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DENTAL AUXILIARIES

THE SCHOOL DENTAL NURSE

A thesis submitted in the Faculty of Dentistry, University of Sydney, in partial fulfillment of the requirements for the Diploma in Public Health Dentistry.

Tan Kian Nam

K.N. TAN, B.D.Sc., (Qld.)

DECEMBER 1965

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PREFACE

A comparison between the medical profession and the dental profession regarding the utilisation of auxiliary personnel shows that the dentists still have a long way to go if they are to match their medical confreres in this matter. However, there is an increase awareness in the dental profession regarding the usefulness of auxiliary workers in assisting the dentist in various minor dental procedures, giving the dentist more time to perform those services which specifically require his special skill and knowledge.

Today, various groups of dental auxiliary workers are being used as members of a dental health team under the professional supervision and control of a qualified dentist. This thesis deals with one such group of dental auxiliary personnel - the school dental nurse. In this review, detailed considerations are given to the initiation and development of this system in New Zealand, and following its successful use, the adoption of the system by various overseas countries, particularly Malaysia. A detailed discussion on the training of these auxiliary personnel, their duties and responsibilities, and their subsequent employment in the Dental Public Health Services of the two countries follows. This is followed by a thorough evaluation of the system in both countries, and the role these workers play in providing dental care for school and pre-school children.

In preparing this thesis the author is greatly indebted to Mr. P.D. Barnard, B.D.S., M.P.H., F.A.C.D.S., Senior Lecturer in Preventive Dentistry, and Professor N.D. Martin, M.D.S., F.A.C.D., F.A.P.H.A., F.I.C.D., A.I.A.C.P., Professor of Preventive Dentistry, for their constant encouragement, guidance, advice, patience and understanding in times of difficulties.
The author also wishes to thank all the staff in the Preventive Department for enabling this work to be carried out in such a pleasant atmosphere, the Librarians of the Sydney University Dental School for their generous and untiring assistance, and Miss P.M. Gray for her efficient typing service.

K.N. TAN.
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I. INTRODUCTION

Within recent years the need has been recognised in many countries for extended dental care as an important component of national health programmes\(^5\). This has come about through a combination of various factors, the most influential being an increase in scientific dental knowledge as a result of intensive research, and an appreciation of the needs and demands of the populace as a result of education.

Dunning\(^9\) pointed out that the planning of such health programmes is an integral part of public health dentistry and has required the consideration of factors such as the dental needs of the population, the resources available to meet those needs, and finally the objectives to be fulfilled in meeting those needs. The objectives of such a programme obviously depend on the attitude of the population towards dental care, the attitude of the government, financial resources and the availability of trained dental manpower.

It is generally accepted that there is a shortage of trained dental manpower in many parts of the world, more so in the emerging countries of Africa, Asia and South East Asia. According to Dunning\(^9\) the distribution of dental manpower in the different continents is as follows:

<table>
<thead>
<tr>
<th>CONTINENT</th>
<th>POPULATION PER DENTIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>65,200</td>
</tr>
<tr>
<td>Asia(^b)</td>
<td>17,400</td>
</tr>
<tr>
<td>Europe(^b)</td>
<td>3,500</td>
</tr>
<tr>
<td>North America</td>
<td>2,400</td>
</tr>
<tr>
<td>Oceania</td>
<td>2,800</td>
</tr>
<tr>
<td>South America</td>
<td>3,800</td>
</tr>
</tbody>
</table>

\(^b\) = excluding Soviet Russia
This is a fairly rough estimate because not every country in each of the continents is taken into consideration when working out the average population per dentist ratio for the continents listed. Nevertheless, it serves to depict the disproportion of dental manpower in the various continents.

Taking individual countries into consideration there is an even greater disproportion regarding the distribution of dental manpower. The most recent set of figures available is that compiled by the World Health Organisation in 1961 and is contained in the World Directory of Dental Schools. According to this source, the distribution of dental manpower in different countries is as follows:

<table>
<thead>
<tr>
<th>Country</th>
<th>Population per Dentist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>228,100</td>
</tr>
<tr>
<td>Argentina</td>
<td>2,000</td>
</tr>
<tr>
<td>Australia</td>
<td>2,400</td>
</tr>
<tr>
<td>Austria</td>
<td>1,900</td>
</tr>
<tr>
<td>Belgium</td>
<td>5,100</td>
</tr>
<tr>
<td>Bolivia</td>
<td>10,300</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>2,700</td>
</tr>
<tr>
<td>Brazil</td>
<td>3,700 (1954 data)</td>
</tr>
<tr>
<td>Canada</td>
<td>3,100</td>
</tr>
<tr>
<td>Ceylon</td>
<td>58,000</td>
</tr>
<tr>
<td>Chile</td>
<td>2,600 (does not include registered medical practitioners practising dentistry)</td>
</tr>
<tr>
<td>China (Taiwan)</td>
<td>10,500</td>
</tr>
<tr>
<td>Colombia</td>
<td>8,800 (1957 data)</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>10,900</td>
</tr>
<tr>
<td>Country</td>
<td>Population per Dentist</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Cuba</td>
<td>3,300 (1959 data)</td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>3,200</td>
</tr>
<tr>
<td>Denmark</td>
<td>1,900</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>10,400</td>
</tr>
<tr>
<td>Ecuador</td>
<td>11,200 (1957 data)</td>
</tr>
<tr>
<td>El Salvador</td>
<td>19,200</td>
</tr>
<tr>
<td>Fiji</td>
<td>27,100 (1956 data)</td>
</tr>
<tr>
<td>Finland</td>
<td>2,500</td>
</tr>
<tr>
<td>France</td>
<td>2,700 (1957 data)</td>
</tr>
<tr>
<td>Germany : Democratic Rep.</td>
<td>figures not available</td>
</tr>
<tr>
<td>Germany : Federal Republic</td>
<td>1,700 (1957 data)</td>
</tr>
<tr>
<td>Greece</td>
<td>3,000</td>
</tr>
<tr>
<td>Guatemala</td>
<td>25,100</td>
</tr>
<tr>
<td>Haiti</td>
<td>35,600 (1957 data)</td>
</tr>
<tr>
<td>Honduras</td>
<td>24,400</td>
</tr>
<tr>
<td>Hungary</td>
<td>8,700 (1957 data)</td>
</tr>
<tr>
<td>Iceland</td>
<td>3,600 (1955 data)</td>
</tr>
<tr>
<td>India</td>
<td>108,000</td>
</tr>
<tr>
<td>Indonesia</td>
<td>283,700 (1957 data)</td>
</tr>
<tr>
<td>Iran</td>
<td>35,900 (1952 data)</td>
</tr>
<tr>
<td>Iraq</td>
<td>56,100 (1959 data)</td>
</tr>
<tr>
<td>Ireland</td>
<td>4,600 (1957 data)</td>
</tr>
<tr>
<td>Israel</td>
<td>1,400 (1957 data)</td>
</tr>
<tr>
<td>Italy</td>
<td>5,500 (1956 data)</td>
</tr>
<tr>
<td>Japan</td>
<td>2,800</td>
</tr>
<tr>
<td>Korea (Republic)</td>
<td>18,900</td>
</tr>
<tr>
<td>Country</td>
<td>Population per Dentist</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Lebanon</td>
<td>3,600 (1957 data)</td>
</tr>
<tr>
<td>Madagascar</td>
<td>91,100 (1954 data)</td>
</tr>
<tr>
<td>Mexico</td>
<td>20,300 (1956 data)</td>
</tr>
<tr>
<td>Malta</td>
<td>9,500</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4,700 (1957 data)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2,200</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>18,500 (1957 data)</td>
</tr>
<tr>
<td>Norway</td>
<td>1,500 (1959 data)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>figures not available</td>
</tr>
<tr>
<td>Paraguay</td>
<td>6,000 (1957 data)</td>
</tr>
<tr>
<td>Peru</td>
<td>6,300 (1959 data)</td>
</tr>
<tr>
<td>Philippines</td>
<td>2,900</td>
</tr>
<tr>
<td>Poland</td>
<td>3,400</td>
</tr>
<tr>
<td>Portugal</td>
<td>18,400 (1957 data)</td>
</tr>
<tr>
<td>Romania</td>
<td>figures not available</td>
</tr>
<tr>
<td>Singapore</td>
<td>2,700</td>
</tr>
<tr>
<td>Spain</td>
<td>11,000</td>
</tr>
<tr>
<td>Sweden</td>
<td>1,600 (1957 data)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2,400</td>
</tr>
<tr>
<td>Thailand</td>
<td>92,600 (1959 data)</td>
</tr>
<tr>
<td>Turkey</td>
<td>23,100 (1955 data)</td>
</tr>
<tr>
<td>Union South Africa</td>
<td>11,200</td>
</tr>
<tr>
<td>Union of Soviet Republic</td>
<td>5,100 (population per stomatologists and dentists)</td>
</tr>
<tr>
<td>United Arab Republic</td>
<td>33,800 (1956 data)</td>
</tr>
<tr>
<td>United Kingdom &amp; Northern Ireland</td>
<td>3,900 (dentists in National Health Scheme)</td>
</tr>
<tr>
<td>United States</td>
<td>1,700</td>
</tr>
<tr>
<td>Country</td>
<td>Population per Dentist</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Uruguay</td>
<td>1,600 (1957 data)</td>
</tr>
<tr>
<td>Venezuela</td>
<td>5,300</td>
</tr>
<tr>
<td>Vietnam (Republic)</td>
<td>170,300 (1957 data)</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>13,400 (1956 data)</td>
</tr>
</tbody>
</table>

This list includes only those countries who had dental schools in 1961. A more comprehensive and exhaustive list is given by Hollinshead. Both sets of figures, although not identical, clearly reflect a general shortage of dental manpower in many countries.

The objectives of a dental health programme may be severely curtailed to a relief of pain or extraction service if only meagre resources and dental manpower are available. This is especially true of economically and dentally underdeveloped countries. Even so, countries with adequate financial resources and with a highly trained dental profession may find that even their manpower is inadequate to cope with the dental needs and demands of their populace.

