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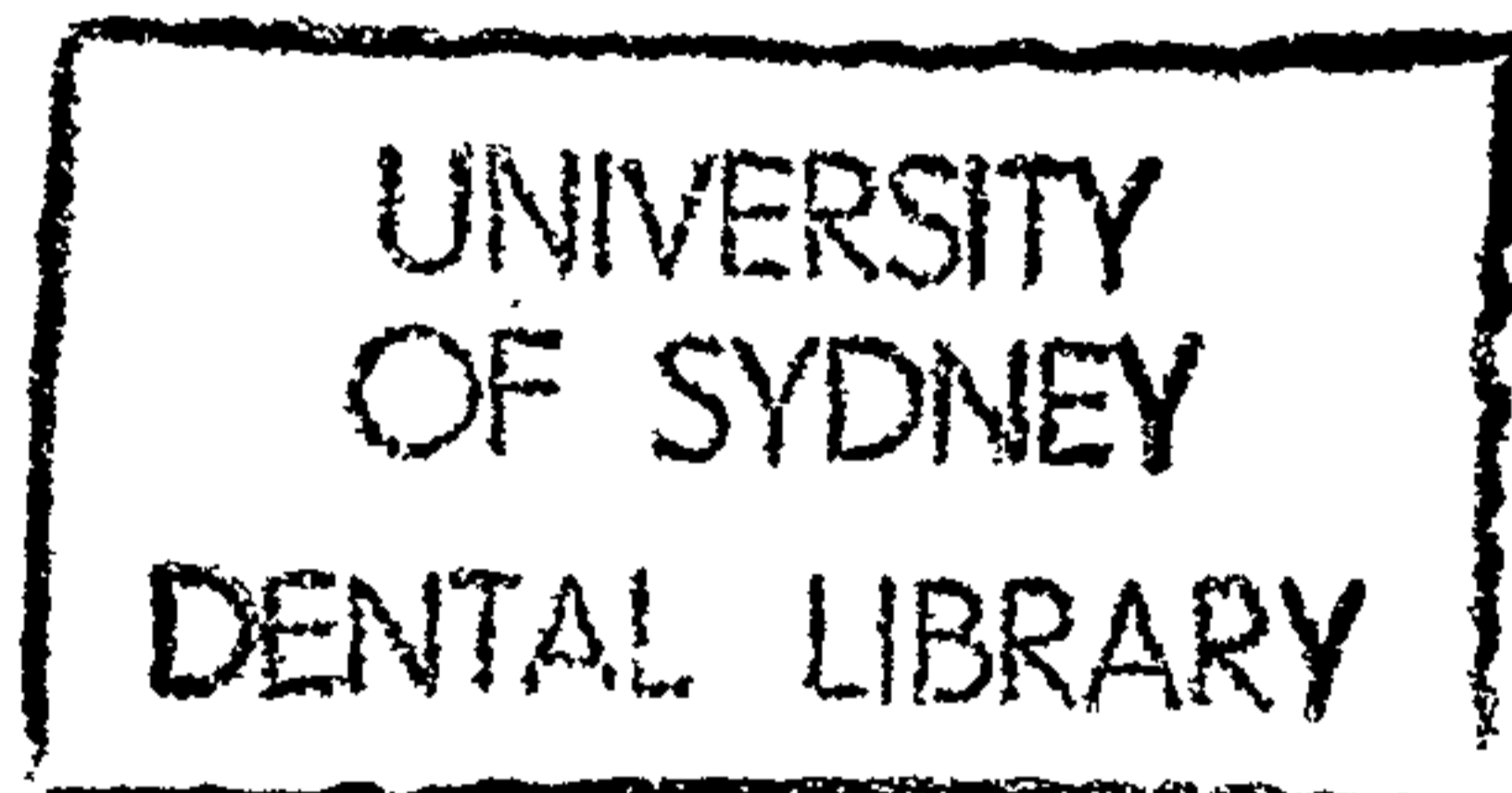
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SCHOOL DENTAL HEALTH PROGRAMMES FOR INDONESIA

A REVIEW OF THE LITERATURE AS AN AID TO
HEALTH PLANNING IN INDONESIA

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Dedication to

- my wife -

Dr Sulistyasih Prawirosidarto

-and my sons-

Widyawardana Adiprawita (Donny)

Widyapramana Dwiatmaja (Ommy)

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Windarto Adisusanto.

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CHAPTER 1INTRODUCTION

McHugh⁶¹ stated that the twentieth century has seen a steady increase in the amount of treatment provided by the dental profession in most parts of the world. The rate of increase has been particularly dramatic in the past decade, with improvements in methods of cutting teeth, in analgesia, and in restorative materials, and with greater and more efficient use of ancillary personnel. The effect of this trend has however, been largely offset by the continued increase in the prevalence of the two major dental diseases: caries, and periodontal disease.

It is apparent that the traditional approach to dental disease, treating disease as it develops, has not been effective and that expansion of treatment facilities would be both difficult and almost prohibitively expensive. Fortunately, preventive methods which are effective and economical have been developed and these provide an attractive alternative, or rather a supplement to traditional methods. It must be appreciated that the complete prevention of dental disease on a community basis, by any method or combination of methods, is not yet possible. Until it is, the best approach will lie in combining and integrating preventive and therapeutic measures to bring dental diseases under control.

Although demonstrated only on a limited basis, there is already evidence that such a combination can be very effective.³⁹

Certainly, if a dental care programme is ever to reach its long term goal of dental health for all, it must have a basis in prevention of disease rather than treatment of its consequences. For that reason methods of prevention would be given priority over the epidemiology and treatment of dental disease.⁶¹

An interesting concept in thinking about preventive measures for any disease is that of levels of prevention. These levels extend from the prepathogenic period of the disease to the period of rehabilitation after the disease itself has passed.

True or primary prevention, according to this scheme, occurs in the prepathogenic period and involves first health promotion and then specific protection. Health promotion includes health education, attention to genetic or environmental factors which might influence the disease, attention to good physical and mental development, and periodic selective examinations. Specific protection includes such immunization as vaccination, attention to personal hygiene and safety, and the use of specific nutrients such as Vitamin D for the avoidance of rickets.

A secondary type of prevention may occur in the early period of pathogenesis. This involves early diagnosis and prompt treatment.

Later in the period of pathogenesis comes tertiary prevention. This includes disability limitation, which is prevention to the extent that the sequelae and complications of the disease are minimised. Rehabilitation is also considered to be a part of tertiary prevention.³⁶

Prevention is in itself a major objective of public health programmes, there are three reasons for this. The first is ethical; that prevention of disease has greater value in life than the cause of disease. The second is teamwork; which is due partly to the necessity of efficient handling of large groups of people and partly to the fact that many processes which are involved in prevention lend themselves particularly well to teamwork. The third is cost efficiency; since prevention is far cheaper than cure in a programme where there is responsibility for both approaches.

A most important endeavour in the field of public health dentistry, and the one occupying most time for most personnel, is the administration of school dental health programmes. In considering school dental health programmes it is important to set these programmes in their proper place in the broad field of school health. It is out of keeping with sound theory in health education to emphasise one programme to the exclusion of other efforts to provide for a child's welfare, and a public health dentist must not allow himself to be placed in a position of urging such a procedure. To do so, moreover, is to lose the co-operation of valuable colleagues in the fields of medicine, nursing and nutrition.

The preliminary services in the dental programme include dental health education, palliative emergency treatment, preventive measures, case finding through dental inspection and other means, and referral to a source of treatment.

These preliminary services were stated to be peculiarly appropriate to dental public health programmes because they involved prevention and teamwork. Treatment services, it was stated, might or might not be part of a dental public health programme, depending upon the claim of the population group on government aid. This pattern fits very well in the field of school dental health services. The American Dental Association, in its objectives for a community dental health programme, gives the following aims for a school dental service:⁷⁷

1. To help every school child appreciate the importance of a healthy mouth.
2. To help every school child appreciate the relationship of dental health to general health and appearance.
3. To encourage the observances of dental health practices, including personal care, professional care, proper diet and oral habits.

4. To enlist the aid of all groups and agencies interested in the promotion of school health.
5. To correlate dental health activities with the total school health programme.
6. To stimulate the development of resources to make dental care available to all children and adolescents.
7. To stimulate dentists to provide adequate health services for children.

The actual services a community can provide in order to implement these objectives will vary very greatly with size of community, region, social need, and many other considerations. In general however, important elements of the dental health programme will include school-community organisations, case findings, health education, specific preventive measures such as topical fluoride treatment, referral of defects, and follow through, and finally, dental care for the indigent or for such segments of the population as the people may wish.

One of the most important things in considering a school dental health programme is the planning process. It has been said that planning is basically a process of projecting and selecting from alternatives for the future. The aim of planning is to obtain the maximum effectiveness of a given amount of resources in terms of the stated goals of a programme. It involves the formulation of alternatives and a choice among them.

Planning has to be seen as a process involving a sequence of logical steps, and constant communication between planner and decision-maker. In a dental health service one might assume that the dental director could be at the same time planner and decision-maker, or that he might have under him a planning unit headed by a specialist in the subject. However, it might be better to visualise the dialogue between the planner

and decision maker as involving a dental health administrator and a general health administrator, or even persons on political and administrative levels above him. In this way it will be kept in view that in dentistry, as in any other health discipline, there are many constraints limiting what the specialist would like to do if he had absolute freedom of choice and unlimited resources.⁹¹

This thesis is composed of three main parts, that is:

1. Defining the problems and setting the objectives.
2. Types of programmes and selection of types of programme for Indonesia.
3. Implementation of dental health services for school children.

The aims of this thesis are:

1. To review some of the literature on planning the school dental health programmes and to present a fundamental approach to school dental health services, in order to gain some perspectives for controlling and preventing dental disease in Indonesia.
2. To help the writer to develop his knowledge of preventive school dental health programmes and to set out general recommendations for types of programmes which would appear to be suited for the needs of some developing countries, particularly Indonesia.

The writer believes it will be useful both for the Faculty of Dentistry of the University of Gadjah Mada, Yogyakarta, and for the Directorate of Dental Health of the Health Department of Indonesia.

CHAPTER 2

DEFINING THE PROBLEMS AND SETTING THE OBJECTIVES

Knutson⁵¹ stated that effective application of the measures for the control of disease depends to a great extent upon knowledge of the manner in which disease occurs in population groups. Collection of information concerning the disease is, therefore, a prerequisite to effective planning for a control programme.

2.1 General and Dental Concepts

The survey method of collecting data produces the amount and type of data suited for analysing the dental health needs of school children. Selected items are obtained which help to determine the kind of dental health programme most appropriate for a given school situation. Individual case histories are recorded and at a later date these data can be used for research studies. This method of compiling information is called the "case-finding technique".

