of population with calculus, pocketing and gingivitis or bleeding at 15 years of age.

iii) *Oral hygiene*: Percentage of population practising specific oral hygiene activities.

iv) *Other goals for specific situations*: Percentage or other numerical expressions, as appropriate.

v) *Overall long term-goals*: Mean number of standing teeth at age 35-44. Percentage of population totally edentulous at age 35-44.

**SERVICES**

i) *Services on demand*: Percentage of population seeking care.

ii) *Systemic care*: Population groups to be included and coverage. Type and quality of care.

**MANPOWER**

i) *Production*: Output of planned types and number of personnel

ii) *Distribution*: Number and types of personnel in various services.
<table>
<thead>
<tr>
<th>Program</th>
<th>Possible Type of Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevention</strong></td>
<td></td>
</tr>
<tr>
<td>a) Water fluoridation</td>
<td>Engineers, plant and laboratory technician</td>
</tr>
<tr>
<td>b) <strong>Group procedures</strong>: brushing or rinsing</td>
<td>a) Administration, organisation and supervision- therapist, dentist, public health workers</td>
</tr>
<tr>
<td>c) <strong>Health education</strong></td>
<td>b) Regular activities- auxiliaries (medical or dental), health educators, school teachers, school nurses, primary health workers.</td>
</tr>
<tr>
<td><strong>Services</strong></td>
<td></td>
</tr>
<tr>
<td>a) <strong>Services on demand</strong></td>
<td>Dentists, therapist, medical auxiliaries, primary health workers, technicians, chair side assistants.</td>
</tr>
<tr>
<td>b) <strong>Systemic care</strong></td>
<td>Dentists, therapists, school dental nurses, primary health workers</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>Dentists, auxiliaries, public health staff, other teachers</td>
</tr>
<tr>
<td><strong>Central administration</strong></td>
<td>Dentists, public health personnel, therapists, health educators, secretaries</td>
</tr>
</tbody>
</table>
### Table 5 Costing check list

Source: WHO 1980

<table>
<thead>
<tr>
<th>PREVENTIVE PROGRAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a) Fluoridation of water:</strong> Capital costs of machinery installation, repair and maintenance, running costs, materials (fluoride salts), laboratory costs (monitoring F in water).</td>
</tr>
<tr>
<td><strong>b) Group procedures</strong> (brushing, rinsing and health education): Salary costs of staff involved- calculated as man-year equivalent of teachers, dental and medical auxiliaries, etc; materials, equipment and transport</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRAINING INSTITUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of institutions, salaries, equipment and materials, repair and maintenance, grants and living costs of students, teaching aids and library facilities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SERVICES (on demand and systematic care)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries of dental and medical personnel, assistant and clerical staff, buildings, equipment, materials, repair and maintenance and transport. Costs or privately provided services should also be estimated using the most common charges for various treatments provided in the different levels of practice.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MONITORING AND EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs of monitoring surveys (per diem and fares where necessary), data handling and reporting, and any special materials needed for field demonstration and testing.</td>
</tr>
</tbody>
</table>
8 OVERVIEWS ON VARIOUS ORAL HEALTH PLANS

Several examples are given here as references to cover circumstances or to deal with exceptions to the usual situation. Also it is understood that preventive programs may be planned on a national local, or special-group basis, subdivisions that cannot be dealt with in detail but for which guidance can, nevertheless, be obtained from the examples offered (WHO 1980). The selection of examples are as follows:

1. **Minimal resources.** The prevalence of caries is very low to low but is increasing. The prevalence of periodontal disease is moderate to high. The ratio of dentist is 1:80 000. There are no auxiliaries and no dental school. Thew indicative figure for 10 years is minimal.

2. **Minimal resources, increasing.** The prevalence of, and trends for, caries and periodontal diseases are as for 1, but the ratio of dentist to population is 1:40 000. The ratio of operating dental auxiliaries is the same. There are two schools, one for dentists and one for auxiliaries. The indicative planning figure for 10 years is moderate, representing a significant real increase over past decades, i.e., an increase not related merely to current fluctuation or inflation.

3. **Moderate resources.** The prevalence of caries is low to moderate and increasing. The prevalence of periodontal disease is moderate to high. The ratio of dentist to the population is 1:20 000, but there are no auxiliaries and there is school for training dentists. The indicative planning figure for 10 years is moderate, with only a modest increase.

4. **Moderate resources, increasing.** The prevalence and trends for caries and periodontal diseases are as of 3. The ratio of dentist to the population is 1:20 000, but there are two operating auxiliaries to every dentist, a school for training dentist and auxiliaries. The indicative planning figure for 10 years is moderate to high, representing a significant real increase over past decades.
For these examples basic steps for planning will be followed, data from an imaginary situation being based on the most usual findings at the level of resources under consideration. In example 1, full lists of goals and services are presented, but in subsequent examples only the changes are shown (WHO 1980).

8.1 EXAMPLE 1: MINIMAL RESOURCES

The assumption is that no representative epidemiological data exist for the population. The population of the country is 5 000 000, of whom 70% are rural or live in small towns and have a traditional social structure and a traditional diet. There are only two large urban concentrations, the capital being one of them accounting for 20% of the population. The urban percentage will rise up to 40% in 10 years. The school age population is 1 000 000, but there is only 50% enrolment, which will rise to 80% in ten years. Of the country's 60 dentists 50 are practising privately in the large two cities, 5 in other communities, and 5 employed by the Ministry of Health. In the rural communities medical auxiliaries and some traditional practitioners give dental first aid. The rate of increase of the population is 3% per annum. There are 20 dental students studying in foreign countries who will become available, four a year, over the next five years.

A survey of 12 year-olds and 15 year-olds is carried out, based on 4 schools in the capital, 2 in the other city, 4 in the rural areas, and 2 in villages, giving a total of 240 children of each age. The selection of schools is made as far as possible randomly, but the schools in the cites are first divided into two socioeconomic levels. One village school is chosen from the mountainous and one from the lowland area. The survey reveals the following caries levels (DMF TEETH) at 12 and 15 years of age:

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Caries level</th>
<th>Source: WHO 1980</th>
<th>12 years</th>
<th>15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural areas</td>
<td>1.0</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- low socioeconomic</td>
<td>2.0 - 2.5</td>
<td>3.0 - 3.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- upper socioeconomic</td>
<td>3.5</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Periodontal disease is uniformly moderate to high, except for the upper class of city dwellers, who have a low prevalence of the disease. There are no other oral disease features of major importance at this stage.

Data for clinical records are minimal but indicate that no more than 5% of the population seek dental care in any one year, the demand being chiefly in the urban area. Most of the care provided is relief of pain by primary health workers and health auxiliaries, mainly through extraction. There is no organised program and no concerted effort at prevention.

The indicative planning figure represents a minimal increase in the budget for oral health program.