This has motivated many countries, both developing and highly developed, to consider the use of various auxiliary dental personnel within the framework of the existing profession to effect an adequate and efficient dental health programme for the populace. The utilisation of such personnel in assisting the dental surgeon individually or in a health team has been well documented in the studies made by the World Health Organisation. For convenience and simplicity, according to one of these reports prepared by the Expert Committee on Auxiliary Dental Personnel of the World Health Organisation, the members of the various dental auxiliary
groups are defined as "those individuals who are subject to the supervision and direction of trained personnel (i.e. dentists); in other words, they are the auxiliary personnel for whose operations and acts their supervisor the dentist is responsible". This definition covers both auxiliary and ancillary personnel and no distinction is made between the two groups.

The same report stated that such auxiliary personnel will have their greatest and optimum usefulness in those countries where there are many dentists. In the less fortunate countries in which there are few dentists there will be a need for trained dental auxiliaries, but their utilisation may be limited by the availability of qualified dentists to supervise the permitted service that is expected and required of them. In those countries in which there are no trained dentists, it follows by definition that dental auxiliary personnel cannot be utilised until such time as when dental supervisory personnel can be made available.

Trained auxiliary personnel assist the dentist in various minor and simpler dental procedures, giving the dentist more time so that he may devote himself more fully to performing those professional services which specifically require his special skill and knowledge and which could not be executed safely by one with less experience and education. Any group of auxiliary personnel is not meant to substitute for the trained dentist, but to supplement and complement him in his work. The addition of one properly trained auxiliary may considerably increase the amount of service which the dentist can provide, and it is likely that combination of other auxiliary groups would permit a dental health team to provide a much improved dental health service.
The function of dental auxiliaries range in complexities in as much as they reflect the kind of duty and responsibility the auxiliary is trained and expected to do. For some, they are not permitted to have contact with patients, while for others they not only have contact with the patient, but may also work directly in the mouth in rendering certain dental procedures. The degree to which the various duties and responsibilities that are delegated to the different groups of dental auxiliary personnel depends upon the legal requirements and the amount of training and experience the group has had. Moreover, it also depends upon the amount of responsibility the dentist wishes or is prepared to assume for the auxiliary worker.

According to the 1959 World Health Organisation report concerning the utilisation of such personnel, the following groups of workers are listed as dental auxiliaries. Brief mention will also be made of their duties and responsibilities.

I. **CHAIRSIDE ASSISTANT**, whose functions include

1. Reception of the patient;
2. Preparation of the patient for any treatment he or she may need;
3. Preparation and provision of all necessary facilities (such as mouth washes, napkins, receivers);
4. Sterilisation, care and preparation of instruments (and in this the assistant should be highly efficient);
5. The preparation and mixing of restorative materials (this will include filling and impression materials);
6. The care of patients on completion of their treatment until they leave, when the assistant will clear away the instruments and prepare them for re-use.
7. The preparation of the surgery for the next patient;
8. The presentation of documents to the surgeon for his completion, and the filling of these;
9. Assistance with X-ray work and the processing and mounting of X-rays;
10. Instruction of the patient in the correct use of the toothbrush when indicated;
11. The after-care of patients who have had general anaesthetics.

II. DENTAL LABORATORY TECHNICIANS, whose functions include:

1. The casting of models from impressions of patients' mouth;
2. The construction of appliances based on these models from the dentist's prescription;
3. The treatment of metals and of plastic materials used in the construction of these appliances;
4. The construction of splints used in facio-maxillary surgery;
5. The construction of orthodontic appliances to the dentist's prescriptions;
6. The construction of special appliances such as obturators and special prostheses;
7. The keeping of dental stores.

III. DENTAL HYGIENISTS, whose functions include:

1. The cleaning of teeth;
2. The removal of calculus;
3. Individual and group instruction in oral hygiene;
4. The cleaning of mouths, on the orders of the dentist, before treatment is instituted;
5. The topical application of fluorides or other prophylactic medicaments;

6. The screening or primary examination of groups, such as school children or factory employees, for dental defects, in order that they may then be referred to qualified dentists for treatment;

7. In the case of school children, liaison with local public health nursing services to ensure effective follow-up of recommendations or treatment.

IV SCHOOL DENTAL NURSES.

This group of dental auxiliary differs from the others in that they are allowed to carry out operative procedures on teeth in the mouth. There has been considerable controversy among the dental profession concerning the utilisation of such auxiliary personnel, although they have been used with success in New Zealand, Malaysia, Ceylon and several other countries.

A detailed consideration of this group of dental auxiliary personnel, their training, subsequent employment, duties and responsibilities will be given in the following pages.

In some countries where dentist shortage is acute and no facilities exist for training dentists unusual measures must be taken to provide even the most rudimentary dental care for the population. The Expert Committee on Auxiliary Dental Personnel of the World Health Organisation suggests two new types of dental auxiliary for such situations - the dental licentiate and the dental aide. 58.

The dental licentiate should be a semi-independent operator trained for not less than two calendar years to perform dental prophylaxis, cavity
preparation and fillings of primary and permanent teeth, extractions under local anaesthesia, drainage of dental abscesses, treatment of the most prevalent diseases of supporting tissue of the teeth, and recognition of more serious dental conditions.

The dental aides would operate only within a salaried health organisation and be under such supervision as was possible under the circumstances, the closer the better. Formal training might last for from four to six months, followed by a period of field training under direct constant supervision. Their duties would include elementary first-aid procedures for the relief of pain, including extraction of teeth under local anaesthesia, the control of haemorrhage and the recognition of dental disease important enough to justify transportation of the patient to a centre where proper dental care is available.