Planning a dental health programme also requires a statement of objectives. The goals to be achieved are determined in relation to the available resources. The formulation of new objectives is an on-going process as the programme is constantly modified. The objectives of the dental health programme are directly related to the broad objectives of the school. Planning is a co-operative undertaking. All the resources of the administration and facilities are utilised.

To ensure healthful living for each student now and in the years to come, instruction must be directed to three basic purposes:

1. Establishment of practices (behaviours) essential to good dental health.
2. Acquisition of knowledge necessary for optimal dental health.
3. Development of attitudes that will motivate the individual to continue to use the acquired knowledge and techniques for the best dental health during the life span.

These basic objectives are inter-dependent. Each serve to promote the development of the others. Health knowledge will to some extent develop attitudes and initiate certain practices. However, knowledge alone does not ensure the development of attitudes and practices.

Attention must be directed to all three. There is ample evidence that, without proper attitudes, little use is made of health knowledge. Moreover, unless a person puts his knowledge into practice, he experiences little if any benefit from it. The American Dental Association has adopted the following objectives as a guide. The control of dental caries and other diseases of the teeth and mouth is best accomplished during childhood. The American people must be helped to appreciate the importance of healthy teeth in a healthy mouth; the value of good teeth for a healthful appearance; good dental health practices including adequate personal mouth hygiene, visits at regular intervals to the dentist, and proper diet. The guidelines also include: enlisting all groups and agencies interested in health promotion to include dental health in their programmes, stimulating the development of resources for making dental care available for all children and youths, and stimulating all dentists to emphasise prevention when performing dental health services for children.

The school dental health programme is intended to be a programme lasting over a period of years rather than a one-time fact finding effort. There is little need to obtain information that has already been found and recorded for significant sampling in a similar situation. For instance, the DMF (adult caries index) and ^{def}~~DMF~~ (caries rate for primary teeth) rates for any school system will probably be very nearly the same as for the national rates. However, to know whether the teeth are missing by extraction is important. This item of evaluation will indicate whether dental care is obtained early enough to save teeth.

It is important to know whether cavities are being filled, but it is neither necessary nor advisable to count the number of cavities or fillings. However this item also leads to a number of misunderstandings among dentists and dental health educators about which teeth should be treated and which do not need treatment.

Dental inspections should be completed early in the school year in order to provide for sufficient dental appointments to complete dental treatment during the school year. Early inspection also provides a longer period for individual guidance.

Recheck inspections are the beginning of the follow-up for dental corrections. Unless there is a small number of pupils, only those who were found to have remediable dental defects should be called to the dental health room for a re-inspection. Some schools require a note from the dentist stating specifically whether dental care is started or completed. If this is the case the dentist's judgement must be accepted. The dental associations have requested that the dentists not sign a completion notice unless all treatment is finished.

A notation on the child's record should indicate dental treatment "completed", "under treatment", or "no treatment". Notation should be entered upon the dental record for each child. At the time of re-check inspection, additional lost permanent teeth should be noted. These lost teeth will affect the final lost permanent tooth index for the year.

In order to save time, dental conditions are usually entered on the cumulative health record at the end of the school year, principally so that the achievement results may be recorded. If the dental condition of any child must be known during the year, it may be obtained from the dental record. If a child is neglected, it shows at the end of the year, not at the first inspection. The children who show a record of poor mouth hygiene should be rechecked within a few days after the first inspection.

Mouth hygiene is a matter of a proper attitudes and habit formation as well as skill in performing the task of tooth brushing. Therefore, it is necessary to stimulate and motivate brushing and flossing. The classroom teacher should be given the names of children who are not practicing good mouth hygiene. Best results can be obtained through co-operation with the classroom teacher. If children do not show improvement in a short time, the dental hygienist or other health personnel must stimulate interest by individual counselling, conferences with parents and home visits. In selected cases, a dental prophylaxis is an educative means of persuading children to practice good mouth hygiene.

2.2 Dental health problems in developed countries

The main problems of dental health in developed countries are dental disorders and dental manpower.

2.2.1 Dental disorders

The major dental disorders in children are: dental caries, malocclusion, and gingival and periodontal diseases.

2.2.1.1 Dental caries

Dental caries poses an immense dental health problem in most developed countries. Caries is prevalent in young children and the extent of the disease increases steadily with age in children of Western Countries.

In the highly industrialised countries, dental caries in children is widespread. In Western Europe the frequency of the disease may differ widely. It is much lower in Southern Europe than in Northern Europe. The Scandinavian countries are among those with the highest caries figures in children and young adults. In Norway, for instance, 20-90 percent of the three year old children have dental caries with 5 carious teeth per child. When children enter the primary school in Norway, at the age of seven years, the still remaining deciduous teeth and at least three of the six year molars are usually affected by caries.

Leaving the primary school at the age of fourteen years, nearly 100 percent of the children have been affected by caries with more than 50 percent DMF teeth.⁸⁷

Rural children are a little less affected by caries than urban children.

In Kiev, 50.7 percent of children have caries. In Bulgaria, observation carried out on 60,000 school children in 1958 have shown that approximately 83 percent of all the teeth of children between the ages of seven and nine are affected.⁸⁵

In the United States, it is clear that tooth decay frequently begins soon after eruption of the deciduous and increases dramatically thereafter.

In studies conducted at the Guggenheim clinic,⁶⁷ 58 percent of the pre-school children examined had already experienced dental caries, and 17 percent were found to have 7 or more cavities. At ages four and five, more than half of the children examined had this number of cavities. Similarly, the examination of pre-school children in upstate New York showed that 60 percent had already experienced dental caries, and 26 percent had 6 or more affected teeth. At age five, 44 percent were found to have at least 6 carious teeth.

Comprehensive studies on the prevalence of dental caries among school children have been made in every section of the United States.

A composite picture of these would indicate that, by the time the average child reaches school age, he has in the neighbourhood of three carious teeth. It is possible that fully 20 percent of all children at the age of six have already experienced decay of permanent teeth and that perhaps as many as 80 percent have experienced decay in deciduous teeth. Also, once decay of the permanent teeth begins, it progresses at an extremely rapid rate.

At twelve or thirteen years of age, the average child has had at least 5 of his permanent teeth attacked; and roughly 65 percent of all children of this age have had some decay experiences. The number of permanent teeth affected continues to climb with age, reaching an average of about 7 for sixteen year olds, and ranging upward from 9 to 16 for young persons in their late teens and early twenties. By this period of life, dental caries experience is almost universal, except among those fortunate enough to have resided in fluoride areas when their teeth were being formed.

Dental caries in children reduces the function of mastication and may lead to local and general infection. Dental caries may therefore be considered as detrimental to their general health.⁸⁷

2.2.1.2 Malocclusion

The other great dental disorder in children is malocclusion. The prevalence of which also varies from country to country. As malocclusion to a certain extent is caused directly or indirectly by caries in the deciduous molars and canines, the prevalence of malocclusion naturally varies with the condition of the deciduous teeth. Prevention of dental caries will therefore contribute to prevention of malocclusion. Thumb and finger sucking, lip biting and tongue habits in pre-school age may lead to various forms of malocclusion. A certain percentage of malocclusions may be considered detrimental to dental or general health by predisposing to caries, gingival and periodontal diseases, all of which may lead to loss of teeth in adult life.

The aesthetic side of malocclusions should not be overlooked as some of them may constitute a real psychic trauma to children as well as to adults and become a handicap to the individual.⁸⁷

In the United States malocclusion is found in a large number of children and adults. In a study of 119,000 students between the ages

of five and twenty-nine, one half were reported as having some kind of malformation. Seventeen percent of the five and six year olds had teeth which deviated from normal alignment, whereas 75 percent of those in the twelfth grade (17 to 18 years of age) had malocclusion.⁶⁷

2.2.1.3 Gingival and periodontal diseases

Mild gingival diseases are common during the stage of deciduous teeth and then the eruption of the permanent teeth, in combination with the usual childhood diseases. More severe forms of the gingivitis and periodontal diseases are usually caused by malnutrition, and they may therefore be considered to be fairly rare in Western Europe. Consequently periodontal diseases do not constitute a grave health problem in childhood.

In the United States, among adults, periodontal diseases are the major cause of tooth loss. There is considerable evidence however, that these diseases frequently have their inception in early childhood.

Among children examined in a suburban school of Chicago,⁶⁷ nearly two thirds had gingivitis which met the study criteria used. Only a minor fraction of the five year old children were affected, but the proportion increased with age so that a majority of all children seven years of age and older were affected.

2.2.2 Dental manpower

Every country in Western Europe is lacking qualified dental personnel to cope with dental diseases in children. In all countries dental services for primary school children have been introduced to a greater or lesser degree. Conservative treatment of deciduous teeth in pre-school children is rare in most countries, and this is true to a large extent also with regard to school children.

There is an even greater shortage of dentists considering the whole population. It has been estimated that not more than about one third of the total population receive regular dental treatment even in countries with the highest dentist to population ratio, one to less than sixteen hundred (Sweden, Norway and the United States).

Three main reasons may be stated for the shortage of dental manpower:

- a. the high prevalence of dental diseases;
- b. the public as a whole has not considered dental diseases as a health problem of high priority; and
- c. insufficient funds for the dental schools.

Toverud⁸⁷ stated that given the high incidence of caries today, no country, no matter how wealthy, could train a sufficient number of dentists and finance the service required to give adequate treatment to the whole population. The only solution is to reduce the incidence through preventive methods.

2.3 Dental health problems in Indonesia

As in developed countries, the main problems of dental health in children are: dental disorders and dental manpower.

2.3.1 Dental disorders

The major dental disorders in children are: dental caries, malocclusion and gingival and periodontal diseases.

2.3.1.1 Dental caries

In 1954 the first dental survey was conducted,⁶³ when 20,285 school children between the ages of 6 to 16 years in 15 cities were examined according to standards laid down by the Department of Health. The survey showed that DMFT rate started with 0.54 at the age of 6 and increased to 3.80 at the age of 16 years. The DMFT for girls was higher than the DMFT for boys. More than 60 percent of the children needed treatment of their permanent teeth, of all affected teeth only approximately 1.4 percent had been filled, approximately 90 percent needed fillings and 5 percent required extraction.

In a study of 11,000 children in Bandung, in 1968-1969, Soeria Soemantri reported mean DMF values ranging from 0.5 teeth in six year olds to 2.1 teeth in 15 year olds.⁵⁷

In 1972 some 3,200 children, aged six through fourteen years were examined in areas in Java, Sumatra, Kalimantan and Sulawesi. For each of these ages, DMF values were about twice the corresponding values for Bandung children.⁵⁷

Noor, R.G.⁶³ reported that in Irian Jaya, where the people still live in primitive conditions, a survey has shown that the DMF rate of children aged 6 to 10 years is 0.4 and rises to about 2.1 at 16 years. There are places in Irian Jaya where 50 percent of the school children have no caries of their permanent teeth. From these reports, it can be seen that caries experience in children in Indonesia seemed to be relatively low, but periodontal disease was a serious problem.