The situation provides the following features of importance for the establishment of an appropriate plan:

i) The incidence of dental caries is in the early stages of increase in the urban populations but there is no definite evidence of an increase among rural dwellers.

ii) Lack of an adequate oral hygiene routine in most sectors of the populations is demonstrated by the data for periodontal disease.

iii) The demand for oral health is low.

iv) Dental manpower is scarce and likely to remain so for a considerable time. Thus there will be a reliance on health auxiliaries and primary health workers for first aid care.

iv) Funds are likely to remain scarce for the oral health sector throughout the duration of any plan at present.
8.1.1 Measurable Goals for a 10-year Period

i) No increase in the prevalence of caries among urban dwellers and even a slight decrease in DMFT teeth (to 3.0) for upper social class 12 year-olds. The prevalence of the disease in the rural population will not reach urban levels.

ii) Reduction of the moderate to high prevalence of periodontal disease to low to moderate during the planning period.

iii) Access by all school children to a specified oral hygiene routine in schools and the demand for all health services to the remainder of the population rising to 10% by the end of the training period.

iv) Services readily available on demand, rising from 5% to 10%, for oral hygiene instruction, simple fillings, scaling and prophylaxis, extraction and emergency care. Only in private practice will more sophisticated forms of treatment will be available.

v) Enrolment of all urban primary school children in a type-1 systematic school dental service Table 7 (Source: WHO 1980) by the end of the planning period.
**Table 7** Options for care provided in different systematic school dental programs
Source: WHO 1980

<table>
<thead>
<tr>
<th><strong>TYPE 1 MINIMAL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>First five primary school years</strong>: contingency care - conservative treatment on demand for the permanent dentition and emergency care (extractions) for the primary dentition.</td>
</tr>
<tr>
<td>(b) <strong>Final primary school year</strong>: conservative care for the permanent dentition.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TYPE 2 LIMITED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>First primary school year</strong>: conservative care for permanent dentition only and emergency care (extractions) for the primary dentition.</td>
</tr>
<tr>
<td>(b) <strong>Second, third, fourth, and fifth primary school years</strong>: contingency care - conservative treatment on demand for permanent dentition and emergency care (extractions) for the primary dentition.</td>
</tr>
<tr>
<td>(c) <strong>Final primary school year</strong>: conservative care for the permanent dentition.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TYPE 3 INCREMENTAL - 2 YEAR RECALL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) First primary school year: conservative care</td>
</tr>
<tr>
<td>(b) Every second year thereafter: conservative treatment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TYPE 4 INCREMENTAL - 12 MONTH RECALL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) First primary school year: conservative care</td>
</tr>
<tr>
<td>(b) Every year: conservative care</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TYPE 5 INCREMENTAL - 6 MONTH RECALL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>First primary school year</strong>: conservative care</td>
</tr>
<tr>
<td>(b) <strong>Every six months</strong>: conservative care</td>
</tr>
</tbody>
</table>

**Notes:**

1. Where type 1 or 2 is extended to secondary schools, conservative treatment is given at the end of the intermediary stage (3 year secondary) and at the end of the senior secondary stage (a further 3 years) with contingency treatment for the intervening years.

2. Incremental types 3, 4 and 5 may provide:
   - (a) conservative treatment for the permanent dentition and emergency treatment only (mainly extractions) for the primary dentition;
   - (b) conservative treatment for both dentitions;
   - (c) orthodontic, prosthetic and other specialised care, as specified.
8.1.2 Services and Manpower Requirements

So that goals (i) to (v) can be achieved, the essential services should be:

a) A national oral health education program and a special oral hygiene program in all schools.

b) A fluoride rinse or toothpaste program in urban schools associated with the oral hygiene program.

c) A service on demand, provided through private practice, health centres, and primary health care centres

d) A systemic school dental service of type-1 for urban primary schools, integrated with preventive action in schools [see(a) and (b) above]

The population subdivisions to receive these services are given in Table 8
(WHO 1980)
Table 8  Population receiving services  
Source: WHO 1980

<table>
<thead>
<tr>
<th>Population subdivision</th>
<th>Start of Plan</th>
<th>End of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5 000 000</td>
<td>6 800 000</td>
</tr>
<tr>
<td>School-age</td>
<td>1 000 000</td>
<td>1 345 000</td>
</tr>
<tr>
<td>School</td>
<td>500 000</td>
<td>1 076 000</td>
</tr>
<tr>
<td>Urban school</td>
<td>285 000</td>
<td>650 000</td>
</tr>
<tr>
<td>Primary school</td>
<td>375 000</td>
<td>650 000</td>
</tr>
<tr>
<td>Urban</td>
<td>185 000</td>
<td>350 000</td>
</tr>
<tr>
<td>Rural</td>
<td>3 500 000</td>
<td>4 080 000</td>
</tr>
<tr>
<td>Urban non-school</td>
<td>1 315 000</td>
<td>2 370 000</td>
</tr>
</tbody>
</table>

The manpower required for such a population consist of:

1. For oral health education and supervision of oral hygiene activities, 1 per 100 000, i.e., 50 in the first year of the plan, rising to 68 after 10 years.

2. For daily oral hygiene in primary schools, 1 school teacher equivalent per 2400 school children, calculated on the basis of 1500-hour schoolteacher year, spread over approximately 38 weeks and a rate of 6 minutes per tooth brushing group of 30.

[Six minutes per day means half an hour per week or 19 hours per 38-week school year for each group of 30 children. The ratio is therefore 1 teacher equivalent to 1500/19 x 30 = 2400]

For the school enrolment detailed in Table 8, this activity requires about 160 teacher equivalents rising to about 280. It should be clear that these are teacher equivalents; no single teacher would spend more than half an hour per week in the activity.
(3) For fluoride rinsing once a fortnight, allowing 10 minutes per group of 30, the requirement is one-sixth of the manpower ratio in (2), namely, 1 school teacher equivalent to 14,400 urban school children, thus about 20 teacher equivalents, rising to about 45.

(4) For 5%, rising to 10%, of the population not attending urban primary school and demanding 15 minutes of service per person in the rural areas and 30 minutes in the urban areas, the dental manpower needed is 25 in rural areas and 20 in urban areas at the start of the plan, rising to 60 and 70 at the end. The ratios that apply are 1:140,000 in rural areas at the start of the plan and 1:70,000 at the end; and 1:35,000 at urban areas at the start and 1:35,000 at the end.

(5) For the type-I systematic school dental services in urban primary schools, close to 1 per 3500, i.e., about 60 for 8500 children, rising to about 110 for 35000 (See Annex 1 for calculation of ratio).

The starting figure for dental manpower is theoretical because the plan has to be developed from the existing situation to achieve 10-year goals requiring a total of 3408 personnel equivalents.

Clearly the urban area is over served at the start of the plan, and movement of manpower to the rural areas is unlikely. By ensuring that new personnel go mainly to the rural sector the urban excess can gradually be overcome. If it is assumed that the 20 new dental graduates in the first 5 years of the plan can be increased to 40 from foreign schools in the second five years, and that the total attrition over the ten year period will be 15, there will be 105 dentist at the end of the plan.

The sum total of manpower is given in Table 9 (WHO 1980)
Table 9  Manpower required: minimal resources  
Source: WHO 1980

<table>
<thead>
<tr>
<th>Service</th>
<th>Start of Plan</th>
<th>End of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health personnel equivalent</td>
<td>Teacher or other personnel equivalents</td>
</tr>
<tr>
<td>Oral health education</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Oral hygiene</td>
<td>-</td>
<td>160</td>
</tr>
<tr>
<td>Fluoride</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Service on demand;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- rural</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>- urban</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>School dental service</td>
<td>60</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>155</td>
<td>180</td>
</tr>
</tbody>
</table>
### Table 10  Auxiliary training schedule
Source: WHO 1980

<table>
<thead>
<tr>
<th>Year</th>
<th>2-Year Intake</th>
<th>2-Year Output</th>
<th>3-Year Intake</th>
<th>3-Year Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>-</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>-</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>18</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>144</td>
<td>220</td>
<td>140</td>
</tr>
</tbody>
</table>

As in **Table 10** the output total allow for a staff of 4-4 in the 2 year course and of 5-6 in the 3 year course (1 teacher to 10 students), 5 or 6 central staff and the remainder to make up for attrition.