Whichever group of dental auxiliary is used, it must be born in mind that such personnel are trained to assist the dentist and not to supplant him. When properly used they supplement and complement the dental surgeon in his work. These points are fully recognised by countries utilising school dental nurses in their national dental health programmes. The school dental nurse is regarded as a member of the dental health team, and she works under the professional supervision and control of a qualified dentist.

The object of this thesis is to examine in detail the utilisation of school dental nurses in New Zealand and Malaysia. In both countries this group of dental auxiliary personnel has been used with tremendous success in the provision of regular, systematic dental care for children of pre-school and school age.
II. NEW ZEALAND AND THE SCHOOL

DENTAL NURSE

INTRODUCTION

In making a study of the New Zealand School dental nurse, it is necessary to examine briefly the dental conditions and background of the country, and its research and prevention programme. Basically, the school dental nurse scheme was founded to provide dental treatment for school children with neglected caries.

New Zealand, a member of the Commonwealth and having an area of about 104,000 square miles or approximately the same size as the United Kingdom, lies in the South Pacific Ocean between latitudes 35° and 40° South.

The population of New Zealand, according to the most recent census taken on 18th April, 1961, was 2,414,984, excluding island territories.

Dentistry in New Zealand is established primarily on the basis of independent private practice for the individual patient. The dentist-population ratio of New Zealand is approximately 1:2,200. The country has one dental school in the University of Otago at Dunedin.
1. **RESEARCH AND PREVENTION**

According to a report in June 1963, dental research in New Zealand is carried out by four groups:

1. By the Medical Research Council;
2. By the Dental School;
3. By the Division of Dental Health;
4. By individual dentists in practice or in the employment of one of the dental services.

The same report stated that the dental profession is not represented as such in the Medical Research Council, but there is a Dental Committee in this organisation which directs the Council's Dental Research Unit and advises the Council on dental research.

Berman reported that the main projects undertaken by the Dental Research Unit include:

1. An epidemiological study of dental caries in relation to soil types;
2. A Maori dental health study;
3. A clinical trial of an amine dentrifice;

The June 1963 report stated that while the Dental School has no co-ordinated research programme, all departments have undertaken some research, and that excellent facilities are available for research in the school.

The same report indicated that there is a full time research worker in the Dental Division, engaging in the study of specific
problems encountered by the Division in conducting its public health programme.

As for research by individual dentists the report stated that only limited funds are available for research into orthodontics.

The report concluded that dental research in New Zealand is seriously limited by lack of financial resources and an inadequate number of dentists trained in this field.

Dental research in New Zealand receives added impetus recently when the New Zealand Dental Association successfully raised sufficient funds to establish the newly created New Zealand Dental Research Foundation to further research activities in the country 11.

As for the prevention of dental diseases, Saunders 39 states that the organisation of the school dental service is founded on the basic principle of prevention - the maintenance of good health, rather than only the treatment of disease. In practice, this involves mass and individual instruction in oral hygiene, the routine use of topical application of sodium fluoride and organised dental treatment at six monthly intervals.

Prevention of dental caries on a larger national scale can be achieved with considerable success through the introduction of fluoridation of the municipal water supply at Hastings was begun and the results are encouraging. Ludwig 27,28 reported that caries prevalence rates for the Hastings children examined in 1954 and 1961 showed that caries experience in the permanent teeth of Hastings children aged
six, seven and eight years had been reduced by approximately 74 percent, 59 percent and 46 percent respectively and in children aged nine to sixteen years by from 33 percent to 17 percent. Caries experience in the deciduous teeth of children aged five, six and seven years was reported by him to have been reduced by approximately 43 percent, 42 percent and 30 percent respectively.

In a more recent report on the dental effects of the Hastings Fluoridation Project between 1954 and 1964, Ludwig\textsuperscript{29} reported that in permanent teeth of children aged six, seven, eight, nine and ten years, caries rates have been reduced by 84, 73, 67, 53 and 53 percent respectively. In the permanent teeth of children aged eleven to sixteen years caries rates have been reduced by from 52 to 30 percent respectively, while caries rates in the deciduous teeth of children aged five, six and seven years have been reduced by 52, 50 and 36 percent respectively. Ludwig concluded that the results obtained in Hastings after ten years of fluoridation closely parallel those obtained in overseas after an equivalent period of exposure to fluoridated water.

Fuller\textsuperscript{14} reported that in 1962 the other towns in New Zealand which have fluoridation going on are Lower Hutt (fluoridated in 1959), Palmerston North and Otorawairere (near Rotorua) and that Wellington, Invercagill and Touranga were almost ready to fluoridate.

He stated that these communities represent a total of over 300,000 people or almost 20 percent of the population of New Zealand drinking fluoridated water by 1962.
2. **DENTAL CONDITIONS IN NEW ZEALAND**

The high prevalence and incidence of dental caries in New Zealand, especially among children, have been established in several reports 4, 19, 21, 22, 39, 55 by different workers. The magnitude of this problem in New Zealand is said to be at least comparable with that in other countries such as Australia, the United Kingdom, and the United States. In fact, there is evidence to support the belief that it might even be higher than in other countries. Thus Hewat 21, reporting on the examination of 2,400 New Zealand children aged from six to sixteen years, estimated that the incidence of dental caries was approximately three times that of American children of comparable age group.