TABLE 1 Dental caries experience in deciduous teeth for 11,002 children in the city of Bandung.⁸⁴

Age in years	6	7	8	9	10	11	12	13	14
df index	4.5	3.9	3.3	2.5	1.7	1.0	0.5	0.2	0.1
Percentage with one or more decayed teeth	84	82	80	75	61	44	24	12	6

TABLE 2 Dental caries experience and percentage of children with one or more DMF teeth for 11,002 children in the city of Bandung (both sexes).⁸⁴

Age	6	7	8	9	10	11	12	13	14	15	16
D	0.44	0.47	0.60	0.76	0.77	0.92	1.13	1.27	1.56	1.68	1.09
M	0.01	0.20	0.02	0.04	0.06	0.14	0.18	0.19	0.25	0.20	0.26
F	0.01	0.04	0.06	0.07	0.09	0.13	0.12	0.16	0.19	0.24	0.04
DMF	0.45	0.53	0.68	0.87	0.92	1.19	1.43	1.63	1.99	2.12	1.39
% with one or more DMF	27.6	29.9	36.9	42.8	43.3	50.8	53.8	59.6	65.8	72.9	50.8

TABLE 3 Dental caries experience in children aged 6-14 years living in seven Indonesian cities.⁸⁴

Location	Number Examined	DMFT	Percentage of caries occurring on occlusal surface
Cirebon	394	2.24	94.1
Semarang	479	1.96	89.1
Surabaya	502	1.40	83.4
Palembang	490	1.67	93.3
Samarinda	506	3.04	93.1
Menado	449	3.18	93.8
Pontianak	497	3.76	86.4

TABLE 4 Dental caries in children aged 6 to 14 years living in seven Indonesian cities, by age.⁸⁴

Age	Location						
	Cirebon	Semarang	Surabaya	Palembang	Samarinda	Menado	Pontianak
6	1.25	0.80	0.86	0.67	0.70	0.58	-
7	1.56	1.10	1.01	0.74	1.21	1.19	1.04
8	1.29	1.32	1.14	1.14	1.68	1.27	1.44
9	2.02	1.57	1.30	1.33	2.56	2.44	-
10	2.23	1.86	2.40	1.39	2.89	2.97	2.49
11	2.54	2.54	1.83	2.00	3.75	3.36	3.50
12	2.73	2.38	2.41	2.71	5.11	4.94	4.65
13	2.92	2.51	1.58	2.90	5.98	6.16	5.52
14	3.22	3.08	2.55	2.86	5.27	6.84	6.35

Whatever the shortcomings in these data may be, it can be safely concluded from them that the caries rate in Indonesian children is low. This low caries rate may be associated with the high rate of enamel fluorosis which has been recorded. The fluorosis occurs even at very low water fluoride levels. If the findings from the survey conducted by the University of Kyoto are valid for areas of Indonesia other than those surveyed, then a large percentage of the population should have fluorosis; many towns have fluoride levels of 0.15 ppm.⁸⁴

TABLE 5 Relation between fluoride in water and enamel fluorosis in Javanese school children.⁸⁴

Fluoride in water in ppm	% Mottled Enamel	Incidence					Community fluorosis index
		+ -	1	2	3	4	
0.02	53.7	19	1	19	5	0	0.77
0.03	35.0	35	5	14	3	0	0.37
0.04	53.2	12	6	5	2	0	0.60
0.05	40.0	2	1	1	1	0	0.40
0.06	46.3	12	5	7	5	0	0.63
0.10	45.2	8	0	9	2	0	0.67
0.22	15.7	8	2	1	0	0	0.11
0.24	61.2	13	8	22	6	0	0.96
2.21	100.0	0	0	0	4	7	3.64
2.27	100.0	0	0	14	29	21	3.11

Source: Survey of fluoride in drinking water and mottling in Indonesia, by Dr Takumi Sato, Faculty of Medicine, University of Kyoto 1971.

2.3.1.2 Malocclusion

Malocclusion is difficult to characterise in a numerical way, and so far no fully acceptable index has been developed. Epidemiological surveys which have been done up to the present time are not adequate enough to give a true picture of the prevalence of malocclusion in Indonesia. Data accumulated up to the present time indicate that there is some correlation between dental caries and malocclusion, and between periodontal disease and malocclusion, and that the most important factor in malocclusion is crowding of teeth.

It is easy to understand that crowding of teeth may lead to more gingival inflammation and dental caries as crowding facilitates accumulation of bacterial plaque. So prevention of malocclusion will contribute to prevention of dental caries and periodontal disease.

2.3.1.3 Gingival and Periodontal Diseases

Although caries experienced in children in Indonesia is relatively low, periodontal disease is a serious problem. Periodontal was reported to occur in one-third of the children aged six years, and two-thirds of those aged 12 years.⁶³

Reports in 1971 showed that approximately 52 million children were under the age of 15. There was a high prevalence of gingivitis among children, ranging from 60 percent in 6 year olds to 80 percent in adolescents.

In the report of the APDF/APRO Committee in Public Health (1974),³ it showed that the percentage of 6 year olds with periodontitis was 36 percent and with gingivitis was 27.3 percent. At the age of 12, these percentages become 50 percent and 68 percent respectively (Table 7).

Another survey that was conducted in five cities in Indonesia of the 6 to 15 year old age group showed that an average of 43.3 percent suffered gingivitis (Table 6).³

TABLE 6 Prevalence of gingivitis in children 6-18 year age group, five cities survey in Indonesia.³

Age	Semarang N%	Surabaya N%	Menado N%	Pontianak N%	Palembang N%	Total
6	9 (45.0)	0 (0)	13 (68.4)	-	8 (44.4)	30 (42.2)
7	26 (55.3)	8 (12.3)	34 (58.6)	6 (26.1)	23 (32.4)	97 (36.3)
8	24 (45.3)	15 (17.8)	43 (78.2)	9 (20.0)	35 (46.1)	126 (40.3)
9	37 (58.7)	23 (22.5)	63 (90.0)	15 (24.6)	22 (34.9)	160 (43.3)
10	37 (53.6)	19 (25.7)	56 (93.3)	17 (23.6)	37 (52.1)	166 (48.0)
11	37 (46.8)	13 (30.2)	48 (96.0)	15 (19.0)	19 (38.0)	132 (43.8)
12	32 (40.9)	17 (28.8)	80 (100)	10 (13.7)	33 (49.3)	172 (45.7)
13	13 (37.1)	7 (29.2)	31 (100)	14 (19.2)	16 (37.2)	81 (39.3)
14	18 (72.0)	12 (50.0)	10 (94.7)	3 (8.8)	6 (42.9)	49 (42.2)
15	5 (100)	5 (45.4)	7 (100)	1 (6.2)	6 (60.0)	24 (49.0)
Total	238 (49.7)	119 (24.8)	385 (86.6)	90 (18.4)	205 (42.2)	1037 (43.3)

TABLE 7 Survey of member countries APDF/APRO Committee
on Public Dental Health
National survey result for gingivitis and periodontitis
(1963 - 1972)

Country	Gingivitis (Periodontitis) %				
	Age 6	Age 12	Age 15-19	Age 34-44	Age 45-54
Australia	- (-)	- (-)	- (-)	- (-)	- (-)
Hong Kong	63.3 (-)	73.1 (-)	81.0 (-)	93.4 (49.0)	- (-)
Indonesia	27.3 (36)	50.0 (68)	- (-)	- (-)	- (-)
Japan	- (-)	- (-)	(27.45) (-)	(58.20) (-)	- (-)
Korea	(7 yr) PI 0.40	(11 yr) PI 0.44	(14 yr) PI 0.41	- -	- -
Malaysia	51.7	60.4	51.4 PI 0.48	-	-
New Zealand	- (-)	- (-)	- (-)	- (-)	- (-)
Philippines	12.2 (-)	23.6 (-)	22.2 (1.4)	38.7 (19.2)	44.6 (34.6)
Singapore (Chinese)	66.0 (-)	73.0 (0.9)	77.5 (7.2)	- (-)	- (-)
South Vietnam	- (-)	- (-)	- (-)	- (-)	- (-)
Taiwan	Age group 6-14 PI 0.2-0.4			Age group 35-54 PI 0.5-1.5	
Thailand	(PI 0.23)	(PI 0.37)	(PI 0.45)	(PI 2.86)	(PI 5.03)

2.3.2 Dental manpower

To demonstrate that the shortage of dental manpower poses a problem, some data on the population should be considered.

In 1971 the Indonesian population was about 120 million (30 million in urban districts and 90 million in rural areas). In mid 1975 the total population of Indonesia was about 132 million. Estimates show that by 1980 the population of Indonesia will be about 150 million.

The overall priorities and needs of the country dictate a rational approach towards the dental manpower situation. The type and quality must be appropriate to the services most needed yet within the resources that are available. Maximum use of financial, manpower and facility resources must be made to extend the availability of appropriate dental health services to a larger proportion of the population. The extension of services should relate to the pattern of needs for emergency services and for prevention of periodontal disease in all areas and of dental caries in urban and urbanising populations.⁶⁰

The following figures will give a rough idea of the number and type of various dental personnel available in the Indonesian country in 1971:

	Dentists	Dental auxiliaries	Dental technicians	Chairside assistants
Total	1000	300	100	500
No. of schools	8	4	3	-
No. of years of training	5 (6)	3	3	-
Annual output	200	50	25	-

The dentist:population ratio is 1:120,000 (as compared to 1:1400 in Scandinavia).⁵⁸

A large but undetermined number of non-professional practitioners (Tukang gigi) are doing dental work, mainly crown and bridge work and dentures, but also some illegal extractions of teeth. Steps are being taken however, to control the activities of such practitioners by compulsory registration (licence) under the Ministry of Health. These licences will have to be renewed each year and no additional licence will be issued. It is estimated that some 2,000 of a previously estimated 4,000 Tukang gigi are registered as unqualified practitioners.

In 1973, there were approximately 1,600 dentists and 400 dental nurses listed in Indonesia for an estimated population in 1974 of 129 million.

Most dentists in Indonesia work in Government or Government-approved services, a duration of 15 years being required before a dentist has a right to sole and full-time private practice in a large city. However, the right to private practice outside of Government working hours may be given at any time. After three years service, a dentist may practice privately, full-time in small cities or rural communities, or take employment in other salaried positions. Government salaries, as far as could be ascertained, amounted to, at best, 1/5 to 1/7 of a guesstimate average part-time private practices income in large cities.