It should be noted that the ratio of dental professional plus auxiliaries to the population at the end of the plan would be close to 1:30 000, and that of dentists to the population about 1:65 000.
8.1.3 Evaluation and Costing

The allowance of central staff should cover the mid-term evaluation (at the end of 5 years), and the final evaluation (at the end of the ninth year) to allow for mid-term modification and timely replanning. Evaluation should consist of a survey, a review of the records, and a report on matters such as the coverage in school services and monitoring activities. Costing of the plan will consist at least the following items:

**Prevention**
- Dental staff salaries
- Other health staff salaries in man-year equivalents
- School teacher salaries in man year equivalents
- Materials, equipment, and buildings
- Transport, duty travel, etc

**Services on Demand**
- Estimated cost to the public of private services
- Dental staff salaries
- Other health staff salaries in man year equivalents
- Materials, equipment and public buildings
- Transport, duty travel, etc

**Training**
- Staff salaries
- School buildings
- Materials and equipment
- Other service (laundry, transport, travel, etc)

**Central Services**
- Staff services
- Building
- Materials and equipment
- Transport, travel, etc
8.2 EXAMPLE 2: MINIMAL RESOURCES, INCREASING

For ease of comparison the same basic population of 5 000 000 is assumed. The trend of prevalence of caries and periodontal disease are the same as for the previous example, but there are 125 dentists and 125 operating dental auxiliaries. There is one dental school and one dental auxiliary school, each with an output of 10 per year (WHO 1980).

The urban-rural population distribution and level of demand are the same as in the first example.

The indicative planning figure is for a moderate real increase in the budget for the oral health program.

The features of importance for an appropriate plan differ from the previous example only in that more dental manpower and funds are available.

8.2.1 Measurable Goals for a 10 Year Period

Goals (1)-(3), (5) and (7) are the same as in the first example. However, goal (4) provides for a wider range of treatment in public as well as private services, covering for example, complex operative care and fixed and removable prosthesis. Goal (5) is extended to all primary schools in a type-2 systematic school dental service.

8.2.2 Services and Manpower Requirements

The essential services for goal achievement are the same as for (a), (b) and (c), in 8.1.2 with a modification in (d) type 2 for all urban and rural primary schools and urban secondary schools (junior secondary) to intermediate level. The population receiving services is given in Table 11 and the manpower required is shown in Table 12.
<table>
<thead>
<tr>
<th></th>
<th>Start of Plan</th>
<th>End of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5 000 000</td>
<td>6 800 000</td>
</tr>
<tr>
<td>School age</td>
<td>1 000 000</td>
<td>1 345 000</td>
</tr>
<tr>
<td>School</td>
<td>500 000</td>
<td>1 076 000</td>
</tr>
<tr>
<td>Urban school</td>
<td>285 000</td>
<td>650 000</td>
</tr>
<tr>
<td>Primary school</td>
<td>375 000</td>
<td>650 000</td>
</tr>
<tr>
<td>Urban primary school</td>
<td>185 000</td>
<td>350 000</td>
</tr>
<tr>
<td>Rural primary school</td>
<td>190 000</td>
<td>300 000</td>
</tr>
<tr>
<td>Urban junior secondary</td>
<td>60 000</td>
<td>160 000</td>
</tr>
<tr>
<td>Rural non-primary sch</td>
<td>3 310 000</td>
<td>3 780 000</td>
</tr>
<tr>
<td>Urban non-primary and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>junior secondary sch</td>
<td>1 255 000</td>
<td>2 210 000</td>
</tr>
<tr>
<td>Service</td>
<td>Start of Plan</td>
<td>End of Plan</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td>personnel</td>
<td>equivalent</td>
</tr>
<tr>
<td>Oral health education</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Oral hygiene</td>
<td>-</td>
<td>160</td>
</tr>
<tr>
<td>Fluoride action</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Service on demand;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rural</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>urban</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>School dental service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>urban</td>
<td>70</td>
<td>-</td>
</tr>
<tr>
<td>primary (1:3068)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rural</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>primary (1:4065)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>urban</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>junior secondary (1:3145)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>265</td>
<td>180</td>
</tr>
</tbody>
</table>

Source: WHO 1980

Similar to 8.1.2 but allowance of 25 minutes for the rural and 50 minutes for the urban.

Type 2 for all primary schools and urban secondary schools up to intermediate level (junior secondary).
In this example the starting figure is not just theoretical, as the requirement is for 265 health personnel and there are already 250 dentally trained workers. If the services provided by traditional workers and by non dental personnel and oral health education are allowed for, the short fall of 50 will be more than compensated. There will be, however, a delay in distribution of dental staff between the urban and rural areas and in allocating them posts in the school and other clinics selected according to the plan.

Initially the urban population will be overstaffed and it will take several years to develop the school service progressively, reallocating sufficient staff to deal with each first year primary intake. If this procedure was followed strictly it would take 9 years to reach the last intermediate secondary year, but an alternative is to have two simultaneous starting points, first-year primary and first-year secondary. There should be very little delay in implementing the preventive services and other parts of the plan.

The health manpower requirement at the end of the plan -523- might then be met by dentally trained manpower alone, in which case the net increase would need to be about 270. Allowing the attrition of three dentists and three dental auxiliaries per year, the existing output of 10 dentists and 10 auxiliaries per year would provide a total of about 195 each at the end of the plan- a shortfall of nearly 140. The decision could be taken to increase the output of dentists, auxiliaries, or both, but it is recommended that the increase should only be the auxiliaries, as shown in Table 13 (WHO 1980)
### Table 13  Auxiliary training schedule
Source: WHO 1980

<table>
<thead>
<tr>
<th>Year</th>
<th>2 year Intake</th>
<th>2 year Output</th>
<th>3 year Intake</th>
<th>3 year Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>12</td>
<td>Not applicable</td>
</tr>
<tr>
<td>-2</td>
<td>12</td>
<td>Not applicable</td>
<td>12</td>
<td>Not applicable</td>
</tr>
<tr>
<td>-1</td>
<td>12</td>
<td>Not applicable</td>
<td>12</td>
<td>Not applicable</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
<td>10</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>10</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>9</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>25</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>220</td>
<td>366</td>
<td>226</td>
</tr>
</tbody>
</table>

The output totals allow for a training staff of 12 at the dental school and 6-7 in the 2-year auxiliary course or 10-11 in the 3-year course. The central staff requirements would be about 10 or 11, leaving a good margin for error in terms of unforeseen attrition. At the end of the plan the ratio of dental professionals plus auxiliaries to the population would be about 1:13 000 and of dentists to the population would be about 1:35 000

#### 8.2.3 Evaluation and Costing

The only change from section 8.1.3 will be the costing of the two schools in terms of salaries, buildings, administration, materials and equipment, transport and student accommodation and stipends.
8.3 EXAMPLE 3: MODERATE RESOURCES

For the same population of 5,000,000, increasing at the rate of 16% per annum, a survey shows that the prevalence of caries of the rural population is 2.0 DMF teeth for 12 year olds and 3.0 for 15 year olds, and among the urban population 3.5 and 5.0. The prevalence of periodontal disease is again moderate to high (WHO 1980).

The ratio of the urban to the rural populations 40:60 at the beginning of the plan and 50:50 at the end. The school age population is 1,000,000, 70% enrolled at the beginning of the planning period and 90% at the end. There are 250 dentists: 125 in private practice and a further 25 employed by the dental school, which has an annual graduate output of 30. The larger towns account for 100 private practitioners, the remainder practising in smaller towns, a number of which have no private practitioners. Public health employees are located in health centres or hospital dental clinics fairly well distributed by population. There are some traditional practitioners and health auxiliaries carrying out dental first aid in rural communities and in congested urban centres.

The clinical records are not comprehensive but are sufficient to show that on average 10% of the population seek dental care: about 14% in the urban and about 7% in the rural areas. A large part of the care provided is relief of pain, mainly by extraction, but the range of restorative care and the population seeking such care are on the increase, especially in the cities. Only vague goals exist and preventive activities are sporadic. The feasibility of fluoridation of water supplies is doubtful. The indicative planning figure represents a modest increase in the moderate budget in the oral health program.

The features of importance for the establishment of an appropriate plan are:

(1) The incidence of dental caries is increasing in all parts of the population.
(2) Oral hygiene is inadequate in most sectors of the population.
(3) The demand for oral health services is growing.
(4) Dental manpower is available to a moderate extent, though there is no cadre of operating auxiliaries.
(5) The modest budget is unlikely to increase to any great extent during the lifetime of the plan.
8.3.1 Measurable Goals for a 10-year Period

Goals (2), (6) and (7) of section 8.1 will be the same. The other goals will be:

(1) That there should be no increase in the prevalence of caries and even a decrease to 3.0 DMF teeth for 12 year olds in groups where that level is exceeded at the start of the plan.