In one report 38 it is pointed out that only 54 percent of two-year-old New Zealanders are completely free from the ravages of dental decay, and by five years of age the percentage of the population free from this disease has dropped to 12 percent. By fourteen years of age, only 0.5 percent of the New Zealand population have sound unfilled teeth. The same report also mentions that 34 percent of seven to nine-year-old children, and 50 percent of thirteen to seventeen-year-old children in New Zealand showed some form of malocclusion.

Fulton 13, in his study of 4,072 New Zealand school children in the age range of from seven to fourteen years, concluded that the prevalence of dental caries is high in the average New Zealand school child. He reported that the average seven-year-old child had two permanent teeth attacked by caries, the average fourteen-year-old had ten. This represents an average attack rate of slightly more than one permanent tooth per child per year over a seven year period. In addition, the average seven year old child had 5.4 deciduous molars
attacked by varies out of a normal complement of eight.

Davies and King \textsuperscript{4}, in studying the annual increment of dental caries in New Zealand, examined 304 children and young adults between the ages of twelve and nineteen years in March 1950. They reported a mean of 42.59 DMF tooth surfaces per person. Of this mean, 12.59 tooth surfaces per person were carious, 2.58 per person were missing and 27.42 per person were filled. On examining the same group in November of the same year, they found a mean of 49.18 DMF tooth surfaces per person. (This represents a total increase of 6.58 DMF tooth surfaces per person during the period March to November, 1950). Of this mean of 49.18 DMF tooth surfaces per person, 14.26 per person were carious, 31.99 per person were filled, and 2.93 per person were missing.

Ludwig, Kean and Pearce \textsuperscript{30}, in studying the dental condition of a rural Maori population, reported that the prevalence of dental caries is relatively high in the deciduous dentition. Similar findings were made by Hewat and Eastcott \textsuperscript{19}, and Hewat, Eastcott and Babby \textsuperscript{20}.

Saunders \textsuperscript{42} has drawn attention to the alarming dental condition of recruits to the New Zealand Armed Service in World War I and World War II. Davies \textsuperscript{5}, reporting on the examination of 597 recruits aged from eighteen to twenty-one years in 1952, stated that the mean number of DMF teeth per recruit was 18.4, of which 5.7 were decayed (D), 7.0 were extracted (M) and 5.7 were filled (F). In his investigation he noted that the mean number of DMF teeth per recruit increased from 17.2 at eighteen years to 20.51 at twenty-one years.

In a further study, Davies \textsuperscript{6} reported that there has been no overall reduction in the dental caries experience of compulsory military training recruits from 1952 to 1958. In fact, among recruits aged eighteen,
twenty and twenty-one, he indicated an increase of approximately
2 DMF teeth per recruit.

All these studies clearly reflect the magnitude of the caries
problem in New Zealand and the necessity of an efficient treatment
service to cope with the back-log of un-met dental needs plus incremental
dental care. As indicated by the studies of Fulton 13 and Dunning 9,
much of these needs plus incremental care have been met by the
utilisation of dental nurses in the school dental service.
3. INITIATION AND DEVELOPMENT OF THE SCHOOL DENTAL SERVICE.

The story of the initiation and development of the New Zealand school dental service is well documented in several reports, in particular in the comprehensive and detailed account by Saunders. The series of events recorded here, which subsequently led to the initiation and progressive development of this unique system, are based on the above quoted reports.

Full credit was accorded to Mr. F.W. Thompson for "sowing the seed that was to come to fruition after many years". It was Thompson, who, in 1905, presented a paper at the inaugural meeting of the New Zealand Dental Association emphasising the need for a better service to care for the teeth of New Zealand children. A copy of Thompson's paper was subsequently handed to the Minister of Education.

In 1912 a programme for regular medical inspection of school children aged ten to eleven years was brought into operation under the joint control of the New Zealand Departments of Education and Public Health. In this inspection physical defects were noted and notices sent to parents of children in cases where medical or dental treatment seemed to be indicated. It was noted that a large proportion of the children examined had defective teeth.

In 1913 Dr. K. Cox, the then president of the New Zealand Dental Association, urged the association to press for the institution of compulsory dental prophylaxis for school children. He also recommended the provision of a system of state dental care for primary school children, aged from six to eleven years, the service being staffed by state dentists. He pointed out to the government that 90 percent of a
group of 10,000 children examined were found to be suffering from dental disorders. He suggested the training of personnel on a relatively short course in the Otago University Dental School, who, upon graduation would be solely responsible for the dental health of school children. There was general approval of his first recommendation, that is, the system of state dentistry for children, but his concept of a shortened course of study was criticised and condemned.

In 1914, August 4th, the first world war broke out. The appalling dental condition of draftees in this war heightened government concern. A large percentage of recruits for the Armed Forces were rejected purely on account of dental defects. This provided another strong argument in favour of a dental health service.

In 1916, the Minister of Public Health suggested the appointment of a number of competent dental inspectors whose sole duty would be to inspect school children and send reports to parents who would then consult their family dentist. For those who could not afford dental treatment, the government would assume responsibility to treat the children free of cost if necessary.