Only about 50 full-time private practices existed and these also were in large cities, the number being somewhat indicative of a limited effective demand to support such services. Those limitations, presumably in cash resources, were even more acute in rural areas, as evidenced by the reluctance of young dentists to take advantage of the third year concession for full-time private practice outside large cities. Some salaried positions notably with the oil enterprise, Pertamina, approximated or even exceeded average part-time private practice incomes.

An estimation of the employment distribution of dentists was:⁶⁰

Ministry of Health	505	- including about 35 part-time teachers
University Dental Schools	405	- including about 90 in private schools
Armed Forces	270	- including about 40 in national services
Dental Nurse Schools	25	
Other Government Departments and Agencies	100	- including nearly 30 with Pertamina and over 20 with the tin enterprises
Full-time private practice	50	
Absent from Indonesia or not employed in Dental Services	<u>245</u>	
	<u>1,600</u>	

About 1200 engaged in part-time private practice so that in all about 1,250 engaged in full or part-time private practice. Of the 1,355 practicing dentists, all but about 50 (10 percent of those employed in the Government Health Services) were working in urban areas in 1974.

About 250 dental nurses of the 400 listed were employed in Government Health Services, of which some 30 worked in teaching and other approved services. On the job training and experience had been necessary where clinical duties required of the dental nurse had been widened to meet treatment demands for extraction of permanent teeth and emergency treatment for adults.

CHAPTER 3

TYPES OF PROGRAMMES

Preventive services on a large scale may be instituted without corresponding curative services. The reverse is not feasible, as it would lead to an ever-increasing demand for dental treatment, which could not be met.

In every country priority must be given to prevention. If the number of trained staff is not adequate, as will often be the case, a well planned and complete preventive programme undertaken in part of a country will be more effective than a country-wide programme of half measures.^{90, 93}

Although we are still unable to prevent the appearance of dental caries, we have nevertheless a reliable method of prophylaxis for all its complications and their influence on humans and, in particular, children.

This method of systematic prophylactic oral hygiene in children is carried out by the public health bodies as a part of systemic work for the protection of the health of the growing generation.

Systematic prophylactic oral hygiene is not merely an organisational form of curative work but is a method founded on a scientific basis, of prophylaxis of dental and maxillary diseases and their complications which result in serious damage to the health of the population.

Systematic prophylactic oral hygiene must be carried out throughout a person's life, but it is particularly important in childhood.⁷⁵

The prevention or control of dental disease should include the following:⁶⁴

1. Improvement in the chemical and structural quality of the teeth during their primary formation and calcification.
2. Chemical treatment of the tooth surfaces during their newly erupted stage of development to increase their acid insolubility.

3. Mechanical removal and chemical inhibition of the deposition and proliferation of cariogenic plaque bacteria.
4. Chemical interference with the bacterial enzymes that ferment carbohydrate to organic acids.
5. Promotion of salivary flow and improvement of buffering ability of saliva.
6. Suggestion of foods with less cariogenic potential as acceptable substitutes for the cariogenic fermentable carbohydrates.
7. Dealing with the social, psychological and environmental factors that influence the selection of food and eating habits.

3.1 Dental health education programmes

Schools have been making sincere efforts to improve the dental health of children by dental screenings and examinations, informing parents of dental defects, referral of children for treatment, establishing school dental clinics for treatment and prophylaxis, application of topical fluorides and provision of dental personnel.

In addition to these services, the schools provide educational instruction in dental health.

But the problem seems to be that very few of the school teachers have specific training in dental health education.⁴ The aim of dental health education is to make the population understand the value of having a healthy chewing apparatus, to encourage all classes of society to co-operate in the application of preventive measures and to make everyone realise the importance of dental examinations and treatment.⁴⁴ Dental health education must clearly give pride of place to prophylaxis.

The priority must be given to the teaching of dental hygiene to children.

Town,⁸⁶ stated that the maintenance of good oral hygiene correlates very well with low prevalence and severity of periodontal disease.

Childhood is a particularly appropriate time to give this education, for this is a very suggestible period of life, and by giving the children health education, we will automatically influence the adults, i.e. the parents.

Roder,⁶⁹ and Stoll,⁷⁶ stated that dental health education is part of the curriculum in many school systems around the world. The rationale is that prevention is the key to controlling dental disease, that caries and periodontal disease are largely preventable through personal behaviour, and that educational environment of the school is the logical place to teach dental health practices which will result in better dental health for today's children and tomorrow's adults.

To be effective, dental health education must be sustained exercise in which the learner must be actively involved.³³ That dental health education is effective in reducing dental disease is indicated by a recent survey of dental services rendered in 1969.⁷⁸ That survey states:

"Of the 35,783 patients included in this nationwide survey more than 25 percent were between 10 and 19 years of age. The dental services received by the greatest number of patients were oral examinations, prophylaxis, radiographs, one or two surface amalgam fillings. These treatments are classed as preventive services. The survey indicates that significant changes have occurred in the proportion of patients receiving various services since similar surveys were conducted in 1951 and 1959. The percentage of patients receiving extractions, fillings and dentures has declined,

while there is an increase in the percentage of patients receiving prophylaxis, radiographic examinations, fluoride treatments and orthodontic corrections. It is reasonable to believe that the improvement shown in the survey can be attributed to increased knowledge concerning dental health, particularly among the private dental office patients."

According to Counsell,²⁸ and W.H.O.,⁹⁰ dental health education functions only when it changes personal behaviour.

To strengthen the programme of dental health education for groups, the planner must be guided by a firm knowledge of the attitudes of his population toward dental health and its behavioural tendencies in response to recommended dental health practices. If goals of a group and the group's needs and values are ignored, a programme of dental health education will find an apathetic audience.

The key persons in dental health education to the public are the dentists and the dental hygienists.⁷¹ Dental health education on prevention of periodontal disease should concentrate on oral hygiene (plaque control) and the need for elimination of calculus and other local irritants. The education in oral hygiene can obviously be carried out by a variety of auxiliary personnel.

Carbohydrate is an essential nutrient component of a cariogenic diet. By an experiment it has been stated that the effects of carbohydrate free and low carbohydrate diets on rat caries development were compared, and it was found that dental caries was present only in the group that ate some sucrose.

According to Nizel,⁶⁴ free sugar and fermentable carbohydrates lodged on the teeth for even a short period of time, ten or fifteen minutes will result in the formation of acid which causes tooth decay.

A reduction in the frequency of intake is more important than the amount consumed as far as dental decay is concerned. Each fresh supply of sugar is an additional attack on the teeth. The provision of an adequate diet, although a responsibility of the parents, is also a national responsibility, especially in the underdeveloped countries. In considering a balanced diet, the parents should be taught that:⁵⁴

1. Meals should be regular and taken in a normal environment.
2. There should be no excessive amount of fermentable carbohydrates.
3. The importance of vitamins and mineral salts.

The best method of dental health education is by individual contacts (particularly between the dentist and his patients) and personal example (e.g. of parents for their children).⁴⁴

W.H.O.,⁹³ stated that all known health education techniques should be utilised in a dental health programme. Some of the available methods are as follows:

1. Mass media (press, radio, television and other similar means);
2. Visual aids (films, film strips, slides, models and other aids);
3. Printed materials (brochures, pamphlets, posters, reminders and other materials);
4. Personal contacts (dentist-parent consultations, instruction in schools by dental personnel, home and school visits by public health personnel, meetings of lay groups and other similar means);
5. Co-ordinated health activities (co-operation and mutual understanding of all professions concerned with the welfare and health of the child).

3.2 Preventive programmes

The prevention of dental diseases in children can be considered under four headings:³⁵

1. Prevention of diseases affecting general health
2. Prevention of malocclusion
3. Prevention of dental caries
4. Prevention of periodontal disease

3.2.1 Prevention of diseases affecting general health

The presence of infected root canals both of permanent and of deciduous teeth is a constant threat to the general health. Every tooth with an infected pulp must either be treated or extracted, even if it causes no local subjective symptoms.

Orthodontic problems must be subordinated to this rule.

Hygienic oral conditions must be established before any other treatment is carried out.

3.2.2 Prevention of malocclusion

The dentist responsible for the child's dental health must observe the development of the dentition and jaws and must therefore have a good understanding of orthodontics.

Prevention should replace treatment as far as possible. Good oral hygiene, including preservative dental treatment, is a requisite for orthodontic treatment. The prevalence of malocclusion observed in the deciduous dentition is lower than in the mixed and permanent dentitions. Observations of prevalence of malocclusion in the mixed and permanent dentitions made in different countries have given results varying between 50 and 70 percent.

This suggests that 50-70 percent of all children have anomalies of both position and bite. The main consideration in orthodontic prophylaxis is the preservation of the deciduous dentition.²⁶

3.2.3 Prevention of dental caries

The following aspects of this subject are considered:

1. Nutrition and diet
2. Instruction in oral hygiene, dental prophylaxis
3. Dental treatment
4. Topical use of fluorides
5. Prophylactic pastes
6. Self administration of topical fluorides
7. Mouth rinsing
8. Fluoride added to table salt
9. Fluoride tablets for children
10. Mass prevention
11. Fissure sealant

3.2.3.1 Nutrition and diet

"Nutrition" is used here to denote the systemic effect of absorbed food components; "diet" the local environmental effect of food in the mouth.

The effect of the former appears to be mainly confined to the formative period, that of the latter to the period after the teeth have erupted.

The physical and chemical properties of the teeth as influenced by nutrition will play a part in their subsequent caries resistance. With the exception of fluorides however, no food components have been proved to be of importance during the formative period.

Hypoplastic and mottled enamel or even the enamel in cases of amelogenesis imperfecta is not more caries susceptible than enamel which is apparently normal. Phosphate in the pre-eruptive period may be of more importance.

Stress can be laid however, on the importance of adequate amounts of the substances necessary for the formation of the teeth and bones.

Much more is known about dietary factors. It has been shown that there is a correlation between caries incidence and sugar consumption. Carbohydrate retention on the tooth surface is a necessary condition for caries initiation, the important factor being the length of time during which the sugar is present on the tooth surface.

The consumption of confectionary should be restricted as far as possible. Immediately after every meal, oral hygiene (tooth brushing, mouth rinsing, etc.) should be practised. The wider observance of these rules demands that the dental health education of the child should begin at an early age.

In order to promote the physiological cleansing of the mouth, fibrous foods should be included in every meal. Fat and protein seem to be protective foods. The addition of phosphates to the diet has had promising results but needs further study.

3.2.3.2 Instruction in oral hygiene; dental prophylaxis

All media of health education are useful in the promotion of good dietary habits. To promote good oral hygiene however, individual instruction and supervision are necessary. As regards the prevention of dental caries, the educational elements of dental prophylaxis carried out by the dentist or auxiliary personnel are of great importance.