(2) That all school children should have access to a specified oral hygiene routine in schools and that the demand for oral health services in the remainder of the population should rise to 15% by the end of the plan.

(3) That services should be readily available on demand, rising from 10% to 15% for oral hygiene instruction, scaling and prophylaxis, a moderate range of conservative care of both supporting tissues and teeth, interceptive orthodontics, extractions, and emergency care. A full range of care should be available in private practice.

(4) That urban school children should be enrolled in a type 3 program and all rural school dental service by the end of the planning period.
8.3.2 Services and Manpower Requirements

The essential services for achieving the goal are the same as (a) and© in 8.1.2, but (b) is modified to include all schools and (d) to provide type-3 systemic care for all urban schools and type-2 for all rural schools.

The population receiving these services is shown in Table 14 and the manpower requirement in Table 15 (WHO 1980)

Table 14 Population receiving services
Source: WHO 1980

<table>
<thead>
<tr>
<th></th>
<th>Start of plan</th>
<th>End of plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>5 000 000</td>
<td>6 800 000</td>
</tr>
<tr>
<td>School age</td>
<td>1 000 000</td>
<td>1 345 000</td>
</tr>
<tr>
<td>School</td>
<td>700 000</td>
<td>1 210 000</td>
</tr>
<tr>
<td>Primary school</td>
<td>450 000</td>
<td>700 000</td>
</tr>
<tr>
<td>Urban school</td>
<td>400 000</td>
<td>650 000</td>
</tr>
<tr>
<td>Rural school</td>
<td>300 000</td>
<td>560 000</td>
</tr>
<tr>
<td>Rural non-school</td>
<td>2 700 000</td>
<td>2 839 500</td>
</tr>
<tr>
<td>Urban non-school</td>
<td>1 600 000</td>
<td>2 750 000</td>
</tr>
</tbody>
</table>
Table 15  Manpower required, Moderate resources  
Source: WHO 1980

<table>
<thead>
<tr>
<th>Service</th>
<th>Start of Plan</th>
<th>End of Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health personnel equivalent</td>
<td>Teacher equivalent</td>
</tr>
<tr>
<td>Oral health education</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Oral hygiene</td>
<td>190</td>
<td>-</td>
</tr>
<tr>
<td>Fluoride action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service on demand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rural</td>
<td>175</td>
<td>-</td>
</tr>
<tr>
<td>urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School dental service</td>
<td>180</td>
<td>-</td>
</tr>
<tr>
<td>urban (1:2294)</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>(1:3106)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>580</td>
<td>240</td>
</tr>
</tbody>
</table>

As in 8.1.2
As in 8.1.2 but for 70% rise to 90% of school population
As in 8.1.2 but per person for 7% rising to 10% of the rural and 14% rising to 20% of the urban populace;
Type 3 all urban schools
Type 2 all rural schools
In all examples in section 8 the school service manpower is calculated for the starting year as if the service is fully established. In reality the school dental service would start with one year and build up to completion adding one year at a time, though, to achieve the goal in this example of extension to all 12 school years during the 10-year plan, two cohorts would have to be added to the service in each two of the years of the plan. The addition could be left till late in the plan, when it is to be hoped that the production of manpower will be best able to shoulder the extra burden (WHO 1980).

In the first year about 30 dental operators will be needed to start the school service. Subsequently the type-2 service for rural schools will require an extremely small increase on its first-year needs until the sixth year, in which the need will be nearly double. The type 3 service for urban schools will need a large increase in its third year, when nearly one-and-a-half times the first-year need will be required. Thereafter a substantial increase will be required every other year. Each years increased manpower requirements would have to be estimated by projected enrolments and subdivided into urban and rural. Special provision will be required for the double-year extension late in the plan, in whichever years are most convenient. In the particular example discussed here, the total health personnel needed at the start of the plan is 580, whereas 300 are needed for services other than school dental services, if much of the oral health education in rural and urban areas is carried out by traditional and non-dental personnel.

The 250 available would be adequate to start all the service envisaged, including the first year of the school dental service. There would, however, be the usual problem of urban oversupply and the redistribution of personnel and facilities. Given an annual output of 30 dentists, there would be sufficient manpower for the requirements of the school dental services for several years.

It should be noted that the ratio of dental professionals and auxiliaries to the population at the end of the plan would be 1:6000 and that of dentists to the population about 1:14 000 if an annual output of 30 is maintained. The latter ratio would be about 1:16 000 if the output was reduced to 20 per year.
8.4 EXAMPLE 4. MODERATE RESOURCES INCREASING

The only change from the demographic and the disease details given in 8.3 is that there is 100% attendance throughout (WHO 1980)

There are 250 dentists distributed as in 8.3 and the annual output of 30 from the dental schools; 500 operating dental auxiliaries, and annual output of 60 from the auxiliary school There are few traditional practitioners and only occasionally is dental first aid provided by health auxiliaries. The clinical record is sufficient to indicate that 15% of the population seek dental treatment in any one-year- 12% rural and 20% urban. The services provided on demand are similar to those described in 8.3, with a little more accent on restorative care. Only vague goals exist, and preventive activities are sporadic; the feasibility of fluoridation of the water supplies is doubtful. The indicative planning figure represents a significant increase in the modest budget for oral health

The features of importance for the establishment of an appropriate plan are the same as those for the example in section 8.3, except that there are operating dental auxiliaries and the finances will improve significantly.

8.4.1 Measurable Goals for a 10 Year Plan

Goals (1), (2), (6) and (7) are the same as in section 8.3. The other goals will be:

(3) That all school children should have access to a specified oral hygiene routine in schools; workers should have access to dental services in large industrial plants; and the demand for oral health services in large industrial plants, and the demand for oral health services by the remainder of the population should rise to 20% by the end of the plan.

(4) That services should be readily available on demand, rising from 10% to 20% for oral hygiene instruction, scaling and prophylaxis, a moderate range of conservative care of both supporting tissue and teeth, interceptive orthodontics, extractions and emergency care. A full range of care should be available in private practice.

(5) That all school children should be enrolled in a type-2 systematic school dental service by the end of the planning period.
8.4.2 Services and Manpower Requirements

The services needed differ from those in 8.3.2 only that the oral health education program in (a) is intensified; an industrial service is added in (c); and type-3 systemic care in (d) is extended to all school children.

The total health personnel need at the start of the plan is 815, and there are 750 dentists and operating dental auxiliaries. Thus, although little dental work is performed traditional workers and health auxiliaries not specifically trained as dental personnel, the staff is virtually adequate at the outset. The main task is therefore to redistribute the auxiliaries and, to a much lesser extent, the dentists. About 50 auxiliaries would be needed to start the school dental service. The rest will be employed in oral health education and services on demand, especially in rural areas. (WHO 1980)

8.5 GENERAL COMMENTS

The examples given are intended to elaborate the approach outlined in the previous sections that national and provincial planners and other consultants and staff can use in planning. The figures used are informed guesses and should be replaced in actual planning by others related specifically to the given situation, the most obvious being the demographic figures— the population increase- and the disease figures. The times for different types of care are also adjustable and may be subjected to preliminary trial (WHO 1980).