In 1917, Mr. Richard Dunn, a Wellington practitioner and editor of the New Zealand Dental Journal, revived Cox's concept of training personnel on a comparatively short course to care for the dental health of school children. Dunn advocated the creation of a new category of auxiliary dental workers - dental nurses - whose duty was to promote the dental health of children as the Plunket nurse was in the wider field of child health.

In the same year, Cox outlined specific preparation for a state dental service for children, staffed by female dental nurses who would
work in dental clinics in the schools themselves as this would ensure minimum interference with school work.

In 1919, the New Zealand government established a school dental service which came into operation at the end of 1920 with five dental officers in the staff of the school medical service.

In the same year, Colonel T.A. Hunter, C.B.E., who had been Director of Dental Service in the New Zealand Military Forces during the 1914-1918 war, was appointed to the newly created position of Chief Dental Officer in the Education Department. Faced with the problem of obtaining sufficient trained dentists to staff a school dental service, Hunter recommended to the government Cox's and Dunn's controversial proposal. He suggested that selected young women should be given two years of intensive training in a government institution, and upon graduation they would work under supervision of dentists. His recommendation was strongly opposed and bitterly resented by certain segments of the dental profession. The government subsequently intervened when no agreement was reached and called a meeting of representatives of the dental profession which consisted of twenty-three delegates from the various branches.

The meeting was held on the 5th September, 1920 in Wellington. After an all-day discussion the vote was taken and Hunter's proposal was approved by sixteen votes to seven. It was an historic occasion which brought about the utilisation of an unique group of dental auxiliaries - the school dental nurses.

The first draft of probationer dental nurses numbered thirty-five and they commenced training in 1921. They were chosen from about 120 applicants with due consideration to educational standards, personality and age, general suitability and general health.
The course planned by Hunter in the training of dental nurses is a scientific one, embracing subjects such as chemistry, physics, biology, anatomy and physiology. In the practical field, the nurse trainee would work on teeth set in dummy jaws until she has acquired sufficient manual dexterity to perform simple cavity preparation, insert fillings, and perform extractions on deciduous teeth in actual patients.

Dunn was entrusted with the training of the dental nurse, but he soon resigned and his resignation subsequently led to Mr. J.L. Saunders appointment.

Of the 35 dental nurse trainees in the first draft, 29 successfully completed the course in 1923. It was not until in 1924 that the dental nurses' status was clearly defined. She was not to be considered as a lower grade of dentist, but as an auxiliary dental personnel enjoying professional standing in her own right in the status indicated by her designation.

About this time, a Miss E.M. Haines, a member of the first draft, was appointed the first matron of the training school. She served for twenty-five years as matron and on her retirement in 1949, was awarded the O.B.E. in recognition of her long service.

In the early stage of the school dental service, only children of state schools were eligible for treatment. It was not until 1929 that facilities for dental care were extended to private and denominational schools.

In 1929 the staff in the field comprised eight dental officers and seventy-four dental nurses. The number of nurse trainee at this time was also seventy-four.

In 1930 Hunter retired, but it was not until 1947 that he was
created a Knight Commander of the Most Excellent Order of the British Empire for his outstanding services to dental health. He was succeeded as Director by Saunders. This led to the appointment of J. Bruce Bibby as head of the training school.

The Depression hit New Zealand in 1931 bringing business to a standstill and leaving thousands of men unemployed. The government's immediate reaction was to curtail expenditure and this led to the appointment of a National Expenditure Commission to examine all departmental expenditure and to recommend means of reducing it. This resulted in a reduced intake of probationer dental nurses of from forty to an average of twenty for the years 1931 to 1935 with no intake in 1932.

In 1934 mobile clinics were added to the school dental service, serving certain sparsely populated areas. At first such clinics were built and maintained at the cost of the local committees of these areas, but later on the Service accepted full responsibility for building, maintaining and operating them.

By early 1936, there were 252 treatment centres, including sub-bases. The field staff consisted of 14 dental officers and 182 dental nurses attending to the dental care of 84,000 children, or approximately half of the children up to and including standard IV of all state, private and denominational schools.

In 1937 the training programme was expanded to accept two drafts of student nurses, one draft entering in March and the other in September. The two-draft system enabled approximately seventy-five student nurses to enter each year and correspondingly increased the number of graduates.

In 1938 the government erected a special building for the training programme. It is modernly structured and designed specifically as a
dental nurse teaching institution. In the same year a dental service for adolescents was envisaged as being the next stage in the development of a national dental health service. This would be an extension of the school dental service to an older age group, treatment to be provided partly by private dental practitioners on a fee-for-service basis, and partly by full time departmental dental officers. This proposal was adopted some nine years later because of the second World War. It was to come into operation in 1947 as the basis of the social security Dental Benefit System.

In spite of the second World War which brought the economy of the country to a war-time basis, the extension of the school dental service had progressed according to plan. During this period there were 232 school dental nurses giving systematic treatment to 101,701 children. The number of schools served was 1,749, out of a total of 2,622. The number of student nurses in training was 156.

By the end of 1941, of approximately 2,600 schools, 2021 had been brought within the system. As the service expanded there was a steady increase in the number of pre-school age children receiving dental care, the number being estimated as 7,922 at the end of 1941.