3.2.3.3 Dental treatment

Two factors should be considered here:

- (a) physiological cleansing of the mouth through mastication must not be hindered by painful teeth, and
- (b) areas of food retention must be eliminated.

3.2.3.4 Topical use of fluorides

Three methods will be considered:

- (a) the use of fluoride-containing abrasive pastes by the dentist for dental prophylaxis; This technique was originally tried unsuccessfully by Bibby. Abrasive pastes containing silex and stannous fluoride may open up new possibilities;
- (b) the brushing of the teeth using fluoride solutions, by the children themselves under supervision. Berggren put this method into practice in Stockholm, where the children brushed their teeth under supervision with a two-and-a-half percent sodium fluoride solution. This method has two objects: education in mouth hygiene and prevention by fluoride effect. Further research is necessary before this technique can be advocated.
- (c) the application of fluoride solutions by dentists or auxiliary personnel. This method has been widely advocated and practised in the U.S.A. both before and after water fluoridation started. In Europe the topical application of fluorides is only of limited practical use. Shortage of personnel and funds have been the limiting factors.

The classical experiments of Knutson and Armstrong (1946), using a 2 percent sodium fluoride solution, showed 35 to 40 percent reduction in new carious teeth over a period of three years in children of 7 to 15 years of age. The method involves four applications at weekly intervals. This procedure commenced at 3 years, 6 years, 10 years and 13 years of age.

Mouth rinsing with solutions of neutral sodium fluoride 0.2 percent weekly and 0.05 percent daily as recorded by Horowitz,⁴⁸ showed a drop of 51 percent DMFT and a drop of 44 percent DMFS, over control after a 20 months period. This is a practical, effective and cheap method using limited professional personnel.

The use of stannous fluoride in dentifrices has also been looked into. One important advantage of topical application is immediacy of effect. Caries inhibition begins as soon as treatment is initiated. The chemicals which are used in topical application: sodium fluoride, stannous fluoride, acidulated phosphate fluoride, and stannous hexafluorozirconate (Sn Zr F_6).

Sodium Fluoride

The recommended treatment technique for application of 2 percent sodium fluoride solution is:⁷⁹

1. The clinical crowns of the teeth are cleaned with a standard prophylactic paste in a motor-driven rubber cup.
2. One half of the mouth (right upper quadrant and right lower quadrant) is isolated with cotton rolls and thoroughly dried with compressed air.
3. Sodium fluoride solution is applied to the teeth with cotton applicators so that all surfaces are visibly wet. The solution is permitted to dry for 3 minutes. The procedure is then repeated on the left half of the mouth.
4. A series of four treatments are given at one week intervals at the ages of 3, 6 or 7, 11 and 13.

About 40 percent reduction in new carious teeth has been obtained over a period of years during investigations. The advantages of sodium fluoride treatment are as follows:

1. A multiple-chair technique (several children treated at one time) can be used by each operator.
2. The treatments used to be repeated only four times during childhood.
3. The solution is stable if kept in a plastic container.
4. The taste of the solution is well accepted by children.
5. There is no discolouration of the teeth and no irritation of soft tissues.

The method lends itself well to the public health procedures but cost and lack of sufficient professional personnel to make the applications have been important hindrances to a wide application of the procedure so far.

Stannous Fluoride

Mercer and Mahler are accredited with perfecting the technique for applying an 8 percent solution of stannous fluoride. A number of investigations has shown their method to be effective in reducing dental caries:

1. A thorough prophylaxis is given. Each tooth surface is cleaned and polished with pumice for five to ten seconds. Pumice is carried between the teeth with unwaxed dental floss and the proximal surfaces of the teeth are stripped.
2. Teeth are isolated with cotton rolls and dried with compressed air. Either quadrant or one half of the mouth can be treated at one time.
3. A freshly prepared solution is applied continually to the teeth with a cotton applicator so that teeth are kept moist with the solution for four minutes. Re-application is required every fifteen to thirty seconds.
4. For highly susceptible children, the application should be repeated every six months, for less susceptible children, one application per year is recommended.

Studies give conflicting results, with a range of 47 percent to 78 percent fewer new DMF surfaces among treated children.

The disadvantages of stannous fluoride are that the solution is unstable and must be made fresh for each patient. It is quite astringent and disagreeable to taste, its application is therefore unpleasant.

Flavouring agents are contra indicated. The solution occasionally causes a tissue irritation manifested by gingival blanching. Pigmentation of teeth has been reported as a light brown colour which tends to mask lesions on radiographs.

Acidulated phosphate fluoride

The new agent for caries reduction is acidulated phosphate fluoride. The solution contains 1:23 percent fluoride. The preferred procedure for application is the same as that for stannous fluoride except that the solution is stable when kept in a plastic container and a new solution need not be made for each patient.

Initial clinical studies indicate that it might possess anti-cariogenic properties surpassing other fluoride solutions now in use. At the end of a two year study during which the solution was applied on an annual basis, children in a test group demonstrated a 67 percent reduction in DMF teeth and a 70 percent reduction in DMF surfaces. Acidulated phosphate fluoride is reported to have none of the disadvantages of sodium or stannous fluoride. A single annual application seems sufficient.

An acidulated phosphate fluoride paste was applied semi-annually by dental hygienists to 151 children between the ages 10 and 13. During the two year study, exfoliated deciduous teeth were collected for analysis of the fluoride uptake, biopsy specimens of permanent teeth were taken at the end of the study for the same purpose. There was a 21 percent caries reduction for previously erupted teeth and a 36 percent reduction for the newly erupted teeth.

Stannous hexafluorozirconate ($S_n Z_r F_6$)

A 16 percent solution of stannous hexafluorozirconate applied on a semi-annual basis showed a reduction in new DMF surfaces of 96 percent after 9 months. A 29 percent solution showed 76 percent less DMF surfaces after 12 months. The research is not conclusive however, and more studies should be made.

Toxic reaction after the use of stannous hexafluorozirconate in a prophylactic paste have been reported. However, the food and drug administration has requested that no further studies be initiated until adequate preclinical studies demonstrate that the compound is safe for use by people.

3.2.3.5 Fluoride prophylactic pastes

A dental prophylaxis is prescribed to proceed the application of any of the fluoride preparations. It is therefore evident that if the fluoride could be incorporated into the prophylactic paste, two operations could be consolidated into one. Bibby evaluated a paste containing 1 percent sodium fluoride in 1946 and reported 25 percent to 43 percent reduction in DMF teeth, depending on the number of treatments given.

The United States Air Force and the University of Indiana have both developed a stannous fluoride prophylactic paste. A silex silicone base was used for the paste. It was found to be seriously lacking as a material for cleaning and polishing teeth.

The aqueous stannous fluoride-lava pumice prophylactic paste tasted better, cleaned better and was less irritating to the gingiva than the silex silicone paste. An average reduction of 34 percent in DMF teeth was noted for the pumice paste at the end of one year. When it was followed by the application of 8 percent stannous fluoride treatment the gain was still greater. Results after two or three years showed that the agents continued to maintain their effectiveness. Further study is needed to confirm the efficiency of any of the fluoride containing prophylactic pastes.

3.2.3.6 Self administration of topical fluorides

The increasing shortage of manpower and the relatively high cost of treatment accentuate the shortcomings of a professionally administered technique as a public health measure.

Research projects are in progress to discover whether self applied prophylactic pastes brushed on the teeth at stated intervals will reduce the DMF rate. Published data strongly suggests that the self administration of topical fluorides may provide an answer to the problems of insufficient professional manpower and excessive costs that hinder topical fluoride programmes. Self administration will probably become the method of choice when improvements are made in therapeutic agents and when techniques for self application are improved.

3.2.3.7 Mouth rinsing

A clinical trial was designed to evaluate the anticaries benefit of a simple stannous fluoride mouth rinse. It was used by school children in a programme of mouth rinsing once each school day during two school years. The water in the area was fluoridated. The stannous fluoride mouth rinse containing 250 ppm (approximately 0.1 percent stannous fluoride) was prepared each day before distribution to the classroom. The classroom teacher supervised the rinsing procedure. It consisted of three successive rinses each day of 10, 20 and 30 seconds each.

In the final results, reduction of 33 percent and 43 percent in DMF scores for the group resulted. The reaction of the group to the rinsing procedure and to the mouth rinse flavour was quite good. A few commented about the slight astringency of the mouth rinse, but there were no serious objections.⁷⁰

3.2.3.8 Fluoride added to table salt

The addition of fluoride to table salt can be an effective means of preventing caries according to experiments conducted over a period of five years in two communities of Hungary.

Because the use of fluoride in salt allows for individual choice and is not compulsory, it does not interfere with personal rights, (European populations have shown strong resistance to water fluoridation on a community basis).

The result of the study showed a 40 percent decrease in the DMF rate in children 2 to 6 years of age. The DMF rate in the 7 to 11 year olds showed a 34 percent reduction.

A procedure for determining the amount of table salt consumption has been developed. When this determination is made for a given region, general introduction of table salt with fluoride can follow. This method is suitable for a mass preventive programme.

3.2.3.9 Fluoride tablets for children

There are some situations in which some other way of adding fluorides to the diet would be more effective and convenient. Various methods have been suggested from time to time. A study made in 1960 by the National Institute of Dental Health proved a method of individual supervision by a dentist effective.

A sodium fluoride tablet (1.0 mg) was dissolved in a regulated quantity of water, milk or fruit juice according to the child's age, and given at stated intervals.

There has been little or no use of this method except in dental practice where individual children who have high susceptibility to dental caries can be carefully supervised.

The use of fluoride tablets should be considered a prescription medication to be used under the direction of a dentist only. Mass medication of this type is not recommended because the effects on individuals can not be controlled.

Although the effectiveness of the use of tablets has been proved by some experts,^{1, 41, 65} according to Dirks³⁵ in rural or underdeveloped areas, the use of tablets may be difficult or even dangerous in the absence of adequate supervision.

The distribution of tablets to all or to a large section of the population (pregnant women and children) would seem possible only in the smaller communities.

3.2.3.10 Mass prevention

Nizel⁶⁴ stated that the main dietary factor effecting teeth in their formative stages that makes them resistant to decay is fluoride. There are rarely sufficient fluorides found in food to build decay resistant teeth so that it must be supplied in some other form. The most economical method is the addition of fluoride to drinking water supplies.

The subject of dental health education - an important tool in the mass prevention of oral disease - will be considered elsewhere. There is, however, another method for mass prevention of dental caries: the use of fluorides. As dental caries is a mass disease, mass prevention is needed.

Up till now the vehicles advocated for fluorides have been: drinking water, milk, salt and tablets. Only for drinking water is there positive proof that the measure is effective and innocuous; this was shown by the first three water fluoridation surveys in the U.S.A. After only two years of fluoridation a caries reduction of about 50 percent was observed.