The goals suggested are based on recent experiences of planning with measurable objectives. Planners should be prepared to use variations of these goals or completely different but appropriate ones; thus, toothbrush drill in school may be feasible in some cultures but unacceptable in some, acceptable in primary but not in secondary schools.
Annex 1  
Calculations of manpower ratios for systematic school services
Source: WHO 1980

A. Treatment times for systematic school services

Table 6 lists 5 types of systematic care. However, only 1, 2, and 3 are used in the examples in section 4, types 4 and 5 being applicable to more complex situations. The treatment time that are used in the ratio calculation below for types 1, 2 and 3 are for a low productivity situation. Expressed in minutes they are:

examination:

  initial            30 min
  recall or final    15 min

fillings            45 min
prophylaxis         30 min
extraction          15 min
contingency care    5 min

B. Systematic care types 1 and 2

Contingency care is allocated at 5 minutes per child receiving care of either type 1 or type 2, because this type of service is indicated with the population with low prevalence of caries, and extraction are the main activity. The basis of this allotment of time is the assumption that 1 in 10 decayed primary teeth needs extraction and 1 in 10 decayed permanent teeth had a filling or extraction during the first 5 years of primary school. This, in population with more than 2.5 DMF teeth at the age of 12 years, assuming an equal DMF score at entry into primary school. The maximum care needed is 0.25 permanent filling and 0.25 extraction per child during 5 years. On the time scale above, this requires only three minutes annually per child. So that the allocation of 5 minutes provides a generous margin to allow for care under the basic assumption and to cover the other requirements of health education, examination, etc.
Initial care, for type 2 only, is based on time allotments for examination; fillings per-child, calculated by dividing the DMF score by the age of 12 by 6; one prophylaxis in a moderate to high prevalence population for each two children at entry into primary school; and an allowance for other care rounded up to the next 5 minutes.

Thus, for a DMF score of 2.5 at the age of 12, the allotment in minutes per child is:

- Initial examination: 30
- Fillings (0.4 increment): 18
- Prophylaxis: 15
- Other: 2

Total: 65 min

C. Systemic care, type 3

The time for initial care is the same way as for type 2. Recall care times are calculated at 15 minutes for examination and prophylaxis, and the accumulated caries increment for 2 years is used. An arbitrary treatment allowance of 10 minutes is added.

D. Calculation procedures

For all calculations a 1750-hour year is used, which provides 105,000 minutes. Ratios for any type of care are thus obtained by dividing 105,000 by the minutes allocated e.g; for contingency care:

\[
\frac{105,000}{5} = 21,000
\]

and for the initial care example:

\[
\frac{105,000}{65} = 1,615
\]

Then the number of cohorts receiving a particular type of care must enter into the calculations; these numbers are displayed in the Annex table. Depending on whether the service ends at primary, junior secondary, the cohort numbers become constant at year 6, 9 or 12, respectively.
Example 1  URBAN, PRIMARY - type 1

Contingency care at 5 min per child:  

\[
\begin{align*}
105,000 & \quad 10,000 \\
5 & \quad = 21,000; \quad 21,000 & = 0.48
\end{align*}
\]

Conservative care:  
Examination 30
Fillings 90 105,000 10,000
Prophylaxis 30 155 = 678; 678 = 14.75
Other 5

Calculations: 5 cohorts receiving contingency care and 1 cohort final conservative care

\[
(5 \times 0.48) + (1 \times 14.75) = 17.15
\]

\[
6 = 6 = 2.86 \text{ per } 10,000 \text{ children} = 1:3500
\]

Example 2  URBAN PRIMARY - type 2

Initial care:  
Examination 30
Fillings 18 105,000 10,000
Prophylaxis 15 65 = 1616; 1616 = 6.19
Other 2

65 min

Contingency care at 5 min per child:  

\[
\begin{align*}
105,000 & \quad 10,000 \\
5 & \quad = 21,000; \quad 21,000 & = 0.48
\end{align*}
\]

Final care:  
Examination 15
Fillings 72 105,000 10,000
Prophylaxis 30 120 = 875; 21,000 = 11.43
Other 3

120 min

(Note: No allowance is made for treatment at this level of caries.)

\[
6.19 + (4 \times 0.48 + 11.43) + 11.43
\]

\[
6 = 3.26 \text{ per } 10,000 \text{ children} \sim 1:3068
\]
Example 2  URBAN, JUNIOR SECONDARY - type 2

Contingency care at 5 min per child: \(105,000\)  
\[
\begin{align*}
5 & = 21,000 \\
21,000 & = 0.48
\end{align*}
\]

(Note the caries increment between 12 and 15 years is compatible with the 5-minute allocation at this age)

Final care:

<table>
<thead>
<tr>
<th>Examination</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fillings</td>
<td>40.5</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td>30</td>
</tr>
<tr>
<td>Other</td>
<td>4.5</td>
</tr>
</tbody>
</table>

90 min

\[(2 \times 0.48) + 8.57\]

\[
3 = 3.18 \text{ per 10,000 children} \sim 1:3145
\]

Example 2  RURAL, PRIMARY - type 2

Initial care:

<table>
<thead>
<tr>
<th>Examination</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fillings</td>
<td>6.75</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>3.25</td>
</tr>
</tbody>
</table>

55 min

Contingency care at 5 min per child: \(105,000\)

\[
\begin{align*}
5 & = 21,000 \\
21,000 & = 0.48
\end{align*}
\]

Final care

<table>
<thead>
<tr>
<th>Examination</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fillings</td>
<td>33.75</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td>30</td>
</tr>
<tr>
<td>Other</td>
<td>1.25</td>
</tr>
</tbody>
</table>

80 min

\[5.24 \times (4 \times 0.48) + 7.62\]

\[
6 = 2.46 \text{ per 10,000 children} \sim 1:4065
\]
Annex 2 Prevention of Dental Caries
Source: WHO 1987

Definition

Dental caries is a bacterial disease of the dental hard tissues (WHO 1972). It begins with the demineralisation of the outer enamel surface and, if not arrested or treated, the dissolution of enamel continues into the dentine and pulp with increasing cavitation and loss of tooth substance. Tooth ache is a common accompanying sign of decay. The end result is the total loss of the crown of the tooth, often associated with abscesses and other type of secondary infection.

Another variety of caries, root caries, begins on exposed root surfaces rather than on the crown. While there may be etiological and bacteriological differences between root caries and coronal caries, the course and outcome of both conditions are similar.

Principles of prevention

Caries occurs as the result of the interplay of three factors:

a) presence of bacteria;

b) Presence of a suitable substrate (or bacterial nutrient);

c) Susceptible dental enamel.

Time may be considered as a fourth factor, since the disease process, once started, does not become immediately clinically detectable (Newbrun 1983).

Prevention is therefore based on breaking the chain of events that promote the formation of caries:

• by modifying the cariogenic bacterial factor;

• by altering the substrate on which the causative bacteria thrive;

• by rendering the tooth enamel less susceptible.
The main methods of caries prevention are the various recommended uses of fluorides. (Source: Fluoridation Census 1975) Fluoride can be administered systematically or topically. Systemic administration should be used only after the fluoride intake from water and food has been assessed, since an excessive systemic intake of fluoride can lead to fluorosis in children. Combined programme of both systemic and topical administration of fluoride are effective.

Fluoridation of drinking-water

Fluoridation is the addition of fluoride to drinking-water in order to bring the total fluoride concentration close to the optimum level. The optimum concentration range is from 0.7 mg to 1.2 mg of fluoride per litre, depending on the mean annual temperature in the locality. In moderate climates, the optimum concentration is around 1.0 mg of fluoride per litre. Most drinking-waters contain at least some naturally-occurring fluoride, while others contain undesirably high fluoride concentrations. The recommended fluoride concentration limits for average temperature ranges in the community are given in Annex 2 Table 1.