About this time a major change in policy concerning the scope of treatment by the school dental service was made. The care of anterior permanent teeth was supposed to be the responsibility of parents, but because of parental neglect the extractions of such teeth in children became routine. It was therefore decided that the school dental service would extend its scope of treatment to include incipient cavities of anterior permanent teeth.

By the end of 1945, of a total of 2,514 public, private and Maori
primary and intermediate schools, 2,345 were being served by school
dental clinics. In all, 210,920 children were under regular treatment
including 24,350 of pre-school age children. The intake of nurse trainee
was increased from 80 to 100 a year.

February 1947 was a date of historic importance. It saw the
introduction by the New Zealand Government of the dental benefits service
for adolescents, under which a further period of dental care was made
available to all children on the completion of their treatment at school
clinics. Treatment was to be continued to the sixteenth birthday.

In 1948 an orthodontic unit was included in the service to emphasise
the importance of preventive orthodontics as part of a sound dental health
programme for children. In 1949 the preventive aspect of the work of the
service was further emphasised and strengthened by the introduction of
topical application of sodium fluoride as a routine procedure.

The shortage of staff in the field resulted in the consideration of
another training centre. On a population basis, Auckland was selected
as the site, and in 1951 the Auckland school for Dental Nurses was
officially opened.

Shortage of staff continued to be a pressing problem. The combined
high birth rate and the increase of school population required a further
increase in the number of school dental nurses. This led the government
to establish a third training school in Christchurch in 1953.

In 1956 Saunders retired after thirty-two years of service. He was
succeeded by Bibby as Director. By this time the Service was in
operation at 695 centres (including sub-bases) and the field staff numbered
625 serving a total of 2,385 schools.

In 1960 the field staff was increased to nearly 1,000 rendering
regular six-monthly treatment for about 375,000 children of primary school age and younger.

In 1963 the total number of school children receiving treatment was 419,597. This consisted of 346,439 school children and 73,158 pre-school children.

According to the School Dental Gazette of October 41, 1965, there are 1,045 school dental nurses serving a population of 456,049 school and pre-school children in 2,502 schools. The present Director of Dental Service is Dr. G.H. Leslie.

This brief review has shown that the training and use of school dental nurses for the dental care of children, which commenced in New Zealand as an experiment in 1921, is now a reality. This position had been achieved in the face of many and often serious, difficulties. The way was not always smooth. There were periods of set-backs and frustrations which at times seemed to threaten the very existence of the Service. Despite such temporary diversions and checks, the course has been steadily pursued throughout these forty-five odd years. A quotation from a statement in the editorial of the October 1965 issue of the School Service Gazette 41 will perhaps underline the secret behind the success of the School Dental Service.

"...the New Zealand scheme has operated successfully only through observing certain cardinal principles evolved over the passage of time. Had we not rigidly adhered to these principles and had not successive generations of school dental nurses displayed the same loyalty and respect, in fact, deep affection for the service, there can be no assurance that the New Zealand scheme would have been so successful...."

Of course, men such as Thompson, Cox, Dunn, Hunter, Saunders, Bibby,
Leslie and others, who contributed so much to make this unique system a reality deserve full credit and the greatest of admiration for their efforts.
4. THE SCHOOL DENTAL NURSE

A. TRAINING

The training of school dental nurses is carried out with these stated requirements in mind: (The career) "affords scope for those with initiative and enterprise. In return, it calls for character, personality, mental and physical strength, and most of all, a genuine interest in the welfare of children. The work is of a responsible nature and requires ability to organise and carry out the dental care of children and the teaching of preventive principles." 36.

APPLICATIONS

According to a booklet 52 on the school dental nurse, issued by the Department of Health in Wellington, vacancies for student dental nurse are advertised by the State Services Commission in newspapers and radio in May and September of each year. Training begins in March at Auckland, Wellington and Christchurch, but in Wellington there is an additional course in September.

Application forms are made available at the principal post offices and should be sent to the Secretary, State Services Commission, Wellington, before the end of May and September.

At least two testimonials, either from a school master, clergyman or a business man, should accompany the application. Two copies of each testimonial are required, the originals to be produced on commencement of training, plus birth and education certificates.

Fulton 13 commented that in the past newspaper announcements produced more than enough applicants, but in recent years it has been necessary to institute definite recruiting campaigns. These are carried
out by means of press and radio, films, vocational guidance material in the high schools and personal recruiting by the staff.

**SELECTION OF CANDIDATES**

With regards to the selection of young women for training as student dental nurses, the various reports 3, 13, 35, 38, 51 have this to say.

A high standard of education, personality and health is required of all young women selected for this profession. Candidates must not be less than seventeen years of age and preferably between eighteen and twenty-five years.

The minimum entrance qualification is School Certificate, but to avoid unnecessary delay, application may be lodged before such examination is taken. In this case the acceptance of the candidate for training is conditional on her passing her school certificate examination.

As selection of school dental nurses is on a competitive basis, preference is given to candidates who have passed the University Entrance or higher examinations, or have additional qualification in music, art or commerce. Preference is also given to candidates with previous experience of an appropriate nature, such as school teacher, dental assistant, hospital aide or social worker.