The chemical action of fluorine during and after tooth development is not fully understood. The manner in which fluorides reduce the incidence of caries susceptibility is thought to be as follows:

1. Fluorides combine with the organic portion of the tooth enamel, thus rendering it less soluble in the organic acids produced in the mouth.
2. Fluorides inhibit specific bacterial action which forms the acids.

3. The effect of fluoridated water is thought to continue as long as it is used.
4. Teeth benefit most from water fluoridation during their period of development.
5. There is some evidence that the decay rate increases if children who have used fluoridated water in their early years are deprived of it in subsequent years.

Dr Dean published studies of tooth decay in 7,259 selected children in twenty-one cities of four states, checked against the fluoride content of their drinking water. The findings were:

1. At one part fluoride per million parts of water, children had about 60 percent fewer decayed teeth than in non-fluoridated cities.
2. Disfiguring stains or "mottled" teeth did not occur where water contained up to 1.5 parts of fluoride per million parts of water.
3. At one part per million, tiny white flecks were on the enamel of about one-tenth of the children. These flecks were usually discernible only under a strong light during dental examination, and were not objectionable.

Extensive investigations in the United States and Great Britain over the past thirty years have shown that children born and brought up in an area with about one part per million of fluoride in the water have 50 to 60 percent less dental decay than those brought up in areas where the water contains only traces of it.

In addition, where there is this quantity of fluoride in the water 30 percent of children aged 12 to 14 years have completely sound teeth. There is strong evidence too that the benefit persists well into middle age and later.

To obtain maximum benefit the water containing fluoride should be drunk during the period when the teeth are forming, i.e. during the first eight years of life; but even those who come later into areas where the water is fluoridated receive some benefit.

3.2.3.11 Fissure sealants

Considerable interest has been aroused by the reported use of sealants in fissures, pits and defects in the enamel surfaces of teeth in order to prevent dental plaque accumulation in these vulnerable areas which could lead to carious lesions. Although much has now been published about these materials, especially of laboratory trials, the clinical results published have been limited by the short duration of the observations. There is however, some evidence that if the material is correctly applied and if it effectively seals the fissures without leakage, then a reduction of fissure caries has been observed over the one or two year periods of the trials.

A great number of dentists who have been involved in prevention especially on a clinical basis, doubt the true efficiency of, or necessity for, these fissure sealants, and their arguments are based, among others, upon the following reasons:

1. Use of fissure sealants does not eliminate the need for the use of topical fluorides.
2. The fissure sealant, even if effective, protects one surface of the tooth mainly (the occlusal). The other four surfaces at risk (the mesial, the distal, the buccal and the lingual) are dependent on the effect of fluorides and of plaque control by the patient.
3. Many observers experienced in the use of topical fluorides over a number of years, especially with the use of stannous fluoride, do not agree with the advocates of fissure sealants who claim that fluorides are ineffective or of little effect in preventing fissure caries.

4. Fissure sealants should be applied only to those fissures which are so deep that they are potentially carious but not in fact affected by caries. There is some argument as to whether "sealing in" caries would be harmful. If the seal were 100 percent effective this would probably be safe, but in practice one can not be sure of 100 percent sealing. The choice of which fissures to seal may involve a considerable exercise of judgement and some forecasting - or even guesswork - at the expense of the patient.
5. Fissure sealants, therefore, must be regarded as applicable where used only for primary caries prevention, whereas topical fluorides, especially of the stannous fluoride type may be effective in controlling already initiated caries and in the reversal of small lesions.
6. The application of the sealant material is far from simple and the many papers giving examples of loss rates of some sealants exemplify this.

However, the main factor must be that, to use these materials is costly in time and procedure in relation to the benefit obtained, and in the present controversial situation it may not appear justifiable to some to involve patients in the necessarily high fees entailed.

At present there are available a number of different commercial sealants.

One published study of bisphenol A and Glycidil Metacrylate showed a caries reduction of 29 percent in three years after placement in pumice, but unetched enamel surfaces.

There are differences in the way in which the sealants are polymerized or cured (after being placed in position). The material which clinical evidence has to date shown to have better adhesive and sealing qualities is one which does not harden until it is irradiated by ultraviolet light focused on it from a special lamp. It then

polymerizes quickly. The other material hardens by a chemical reaction between the mixed components of the applied paste. There would appear to be some doubt currently regarding the safety of unmodified ultraviolet lamps.

Adhesion for all these materials is obtained by partly decalcifying the immediately surrounding enamel surface, usually by the use of 50 percent phosphoric acid. The acid etches the surface of the enamel dissolving some of the mineral constituents to a depth of 7 to 10 microns, and this roughens the surface enabling the fluid sealant to flow into the irregularities and on setting there should be a strong bond formed.

If the decision is made to use fissure sealants, the dentist should study very carefully the instructions for use which are issued by the manufacturer of the particular sealant chosen.

3.2.4 Prevention of periodontal diseases

Prevention of periodontal diseases is as important as the prevention of dental caries. Periodontal disease can be caused by: Systemic factors, predisposing local factors, and existing local factors.

3.2.4.1 Control of systemic factors

Most of the systemic factors in periodontal disease are unknown.^{35, 94} However, it is known that Vitamin A plays a role in the metabolism of the epithelium and indirectly in resistance against infection. Some of the components of the Vitamin B complex are of importance for the resistance both of the epithelium and connective tissue. Vitamin C is essential for the formation of collagen. An adequate intake of vitamins should therefore be advocated whenever a deficiency is suspected.

In some economically less developed countries, correction of the diet, including vitamin deficiencies, may be a valuable adjunct in preventive work. In the economically more developed countries, most people have an adequate diet as far as vitamins and nutrients are concerned.

3.2.4.2 Control of predisposing local factors

Any local or systemic condition interfering with the growth and development of the periodontium is liable to predispose to periodontal disease. Therefore all measures which contribute to the normal development of these structures will contribute to the prevention of periodontal disease. Chronologically, the first factor to be considered is a balanced diet for the pregnant woman. In this sense different factors may play an essential role, as for instance:

- (a) a sufficient supply of proteins of good quality;
- (b) a correct quantity and ratio of mineral salts
(especially calcium and phosphorus);
- (c) an adequate intake of vitamins

Secondly, the same considerations must also be given to the diet of the growing child. Particularly, a lack of Vitamin D interferes with the growth and development of the jaws and teeth, but other vitamins may also be involved.

3.2.4.3 Control of local existing factors

Bacterial plaque and calculus are the most common direct causes of periodontal disease. Any measure able to prevent the formation of such deposits should be undertaken.⁹⁴

Control of local factors by individuals

Raw and fibrous foods help to clean the teeth and gingiva during mastication, and should be introduced into the diet at as early an age as possible. Brushing the teeth and gums, using a suitable technique, immediately after every meal, or at least twice daily, is an important part of the treatment and prevention of periodontal diseases.

The aims of tooth brushing are to remove plaque from the teeth, gingival margins, and gingival crevices and to prevent calculus formation and to stimulate the blood supply and increase keratinization of the gingiva by massage. Thorough rinsing with plain water helps to remove any debris loosened by the tooth brushing. The addition of some weak

antiseptic or flavouring agent may make this procedure more acceptable but not more efficacious. Debris between the teeth can seldom be removed by tooth brushing or mouth rinsing. In children where interdental papillae are usually still firmly attached to the teeth, special interdental cleaning is rarely necessary. However, in older children and adults when there is evidence of inflammations, use of dental floss is indicated. In persons with recession of the papillae, interdental cleaning is always indicated and it is probably the most important part of tooth cleaning.

Special tooth brushing methods can be used, but in most cases such aids as interdental sticks, elastic bands or dental floss are indispensable.

Control of local factors by the dentist

Ideally, from an early age every person should have regular and periodical oral examination, preferably twice a year, for checking whether any disease is present, for treatment if necessary and for ascertaining the effectiveness of oral hygiene habits.

Even when thorough tooth cleaning is maintained by the patient there will be regions in the mouth where the cleaning is not sufficiently effective. Regular visits to the dentist for oral prophylaxis are therefore necessary. Any deposits of calculus, supra-gingival as well as sub-gingival, should be removed with proper instruments. Particular emphasis should be given to the interdental areas. Attention should also be paid to the fact that not all accretions are calcified to form calculus.

The prevention or correction of malocclusion will help to prevent periodontal diseases by:

- (a) eliminating gross stagnation areas
- (b) providing sufficient room between the teeth
for well formed interdental papillae

- (c) preventing food packing
- (d) making a lip-seal possible
- (e) preventing direct damage to the gingiva by
teeth of opposing jaw
- (f) preventing occlusal trauma

Proper restorations that maintain the normal contour of the teeth and provide adequate contacts between them are important in preventing localized periodontal disease. Every care should be taken that overhanging margins are avoided or corrected and that removable appliances are carefully designed to prevent periodontal damage.

3.3 Curative programmes

Preventive measures alone however, will not suffice; curative measures will be necessary as well and must be included in any dental health programme for children.¹⁷

The aim of curative measures is good mastication and normal occlusion. They also play an important role in the prevention of pulp lesions and subsequent infection.

The services provided will vary widely in accordance with the needs and resources of each country. If the development of a comprehensive children's dental health service is impossible, priorities must be established.

Experience shows that a decentralized system of dental health services for children is preferable. In some areas mobile units have proved very useful. It is desirable that larger towns should have a centrally-situated clinic with a staff of specially trained dentists to which orthodontic, surgical and other complicated cases, including handicapped children, can be referred.

The importance of the deciduous teeth, especially the second molar and the canine, and therefore of treatment beginning at pre-school age, and the prevention and early treatment of gingival disorders, were widely accepted. Ideally, the commencement of treatment should be at the time of onset of dental caries which generally occurs at about the age of three.

High standard equipment, including x-ray apparatus, and excellent facilities are essential in order to provide effective services. Curative services should include the treatment of all oral and dental disorders.

Where this is not possible, the following is recommended in order of priority:

- (a) relief of pain and other emergency treatment;
- (b) treatment of oral conditions endangering the child's general health;
- (c) conservation of the permanent dentition and supporting tissues;
- (d) conservation of the deciduous dentition;
- (e) interceptive orthodontic treatment;
- (f) orthodontic treatment.

In many countries the dental profession is under an obligation to provide some kind of orthodontic treatment. The priorities in treating caries and malocclusions should be the following:

- (a) caries prevention;
- (b) treatment of caries in the deciduous dentition;
- (c) treatment of caries in the permanent dentition;
- (d) orthodontic prophylaxis;
- (e) orthodontic treatment of simple cases;
- (f) orthodontic treatment of more advanced cases;
- (g) orthodontic treatment of severe cases.