Annex 2 Table 1. Recommended fluoride concentrations for average temperature ranges

<table>
<thead>
<tr>
<th>Annual average of maximum daily air temperatures</th>
<th>Fluoride concentration mg/litre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>C</td>
<td>F</td>
</tr>
<tr>
<td>10.0 - 12.05</td>
<td>50.0 - 53.0</td>
</tr>
<tr>
<td>12.0 - 14.6</td>
<td>53.8 - 58.3</td>
</tr>
<tr>
<td>14.6 - 17.6</td>
<td>58.4 - 63.8</td>
</tr>
<tr>
<td>17.7 - 21.4</td>
<td>63.9 - 70.6</td>
</tr>
<tr>
<td>21.5 - 26.2</td>
<td>70.7 - 79.2</td>
</tr>
<tr>
<td>26.2 - 32.5</td>
<td>79.3 - 90.5</td>
</tr>
</tbody>
</table>

Adapted from Preventive dental services, Dept of Health, Canada 1980: Source: Fluoridation census 1975.
Controlled water fluoridation is recommended for communities that have an established, treated, central water supply and adequately trained waterworks operators, where people actually drink the piped water (rather than the rain water or private well-water), and where caries is present at least at low levels (1.2-2.6 DMF or higher for 12-years-old), especially if the incidence of decay is increasing.

The technology of fluoridation is well established. The implementation of community water fluoridation is the responsibility of health administrators, water supply authorities, food industry authorities, and sanitary inspectors. Oral health administrators and dentists should play an active role in the planning and implementation of water fluoridation. The responsibilities of oral health administrators are (Dunning 1970):

a) In the initial phase:
- to inform people of the benefits of fluoride for their teeth and its safety for oral and general health.
- To encourage authorities and administrators to start water fluoridation.

b) Before beginning central water fluoridation:
- to assess the current levels of fluoride intake from existing water supplies.
- to carry out an epidemiological survey in order to assess the prevalence of dental disease, at least dental caries and endemic dental fluorosis.
- to determine the optimum concentration of fluoride based on the average maximal daily temperature of the area.

c) After the establishment of water fluoridation in cooperation with appropriate authorities:
- to institute a surveillance programme to ensure that the established concentration of fluoride in drinking-water is being maintained at recommended levels.
- to monitor the levels of caries and fluorosis at pre-set intervals.
- to develop a programme for the continuing education of water-plant operators.
Water fluoridation is considered to be a highly cost-effective method of controlling dental caries in those communities that have municipal piped-water supplies and the means to maintain them. It was recommended as a public health measure by the World Health Assembly in 1969, 1975 and 1978. Resolutions in favour of fluoridation have also been passed in the WHO regions.

If central water fluoridation is not possible, it might still be possible to fluoridate the drinking-water of schools. The recommended concentration of fluoride is 4.5 times the optimal concentration for public water supplies in any climate. This level is derived from several studies carried out in the United States of America, and is based on the proportion of total water intake consumed at schools in that country. If the proportion is not applicable in a particular culture then suitable adjustment should be made (Fluoridation Census 1975. US Dept of Health).

Salt fluoridation

Salt fluoridation is, like fluoridation of public water supplies, a convenient method of administering fluoride in areas deficient in that element (Toth 1976). It is especially suitable where salt distribution is systematic and controlled, such as in countries with a national system of salt distribution. The concentration recommended is 250 mg of fluoride per kilogram of salt (WHO 1972). Only one of the following three methods should be used for a defined population:

- fluoride salt;
- water fluoridation or
- fluoride tablets, since they are all predominantly systemic methods of administering fluoride.

Fluoride tablets

The term ‘fluoride tablets’ is a generic term used to describe the systemic administration of fluoride using tablets, lozenges, or drops. The action of fluoride tablets, when taken as recommended, is equivalent to that of fluoridated water and salt. Fluoridate tablets may be prescribed to children aged from 6 months to at least 13 years, who are not receiving fluoride systemically in any other way. Recommended dose levels are shown in Annex 2 Table 2.
Annex 2 Table 2. Fluoride dosage (mg) for areas with different levels of natural fluoride in the water supply

<table>
<thead>
<tr>
<th>Age</th>
<th>Fluoride level (mg/litre) in water supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>6 months - 2 years</td>
<td>0.25</td>
</tr>
<tr>
<td>2 - 3 years</td>
<td>0.50</td>
</tr>
<tr>
<td>3 - 13 years</td>
<td>1.00</td>
</tr>
</tbody>
</table>

(Source: Fluoridation Census 1975 US)

The ingestion of fluoride tablets must be supervised to ensure that they are taken daily in the prescribed dose.

Contradictions for the use of fluoride tablets are the same as for salt and other sources of systemic fluoride, i.e., they should not be used when the amount of fluoride obtained from drinking-water and other food sources is already at an appropriate level.

**Professionally applied fluorides**

In this case, high-concentration fluoride preparation (solutions, varnishes or gels) are applied direct to the teeth by dental professionals or auxiliaries. Because they are individually applied, the procedure is more expensive per capita than mass-application methods, and their use should, therefore, be restricted to selected susceptible individuals.

For professional application the following preparations are recommended:
- 2% neutral sodium fluoride (0.9% fluoride ion);
- 8% stannous fluoride (2% fluoride ion) or
- 2.8% acidulated sodium fluoride (1.23% fluoride ion)

Stannous fluoride and acidulated phosphate fluoride are available as gels; all can be used as solutions. Fluoride varnishes contain sodium fluoride.
**Fluoride mouth-rinses**

The use of mouth-rinses is a method of topical application of low concentrations of fluoride to the teeth. Effective regimens are:
- daily uses of 0.05% sodium fluoride solution
- weekly or fortnightly use of 0.2% sodium fluoride solution

Other compounds, such as stannous fluoride, have been successfully used in rinses. However, of these compounds sodium fluoride is the least expensive and its taste is the most acceptable.

The daily use of mouth-rinses is more expensive and does not seem to be more effective than weekly use. However, daily use is recommended for the home, because it fits well into the daily oral hygiene routine, whereas the supervised weekly or fortnightly procedure is better for the routine of schools. The procedure is contraindicated for children below 6 years of age who tend to swallow at least some of the rinses.

**Fluoride dentifrices**

Toothpastes containing fluoride are available in many parts of the world. Properly formulated toothpastes contain stannous fluoride, sodium fluoride, sodium monofluorophosphate, or amine fluoride, with suitable abrasives to ensure that the fluoride is biologically available. The fluoride concentration is usually around 0.1%. Many studies have shown that the regular use of fluoride toothpastes with compatible abrasives is highly effective in preventing caries. A fluoride toothpaste is used just like any tooth-cleaning material, being brushed on to the teeth with a toothbrush, cleaning stick or other suitable oral hygiene aid. Normal home use is encouraged, although supervised brushing programmes can be set up in schools where appropriate.

Fluoride toothpastes can be used in conjunction with any of the systemic methods for administering fluoride (water, salt, or tablets), and can provide additional benefits when used with
a topical fluoride preparation (professionally applied materials or mouth rinses).
Fluoride toothpastes are not recommended for young children who may swallow excessive quantities and thereby risk fluorosis.

**Fissure sealants**

Fissure sealants are plastic materials which, when painted on to the pits and fissures of posterior teeth (the areas most susceptible to decay), set hard and obliterate the fissured area. Caries is thus prevented from progressing in these areas.

The technique for the application of sealants is simple, but it does require good access, good light, and a saliva-control system for keeping the tooth surface dry during the application. Annual check and reapplication are advisable. Where a sealant remain intact, caries does not progress.

Sealant can be applied by auxiliaries as well as by dentists, or by primary health care workers after suitable training. The technique is relatively expensive, but highly effective. It is most effective when applied to the most caries-prone teeth, the first or second molars, soon after they erupt.
Annex 3  Prevention of periodontal disease
Source: WHO 1987

Definition

Periodontal disease

Is a generic name given to a group of inflammatory and degenerative conditions of the soft and bony tissue supporting structures of the teeth (FDI 1984). All are bacterial in origin. Initial inflammation occurs as a result of the presence of plaque bacteria. The causative bacteria are normal inhabitants of the oral cavity that accumulate around the necks of the teeth in a visible white film called plaque. Plaque formation is normal. Soon after cleaning, the enamel is covered by pellicles of salivary origin. Within hours, these pellicles are colonized by bacteria to form plaque. (Axelsson and Lindhe 1979) Plaque will increase in bulk, if left undisturbed, to reach a maximum after three days. If still undisturbed, its bulk does not change but its bacterial profile does. This ‘mature’ plaque is most likely to lead to periodontal disease.