In a rationally planned dental health service for children, the function of orthodontics would be the prevention, interception and treatment of incipient conditions which would require regular treatment at a later age. Depending on manpower, financial and other resources, the following priorities are suggested:

- (a) prevention and treatment of caries in the permanent dentition;
- (b) orthodontic prophylaxis;
- (c) prevention and treatment of caries in the deciduous dentition;
- (d) orthodontic treatment of simple cases with simple removable appliances by dental practitioners, dental officers and specialists;
- (e) treatment of more advanced malocclusions by specialists;

In addition, measures should be taken to provide care for children with severe malocclusions, cleft palate, etc.

3.4 Types of programmes suitable for Indonesia

The Indonesian Dental Association,³ has suggested the following priority needs for improving dental services in Indonesia:

- (a) dental health education for all school children and the public;
- (b) preventive measures for all school children;
- (c) training of dental auxiliaries.

3.4.1 Dental health education programmes

Dental health programmes should be based upon establishment of a daily oral hygiene exercise in all primary schools. For such reasons, dental health programmes should have flexibility so that they are acceptable to each particular community.

Dental health educators must remember not to go against traditional customs which are still practised, especially in rural communities. In fact, they must make use of such customs in their educational programmes in order to establish a rapport with the people of differing

customs and backgrounds.

Dental health education should be given through the school children, also involving the parents as participants, and through all health centres in each district.

Dental health education is an integral part of both the dental health programme and general health education activities of the country.

The goals of dental health education are:

- (a) to increase the use of dental health facilities by school children, to increase awareness of emergency, preventive and curative services available;
- (b) to reduce caries prevalence in the child population enrolled in the school dental service by self-application of topical fluoride paste in a brushing programme;
- (c) at the rural school and health centre level, to establish tooth brushing programmes and promote other traditional, beneficial, oral hygiene practices to include all sections of the population at the urban school level to maintain and extend tooth brushing programmes to cover all schools and health centres and extending to all sections of the population;
- (d) to provide within the nutrient and dietetic education programme in both urban and rural school children.

3.4.2 Preventive programmes

The preventive measures for school children consist of:

3.4.2.1 Oral hygiene programme

The oral hygiene programme consists of supervised tooth brushing drills and dental prophylaxis. W.H.O.⁹⁵ stated that oral hygiene is essential to oral health. However in the prevention of dental caries, brushing of the teeth and other aids to oral hygiene are only likely to be effective to the extent that they are able to control the accumulation and retention of plaque.

For this reason, their efficacy as a public health measure to prevent caries should not be over-emphasized. Brushing of the teeth, supplemented by appropriate methods of interdental cleansing, can be effective in individuals who are motivated and able to follow a strict, careful, and efficient regime. It should also be emphasized that brushing the teeth is part of a total preventive programme and that it can be used as a method of applying fluoride, but that it should not be regarded in isolation as a preventive measure against caries.

The systematic prophylactic oral hygiene must be carried out throughout a person's life, but it is particularly important in childhood.

The main requirements to ensure its effectiveness are:

- (a) preventive oral hygiene must be planned, so that the whole child population of a town or district is included in a definite sequence, starting at an early age;
- (b) preventive oral hygiene must be methodical. Prophylactic examinations must be carried out at regular intervals as a rule twice a year;
- (c) preventive oral hygiene must be comprehensive. A child may be considered to have a healthy mouth if all carious lesions in deciduous and permanent teeth are filled, roots and teeth which can not be treated or in which treatment has been unsuccessful are extracted and inflammatory conditions of the buccal mucous membrane are eliminated. Children with anomalies of bite and deformities of the jaw must be given orthodontic and prosthetic treatment;
- (d) A preventive oral hygiene service must make provision for a prevalence study, an analysis of its dynamics and an estimate of the effectiveness of the curative and prophylactic measures carried out.

- (e) Preventive oral hygiene of the mouth must be combined with the education of children in hygiene and an extensive health education programme among parents and the rest of the population.

Systematic prophylactic oral hygiene is not merely an organisational form of curative work but is a method, founded on a scientific basis, of prophylaxis dental and maxillary diseases and their complications which result in serious damage to the health of the population. This method is based on the following premises:

- (a) the great majority of dental inflammatory processes which cause discomfort to the sufferers and are a danger to their health, starting with pulpitis and ending with osteomyelitis of the jaw, phlegmous and chronic septic conditions, are the result of complicated dental caries;
- (b) the early treatment of uncomplicated caries by fillings is quite reliable in cutting down its spread and preventing the appearance of the complications arising from it;
- (c) the development of dental caries in its early stages is characterised by the slow progression of the process. With regular prophylactic examinations at definite intervals it is nearly always possible to detect the appearance of carious lesions of the teeth before complications arise and to stop their further development;
- (d) carious lesions of the teeth start as a rule in childhood soon after the teeth erupt and a particularly large increase occurs in early schoolage. Thus only by starting regular preventive oral hygiene in early childhood is it possible to preserve all the teeth from destruction and prevent complicated forms of dental, maxillary and buccal disease.

3.4.2.2 Topical application

It has been reported,^{14, 20, 32, 38, 47} that the use of sodium fluoride, acidulated phosphate-fluoride and stannous fluoride as topical therapy, results in caries reduction. This method is very effective in caries reduction particularly for areas where water fluoridation can not be applied.

3.4.2.3 Mouth rinsing with fluoride solutions

Many experts reported,^{43, 48, 52, 53, 70} that the use of fluoride solutions as an anti-caries mouth rinse is very effective, inexpensive and feasible method for the prevention of dental caries in non-fluoridated areas. This method is suitable for Indonesia which has a shortage in dental manpower and finance.

The advantages of fluoride mouth rinsing:

- (a) little time is involved for the preventive procedures;
- (b) the technique of application is easy to learn;
- (c) few materials and supplies are required and the procedure is inexpensive;
- (d) non-dental personnel with minimal training can easily supervise the procedure;
- (e) frequent applications can be administered easily with minimal interruption of a school's academic programme.

The aim of this method is to rinse at school once a week with 0.2 percent sodium fluoride solution containing 0.1 percent fluoride ion.

Method of mouth rinsing:

- (a) volunteer workers were provided to mix the solutions;
- (b) solutions were delivered to schools in 1 gallon polythene bottles fitted with spring loaded 10 ml pumps;
- (c) other materials - paper napkins, small paper cups;
- (d) after instruction, teachers dispensed and supervised mouth washing;
- (e) the mouth washing was carried out in all classrooms on the same day of the week;

- (f) the children in each classroom were given approximately 10 ml of solution in a paper cup; together, they rinsed vigorously for 1 minute; the rinsing was timed;
- (g) after rinsing, each child expectorated into the paper cup, stuffed an absorbent napkin into the cup to soak up the solution, and then the liquid; free cup containing the saturated napkins were collected in a large plastic bag.

Complementary instructions:

- (a) Immediately before a mouth wash, it is not permitted to brush the teeth with any kind of toothpaste.
- (b) During the mouth wash, it is not permitted to swallow parts of the solution.
- (c) After the mouth wash, it is not permitted to rinse the mouth with water or to eat or drink anything until half an hour has elapsed.

3.4.2.4 Fluoridation of drinking water

Fluoridation of drinking water as a public health measure has proved to be the most efficient against caries. It is the most effective and economic method for reducing dental caries incidence by up to 60 percent. Fluoride should, if practicable, be introduced into all public water supplies. The optimum fluoride level is usually determined relative to annual average maximum temperature and is given as less than 1 ppm for tropical countries such as Indonesia.

Tropical countries using these lower levels should evaluate the results achieved and if the drop in dental caries prevalence is not as great as expected, consideration should be given to raising the level of fluoride.

The extensive reduction in the prevalence of dental caries resulting directly from water fluoridation is very significant. ^{2,15,16,}
^{34,49,56.}

This method should be suggested for Indonesia (only for urban areas or big cities where a water supply is available), because the effectiveness of fluoridation does not depend on family income, education of parents or on the availability of dentists.⁸⁰

3.4.2.5 Self administration of topical fluorides

The method of self administration of topical fluorides may provide an answer to the problems of insufficient dental manpower and excessive costs of topical fluoride programmes. Woods,⁸⁹ reported that a programme of self application of a 10 percent $S_n F_2 - Z_r Si O_4$ preventive paste (3 times per year) by primary school children aged 5 to 9 years in schools in a rural community has been demonstrated to be practical and effective in reducing the incidence of dental caries. There was a 36 percent reduction in DMFT increment at the end of two years in the children aged 7 to 9 years.

This programme has been designed specifically for isolated and small rural communities.

The effect of the programme on dental health can be achieved without making unrealistic demands on dental manpower.

3.4.3 Curative programmes

The treatment of any disease should start in the beginning of its development. This means that dental control and treatment, if necessary, should start at an early age. This age will vary from country to country according to the caries situation, but ideally it should not be later than three years. The following lists are recommended in curative programmes for school children in order of priority:

- (a) relief of pain and control of infections;
- (b) emergency dental treatment;
- (c) treatment of oral conditions endangering the child's general health;
- (d) conservation of the permanent dentitions;
- (e) conservation of the deciduous dentitions;

The needs for orthodontic treatment and other difficult cases should be referred to the hospital.

CHAPTER 4IMPLEMENTATION OF DENTAL HEALTH SERVICES FOR SCHOOL CHILDREN4.1 General and dental concept

Ideally, a child should be examined, and any necessary treatment provided, from age three to school leaving age, and through adolescence to age 21.

Up to age 10 the examination should take place at six monthly intervals, thereafter, annually. Parents may be encouraged to present their young children for dental examination, and where necessary treatment, through the agency of health visitors who visit homes in the course of their post-natal work and through attendance at ante and post-natal clinics.

Adolescents who are likely to have entered employment on leaving school may be encouraged to continue the dental care they have received during their school life. At present, the actual method of providing the dental treatment for school children should be the following:⁸¹

- (a) fixed clinics serving a group of schools;
- (b) a clinic attached to each school;
- (c) a mobile clinic.

Three main reasons may be stated for this method:

- (a) there is minimum interference with the child's education due to absence from class;
- (b) a mother is relieved of the necessity of accompanying the child from school to clinic;
- (c) the risk of accident to a child in transit between the school and the clinic is eliminated.

The amount of dental manpower required to provide a complete service depends upon whether the service is to be manned entirely by fully qualified dental surgeons or whether these are to be assisted substantially by dental auxiliaries, trained to undertake a certain amount of the operative care of children under their direction.

Account must also be taken of the extent to which dental practitioners in general practice can contribute. There are three categories of dental personnel:

(a) The dentist (professional); a graduate of a University or dental college who is registered to practice dentistry.

(b) Operating dentist auxiliary;

Includes: the school dental nurse (New Zealand type)

the dental hygienist (U.S.A. type)

the school dental therapist (Australia type)

The operating dental auxiliary is a person who, not being a professional, is permitted to carry out certain treatment procedures in the mouth, under the direction and supervision of a professional.

The operating dental auxiliary is trained to carry out the scaling and polishing of teeth and to give instruction in oral hygiene which should include proper eating habits.

The operating dental auxiliary has a particularly important part to play in prevention by dental health education. Duties may also include a combination of the following:

1. the cleaning of teeth;
2. the removal of calculus;
3. individual and group instruction in oral hygiene;
4. topical application of medicaments;
5. examining patients and charting the dental condition;
6. preparation of cavities in deciduous and permanent teeth and filling them;
7. Simple extraction of teeth under local anaesthesia
(Indonesian dental nurses are trained to do block anaesthesia using local anaesthetics).

Restrictions placed on this category are:

1. they are not registered or licenced as professionals;
2. their work may often be limited to children but local circumstances may be such that adult groups might also be treated;
3. they should normally work within a public health service (i.e. Community Health Centres, Indonesia).

(c) Non operating auxiliary;

1. Clinical - chairside assistant; A person who assists the professional in his clinical work but does not carry out an independent procedure in the oral cavity.

Duties of this personnel usually include all or some of the following:

- (a) reception of the patient
- (b) preparation of the patient for treatment
- (c) preparation and provision of all necessary facilities
- (d) sterilisation, care and preparation of instruments
- (e) preparation and mixing of restorative materials
- (f) responsibility, on completion of treatment, for care of the patient until the latter leaves
- (g) preparation of the surgery for the next patient
- (h) presentation of documents to the dental surgeon for his completion; filing of these documents
- (i) assistance with x-ray work, including processing and mounting of x-rays
- (j) instruction of the patients, where necessary, in the correct use of the toothbrush
- (k) after care of persons who have had general anaesthetic

However, this type of auxiliary may be permitted in suitable circumstances to carry out any of the following procedures within the mouth, under direct supervision of a professional:

- (a) application of rubber dam
- (b) application of matrices
- (c) placement of plastic materials in prepared cavity
- (d) trimming and polishing of fillings
- (e) polishing of teeth
- (f) exposure of x-rays in mouth

2. Laboratory - dental technician;

A person who assists the professional by carrying out certain technical laboratory procedures. The normal duties may include any or all of the following:

- (a) casting of models from impressions of patient's mouth
- (b) construction of appliances for the mouth
- (c) treatment of metals and plastic materials used in construction of such appliances
- (d) construction of splints used in maxillo-facial surgery
- (e) construction of orthodontic appliances
- (f) construction of special appliances such as obturators, and special prostheses

4.2 Dental health services for school children in Australia

Dental health services for school children in Australia have traditionally been provided by private practice, supplemented by dental hospital services for disadvantaged groups. School dental services began in most states, as state functions, during the 1920s.

The philosophy was to provide treatment for school children, with priority for children who were unable to obtain treatment from private practice, for various reasons, mainly financial and geographic.

In Australia each state has a school dental service operating within the Department of Public Health of the State. The extent of service varies slightly in the different states but in general the school dental service provides for a measure of professional supervision over the dental health of a section of the school population during the period of attendance at primary school.

The school dental service also trains children in the care of the teeth and teaches them the principles of dental health. Dentists are employed by the Department on a salary basis.

NEW SOUTH WALES

In New South Wales the school dental service operates an examination service in which parents are advised of dental defects by marked charts. A free dental service is provided to restricted age groups:

- (a) 6 to 8 years in the metropolitan area
- (b) 6 to 9 years in the country area
- (c) all age groups in remote areas where there
is no private practitioner
- (d) an emergency service is available to children
of all ages suffering pains

In country areas, mobile dental clinics offer free treatment in school grounds. Dental service is also provided for children attending day nurseries in metropolitan Sydney.

VICTORIA

In Victoria, officers of the school dental services provide dental treatment at dental clinics in the metropolitan area and in mobile units which visit schools in certain country districts.

There are two types of mobile units:

- (a) single-surgery dental vans for rural schools that
have enrolments of fifteen to seventy-five children;

- (b) two-surgery semi-trailer units that visit group and consolidated schools and other large schools in country towns having 200 to 400 children.

For the metropolitan area, dental service is provided in three dental centres. Each of these centres has a district allotted and children are brought from their schools by contract bus, under the control of an escort teacher provided by Department of Education. In addition, the Department provides a subsidy to any municipal council willing to provide facilities for pre-school dental service.

QUEENSLAND

In Queensland the school dental service provides treatment to all children in primary school. The basis on which treatment is undertaken is:

- (a) in places where there are private dental practices, treatment is restricted to children where parents' income does not exceed a stipulated limit
- (b) in areas without resident dental practitioners, free treatment is available regardless of income of the parent.

Dental treatment is given in fixed clinics in the "dental room" in specified country schools in the State and in the remote areas in "dental trains". In country areas without fixed dental clinics, treatment is given in the school building by travelling dental officers using portable units.

SOUTH AUSTRALIA

The Royal Adelaide Dental Hospital provides dental services to children in the six Welfare institutions including an orphanage and spastic centre.

In country areas where there is no private dental practice, the Department of Public Health operates a service for school children.

Only primary school children are treated. Treatment is given either in mobile surgeries of the caravan type or in school rooms using portable equipment.

AUSTRALIAN CAPITAL TERRITORY

The Australian Capital Territory Dental Service provides dental treatment to primary, infant and pre-school children as well as expectant and nursing mothers and low income adults.

Dental surgeries have been established in various schools in Canberra providing annual examination and treatment comprising mainly conservative work and exodontia.

Orthodontic and prosthetic appliances are not constructed and restoration involving gold is not carried out.

NORTHERN TERRITORY

The Northern Territory Dental Service is administered from A.C.T. and provides dental treatment for all school children as well as adults. Treatment is given in fixed clinics and mobile units.

WESTERN AUSTRALIA

In the Capital and other larger towns in Western Australia, treatment is given to children in certain age groups in fixed dental clinics. In places without private dental practitioners, mobile surgeries of the caravan type provide treatment to all children.

TASMANIA

In Tasmania all children are treated up to the school leaving age. The school dental service is organised into about fifteen dental districts each containing an average of 3,000 school children.

For areas where it is difficult for children to get to a district clinic, the service maintains a series of mobile surgeries of the caravan type.

4.3 Dental health services for school children in Indonesia

Dental health programmes in Indonesia are largely government sponsored.

The Government provides the following services for school children in the Government Health Centres:

- (a) Curative
- (b) Preventative
- (c) Emergency treatment

The services are rendered free for school children. Only emergency treatment is free for the adults. The school children also receive free dental treatment in schools. The dental health personnel visit each school twice a year to examine and treat those who need treatment.

The other alternative would be for parents to take their children to private surgeries, at their own cost. Dental health education programmes are carried out by both the dental health personnel and the school teachers and also by the general health personnel to a limited extent.

Tooth brushing programmes and topical fluoride applications are given in some schools.

There is no communal nor school water fluoridation in the country, and very negligible amounts are found in the ground water.³

One would expect that the type of treatment rendered to the school children would be mainly emergency treatment.

The reason is constraints of manpower and funds. The school dental services in Indonesia are still rudimentary as the main problem would appear to be associated with lack of funds.⁸²

Considering the generally low level of dental caries prevalence and the extremely low prevalence in most rural sectors, the following goal was proposed:

- For urban schools and those serving urbanizing population groups or rural groups already at the moderate caries level, systematic care would be given by:

- (a) examining the first primary class and providing conservative care for the permanent teeth only;
 - (b) giving contingency care from the first to the last primary class;
 - (c) providing conservative care for the last primary class;
- to achieve coverage in 1979 of the target group of approximately 3,000,000 school children.⁶⁰

CHAPTER 5SUMMARY AND CONCLUSION

1. Dental caries and periodontal disease are the most widespread dental diseases of mankind in the world. No nation or area of the world is free from them.
2. In developing countries, especially in rural areas, periodontal disease is more prevalent than dental caries. In urban areas, dental caries is more prevalent than periodontal disease. It may be associated with nutrition and socio-economic factors.
3. Current Indonesian studies show that in children there is a higher prevalence of periodontal disease than dental caries. Periodontal disease is a serious problem in that two-thirds of children suffer from some form of periodontal disease.
4. The school dental health programmes have great usefulness, when based upon dental health education (including nutrition), case finding, preventive procedures (such as dental prophylaxis and topical fluoride therapy), referral of treatment needs to private dentists where possible (to hospital for Indonesia), and dental care at Government expense for those unable to obtain private care.
5. The best method for controlling dental diseases is a combination of and integration between preventive and therapeutic measures. But if a dental care programme is ever to reach its long term goal of dental health for all, it must have a basis in prevention of disease rather than treatment of its consequences.
6. The dentist is the key person in the dental care of children. His education in children's dentistry and orthodontics should be sufficient to meet the needs of public dental health services.

7. The use of dental auxiliaries must be fully encouraged and a number of factors affecting the type of auxiliaries needed should be listed.
8. Dental control and treatment should start at an early age, ideally not later than three years.
9. Water fluoridation is the most effective and economical method in reducing dental caries incidence by up to 60 percent. This method should be recommended for large cities and urban areas in Indonesia.
10. Topical fluorides are recommended as a method which will produce a reduction of dental caries incidence, when water fluoridation has not been implemented.
11. More attention should be given to the prevention and early treatment of gingival disorders in children, as they may give rise to severe pathological conditions in the tooth-supporting tissues at a later age.
12. The increasing demand for orthodontic treatment cannot be met today. For this reason, more specialists in orthodontics should be trained, and post graduate courses organised for dentists engaged in dental services for children.
13. It is recommended that the dental profession should make greater use of the services of teachers and health educators in promoting all aspects of dental health education.
14. The attention of school and health authorities should be drawn to the desirability of reducing the consumption of easily fermentable carbohydrates particularly in a fine form and taken in between meals.
15. In Indonesia, dental health education programmes (including correct tooth brushing) and mouth rinsing with fluoride solution, should be taught concurrently and instituted through the schools and community health centres.

16. The Indonesian Dental Association suggested the following priority needs for improving dental services in Indonesia:³

- dental health education for public through all community health centres
- prevention measures including mouth rinsing with fluoride solutions and other fluoride topical application programmes for all school children
- tooth brushing campaign for all school children
- training of dental auxiliaries to undertake a certain amount of the operative care and preventive procedures for school children
- incremental dental care for school children in high caries rate areas; treatment programme for 14 year old school children in low caries
- water fluoridation programmes in the bigger cities after feasibility study, provision of basic dental care in community health centres with referral for specialised treatment to hospitals.

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