Gingivitis is the inflammation of the gingival tissue around the tooth without the involvement of the underlying structures. Gingivitis is characterized by readiness of the gingival tissue to bleed, sometimes spontaneously. Bleeding of the gums following tooth brushing is a characteristic diagnostic sign. Gingivitis is a reversible condition.

Undisturbed plaque can also become calcified by minerals in the saliva to form calculus. Calculus below the gingival margin, called subgingival calculus, is a major determinant of periodontal disease, following gingival inflammation, and is also associated with destructive periodontal disease conditions.

Periodontitis, or destructive periodontal disease, is the progressive loss of attachment of the gingival tissues and the subsequent loss of alveolar bone. If the disease progresses unchecked, the affected teeth become mobile and will eventually be lost. Periodontal abscesses causing pain and loss are also frequently associated with periodontitis. While periodontitis does not seem to develop without being preceded by gingivitis, gingivitis does not always progress to periodontitis.
Principles of prevention

Current microbiological data and our knowledge of host-tissue responses have not yet shown any single microorganism or group of microorganisms to be the specific causative agent (s) in the development of gingivitis or periodontitis. Clinically, therefore, all dental plaque must be considered, and dealt with, as a potential disease-promoting factor.

The natural history of periodontal disease is not as well understood as that of dental caries, although both are plaque-induced diseases. The main prevention strategy for periodontal disease is, therefore, based upon the regular and consistent removal of plaque. This control of plaque development should be carried out mainly by the individual, although professional treatment is frequently necessary as well. The aim is to keep the mouth free of long-term plaque accumulations and thereby to restrict the disease to no more than the earliest, reversible, stages of gingivitis.

Oral hygiene instruction

It has been mentioned previously that plaque accumulates on the gingival areas of the teeth if it is not regularly cleaned off. The purpose of oral hygiene instruction is to teach people how to clean their own mouths effectively, and to persuade them to do so regularly so as to maintain gingival health. A reasonable level of oral hygiene is fundamental to the control of periodontal disease.

Materials used for cleaning the teeth and gums include traditional chewsticks and toothbrushes as well as electric toothbrushes, toothpicks, and dental floss. Various cleaning agents, from commercial toothpaste to salt and baking soda, are used for their abrasive effects and as flavouring agents. Too much abrasive materials can be damaging. Tongue cleaners do not remove plaque, but can result in a feeling of cleanliness and well-being.
While there is no universal approach or technique for maintaining oral hygiene, the aim is to remove or disrupt plaque before it matures, and to do this consistently without damaging the oral hard and soft tissues. (WHO 1967)

The following principles form the basis for oral hygiene instruction:

1. Artificial aids are necessary for the control of plaque. The self-cleansing action of tongue and cheeks may remove loose food debris, but has little effect on plaque.

2. The method chosen, whether toothbrush or chewstick, is of less importance than the way in which it is used.

3. Toothbrushes and chewsticks should be changed regularly, since cleaning the teeth with a worn implement is not effective.

4. Where prevention of dental caries is intended as part of the procedure, toothpaste with fluoride should be used as a cleaning agent wherever possible.

5. For effective cleaning of the spaces between teeth, it is desirable to use dental floss carefully.

6. Traditional oral hygiene practices, like using chewing sticks, should be encouraged in areas where their use is effective and customary.

7. There are a number of conditions that make it difficult for an individual person to maintain an optimal level of oral hygiene (e.g., untreated dental caries, gingivitis, periodontitis, malocclusion).

   These conditions should be corrected by a dentist wherever possible.
The choice of approaches for instruction depends on the objectives and level of activities planned. In those countries where oral education is new for the whole community, it is reasonable to start with oral health education using appropriate means for the dissemination of information such as radio, television or films. The next step is to provide oral hygiene education for children in kindergartens and schools, and for adults in the workplace. It should be kept in mind that instruction alone will not guarantee good oral hygiene; in order to achieve positive results it is necessary to practice exercises with individuals or small groups. Ideally, school children should have regular, periodic reinforcement sessions; during the teaching process children need daily supervision for a period of one week to one month, depending on their age. Afterwards, periodic evaluation is sufficient. Both children and adults should be shown how to examine their mouths regularly in order to detect plaque; use of disclosing agents can be helpful for this. Pamphlets, brochures, and radio and television can be useful ways of disseminating helpful hygiene instruction, although personal instruction is usually considered to be more effective.

**Scaling and cleaning**

Scaling and cleaning (called prophylactic treatment in some countries) result in the removal of soft and hard deposits (i.e., plaque and calculus) from the tooth surfaces by a dentist or other trained person, using special hand instruments or ultrasound devices. Subgingival calculus, especially, can only be removed in this ways. The purpose of scaling and cleaning is the same as for personal oral hygiene practices, that is, the removal of accumulated plaque deposits. Scaling should be an integral part of an oral hygiene instruction programme so that subsequent oral cleansing can be performed by the individual in order to avoid the reformation of calculus.

In countries where resources are limited, the use of trained personnel to provide these services is expensive, often too expensive for the country’s economy. These services can only be considered as part of a preventative programme if good oral hygiene can first be established. Scaling should be carried out periodically, how often will depend on the individual’s propensity for calculus formation.
Annex 4  Health education and promotional efforts for preventive measures
Source: WHO 1987

The success of preventive measures depends on their availability, as well as on their acceptance and use by individuals, health workers, and communities. To help ensure that all individuals benefit from preventive measures, well planned, vigorous educational and promotional efforts are required. Thus, there is an educational component to each preventive measure. Health education by promoting optimal professional and public acceptance and use of known preventive measures is the cornerstone of success. Health education may be especially necessary in preventing oral health disease because they are pervasive, and generally not life threatening (WHO 1987).

Health education is any combination of learning opportunities that facilitates voluntary changes of behaviour which lead to improved health. The behaviours of individuals, families and communities, or institution need to be changed. Education is needed during the initiation and at all subsequent stages of any community health measure (Murray 1976).

Health promotion is any combination of educational, organisational, economic, and environmental activities that support behaviours leading to improved health. Health promotion either alters the environment in such a way as to improve health without specific individual actions, or enables individuals to take advantage of preventive measures of services. For example, offering a fluoride mouth rinse program in schools enables pupils to benefit from a measure to prevent caries with little effort on their part. Similarly, the enactment of legislation requiring the use of seat belts and safety seats for infants in automobiles promotes general health.

Objectives of health education and promotion

The ultimate objective of both oral health education and promotion is improved oral health and the effectiveness of these activities should be measured in terms of improvement in oral health status. Appropriate indices would be the level of caries incidence or severity, or the prevalence of gingivitis. Environmental changes that promote oral health can become short term objectives
and can therefore be considered as positive outcomes of health education and promotions improved health and the effectiveness of these activities should be measured in terms of improvement in oral health status. Appropriate indices would be the level of caries incidence and severity, or the prevalence of gingivitis. Environmental changes that promote oral health can become short term objectives and can therefore be considered positive outcomes of health education and promotion; examples might be the installation of community water fluoridation or a reduction in the availability of sugary foods in a school (WHO 1987)

Educational principles for improved oral health

(WHO 1987)

(a) The content of all educational materials should be accurate, complete, and based on scientific evidence.

(b) Education should be an integral part of all preventive procedures, and educational messages should be reinforced periodically.

(c) Educational material should be appropriate for each particular audience.

(d) Active involvement of the audience is the key to effective learning.

(e) Education alone is not a preventive measure.

Methods of health education

Health education methods include a variety of activities, such as:

- one to one communication, ranging from discussing the need for a fluoride program with a local administrator to giving plaque removal instructions to an individual.
- group presentation, e.g; oral hygiene instruction for school children and school teachers.
- mass communication, using newspapers, posters, booklets, slides, video-tapes, films, radio, and television to propagate oral health messages.
Improvements in personal hygiene

Just as improved levels of hygiene in the community and at the personal have been accompanied by improvement in general health status, so improved levels of oral hygiene have been followed by improved gingival health. Concomitant with improved oral hygiene has been the wider use of fluoride containing toothpaste and this is associated with the reduction in the amount of dental decay.

The level to which personal hygiene is practised and the methods used are influenced by many factors, including family and social traditions and environmental and economical constraints. Individuals learn the practice of personal hygiene from a number of different sources, with varying degrees of success. Much is learnt at home at an early age, but the are many other important sources of learning, such as from peers and school teachers. There are, therefore, many opportunities and setting that can be used to influence hygiene practices. Some of which are:
- mother and child clinics;
- school setting for children, adolescents, and adults;
- workplaces;
- residential facilities
- mass organisation for children, adolescents and adults
- community centres

Oral hygiene is a natural component of personal hygiene and should be included as part of any effort to improve personal hygiene. The methods of health education are appropriate for enabling people to learn how to improve their oral hygiene.

The educational messages concerning personal oral hygiene will contain elements concerning:
- methods and devices for the mechanical removal of plaque;
- lifestyles affecting oral hygiene;
- personal use of fluorides;
- self- examination for predisposing factors and incipient disease.

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Just as oral hygiene is a component of personal hygiene, so dietary counselling for health is a part of general dietary and nutritional counselling, and thus a part of general health education. The consumption of certain types of food can directly affect the teeth, in particular sugars and fermentable carbohydrates and acidic foods and drinks.

These components can be found in a variety of different foodstuff, drinks, and medicines. When they are consumed frequently in the absence of preventive agents such as fluorides and sealants, damage to the teeth results.

Dietary counselling should therefore focus on:
- the risks associated with the frequent consumption of sugars, fermentable carbohydrates, and acidic foods;
- the foods that contain sugars and fermentable carbohydrates, and that are acidic;
- frequency of consumption of these foods;
- the use of sugary foods as reward;
- acceptable substitutes for cariogenic foods.

The adoption of a national nutrition policy, permitting coordination of nutrition, agriculture, and payment mechanisms, can help the population adopt positive dietary and nutritional practices. Activities to achieve such policies are good examples of health promotion.
9 DISCUSSION

The thesis has discussed the application of planning as an administrative tool of rational decision making, it has also attempted to show that the application of this tool is of benefit to the health service system. The WHO goals of oral health for all by the year 2000 incorporate the concept of social justice - that is, that goal should be pursued for all members of the community.

The Fiji Government does not seem to have incorporated this idea of social justice, as the use of services and the supply of services has shown that there is no balance between need, use and supply. Of oral health care, the point that is of importance is that this is an area where the tool of planning will best serve the community. It allows rational choices between alternative programs. Until planning is used in the field of oral care, the goals of oral health for all will not be achieved with any basis of social justice.

Peterson (1986) describes planning: as an aid or replacement to political decision making; as a means of anticipating or looking ahead; as a means of improving social justice; as a means of improving the logic, science, or intellectual caliber of efforts applied to our problems; as the design efforts and machinery used to turn ideas into blueprints for action; as the gentle persuasive route to getting good, democratic equitable decisions made; and as a means of control. For some of us, planning means the specification of a plan of action; for others, it means determination of the most efficient allocation of resources; for still others it involves the means by which we determine the kind of future we like to have. A totally different way of describing planning is offered by Navarro (1970), "the purpose of planning is to rationalise the activities on which planning is imposed, to make subject to calculation what was previously left to chance, and to replace spontaneous adjustment by deliberate control". A thorough knowledge of the overview of the planning process and the major components of its logical steps is certainly of practical use to anyone who is expected to play a major role in planning.

In Fiji, the planning and implementation of an effective national school oral health program is a complex process because of various factors. These include geographical, political, ecological,
dietary, epidemiological, political, demographic socio-economic and manpower considerations. In order to design realistic plans for a structural oral care delivery system including a comprehensive preventive program, planners should base programms on realistic objectives, with attainable and measurable goals. Common shortfalls to achieve goals has been discussed by (Moller 1982). He said when planners do not follow the logical steps this may result in:

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

Therefore the planning, implementation and evaluation of oral health services, should be based on realistic objectives and attainable and measurable goals and not 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 1980). In Fiji the picture in oral health is one of divergent trend. An increasing dental caries problem, a stable, high periodontal disease problem and scarcity of resources has called for immediate attention for integrated, coordinated planning of preventive and treatment services for oral health, as well as for appropriate manpower production, as a urgent priority to avoid major wastage or inadequacy of resources.

One major drawback in Fiji is the lack of proper information as a basis of planning. Service records which are mainly used for information, are sometimes poorly designed, serving only administrative purposes such as recording for productivity evaluation and financial information. Such records are insufficient for assessing the dental health status of the whole population of a country. Even if they contain the right type of information, which they seldom do, they will only show the status of those coming for treatment (Davies 1968). They will therefore give a distorted view of the dental health status of the population. Thus proper surveys are of great value for long term planning and evaluation. Information categories can be collected through surveys which will serve as base line for future evaluation. The characteristics of the population in question; composition by age, sex and other attributes that may be relevant to a given situation. The needs expressed in terms of the prevalence and incidence of those diseases
or conditions that the program may encompass. Information on demand based on past
experience of effective demand or past utilisation of services. Cost effectiveness of alternative
methods and procedures is of crucial importance in planning. If planning is not to be a mere
extrapolation of the present into the future, what has been done and achieved must be compared
with what must be otherwise be achieved if some other methods or procedures were adopted.

Evaluation is important as it aims to assess how far the objective of the plan have been
attained. Two basic dimensions are sought for the attainment of objectives (effectiveness) at the
least possible cost (efficiency). It has been said that evaluation is the mirror image of planning.
The logical thinking behind the evaluation process is essentially a check on the correctness of the
planning estimates as far as economy is concerned (efficiency) and of the anticipated results of the
activities (methods and procedures utilised). In the evaluation process a check is made on the
appropriateness of the choices excised when planning, and the adequacy of the program to the
needs of the population covered.
The concepts of planning and system analysis have their application to the health field.

This has been discussed so that it gives some background to strengthen the principle that every effort must be made to establish a policy to be responsible for monitoring the oral health situation every five years and for ongoing, data based, coordinated planning for specific goals.

This will ensure that the national policy goal of health for all by the year 2000 will be attained in a manner in which the strategy can be evaluated by setting plans of action which conserve resources by detailed data based programming, budgeting and implementation.

**WHO (1976)** recommended that:

i) careful and continuous national health planning, using a logical systematic approach, is essential in order to make wise use of resources for oral health services.

ii) health planning should take place within the context of the national, social, political, economic, and health policies and oral health planning should be a integral part of that planning.

iii) oral health programs, therefore, should be consistent with the existing state of development of, and make logical advances in, both preventive and curative programs consistent with developing resources.

iv) planning for dental health manpower should be an inseparable part of total oral health program planning.

v) it is important that oral health planners be aware of the potential of non-health and non-dental resources in achieving oral health objectives and use these resources imaginatively.

vi) evaluation is an essential component of responsible administration; it should be planned as an integral part of the program and should assess health program in terms of appropriateness, adequacy, effectiveness and efficiency. It should be understood that availability, accessibility and acceptability of services to consumers and providers are also factors to be accumulated.
If oral health for all has to be achieved, oral health care appropriate to the needs has to be implemented. Society has an obligation therefore to use the tools of planning to facilitate implementation. As Fiji has been a signatory to the WHO goals for oral health into the year 2000, it has an obligation to proffer leadership of attainment of these goals. It also has responsibility for direction and administration of many facets of the oral care system as well as its allocation of funds to the system. As part of the total goal of health for all by the year 2000 our country needs to develop a national plan with measurable goals for oral health within the national health plan.
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