Fulton 13 stated that all applicants who meet the above general requirements are referred to the principal dental officer of the Health Department in the district where the applicant resides. A personal interview with the applicant follows and a confidential report is submitted to the central office. Such a report covers physique, general appearance, speech, temperament and nervous disposition, personality, standard of education, adaptability and environmental influences, and ends with one of the following recommendations - eminently suitable,
very suitable, suitable, unsuitable. A selection committee (usually consists of the Director of the Dental Division, the assistant director for training and the principal of the training school) then review these confidential reports.

It is at this stage that candidates are required to agree, if appointed, to live in hostels controlled by the Division during their training period if their homes are not in the places where the schools for dental nurses are located, and to agree to accept appointment to any district in New Zealand when their training is completed.

When accepted the cost of fares incurred in travelling by the most economical method of transport from points within New Zealand to the training centres is met. On arrival at the training centre, students are issued with uniforms, including caps, regulation white shoes, white stockings and service cardigans. Service blazers are available at students' own expenses.

HOSTEL ACCOMMODATION

Hostels are run in conjunction with training schools and are considered an essential part of the schools. At the time of writing there are two hostels in the Wellington training school, two in Auckland, and one in the Christchurch school.52 A matron supervises each of the hostels and she is responsible to the principal of the school.

Fairly strict regulations and rules are enforced in the hostels. These are generally designed to provide for evening study (there is a compulsory study period) necessary rest and sleep, together with reasonable freedom for recreation. They are for the smooth running of the hostels and student dental nurses in residence are expected to abide by them.
TRAINING SCHOOLS

The training of student dental nurses is carried out in the schools for dental nurses at Wellington, Auckland and Christchurch. The first training school was established at Wellington in 1921, the second in Auckland in 1951 and the third in Christchurch in 1954. These institutions have no connection with New Zealand's national dental school at the University of Otago, Dunedin, but are run by the Department of Health.

FACULTY STAFF

The training of dental nurses is undertaken by qualified dentists assisted by dental tutor sisters. They are all employees of the Health Department and there is no integration or interchange of faculty members with the University.

Berman reported that at each training school there is a principal, vice-principal, senior dental officers, dental officers, a matron and tutor sisters. Tutor sisters and dentists work closely together, much of the clinical work being supervised by the former.

For clinical operative dentistry there is one instructor to every ten to twelve student dental nurses.

SCOPE OF THE COURSE

According to the various reports of the course undertaken by student dental nurses, the training period extends over two calendar years. The course is an intensive one and is directed specifically towards the work the nurse trainee will undertake on graduation, namely, the routine dental care of children of pre-school and primary school age in school dental clinics.
During the first year, student dental nurses gain a general knowledge of the basic medical services with special reference to the dental and oral aspects. Practical work constitutes a fairly large part of the first year's curriculum and is so designed to prepare the nurse trainee for the clinical treatment of children with which she is almost fully engaged for the second year of training. Cavity preparations and the placing of fillings are done in teeth mounted in phantom heads prior to the actual treatment of patients in clinics.

The following table (1)\(^{50}\) shows the course of study and clock hours (lecture, drawing, laboratory and clinic) in the training of student dental nurses.
<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>LECTURES (HOURS)</th>
<th>DRAWING (HOURS)</th>
<th>PRACTICAL (HOURS)</th>
<th>CLINIC (HOURS)</th>
<th>TOTAL NUMBER OF HOURS</th>
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<td>2. Poster Work</td>
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<td>6. Histology (General and Dental)</td>
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<td>50</td>
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<td>7. Physiology</td>
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<td>8. Use and Care of Equipment</td>
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<tr>
<td>9. General Pathology</td>
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<td>Not Listed</td>
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<tr>
<td>10. Operative Dentistry (pre-clinical)</td>
<td>55</td>
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<td></td>
<td>250</td>
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<td>11. Pharmacology and Therapeutics</td>
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<tr>
<td>12. Dental Pathology</td>
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<td>13. Clinical Records</td>
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<td>14. Local Anaesthesia and Extractions</td>
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<td>Demonstration Variable During Lecture Period</td>
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<td>16. Child Welfare</td>
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<td>17. Orthodontics</td>
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<tr>
<td>Clock hours, first year</td>
<td>234</td>
<td>78</td>
<td>189</td>
<td>250</td>
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* Total number of hours spent in General Pathology and Dental Pathology is not listed.
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<th>SUBJECTS</th>
<th>LECTURES (HOURS)</th>
<th>DRAWING (HOURS)</th>
<th>PRACTICAL (HOURS)</th>
<th>CLINIC (HOURS)</th>
<th>TOTAL NUMBER OF HOURS</th>
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<td>700</td>
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<td>(throughout 12 months)</td>
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<td>19. Organisation and</td>
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<td>Administration</td>
<td>class exercise)</td>
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<td>20. Dental Health Education</td>
<td>15 Demonstration</td>
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<td></td>
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<td>752</td>
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<td>Clock hours for two year</td>
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<td>78</td>
<td>189</td>
<td>950</td>
<td>1516</td>
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<tr>
<td>course</td>
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In general, the whole course is planned to give the school dental nurse a preventive bias in her work, and to meet any problem which may arise in organising the treatment of a large group of children at her school dental clinic.

During the two-year course there are class examinations as well as the primary, intermediate, qualifying and final examinations. These examinations are of a written, oral and practical nature. The final examination is conducted by a Board of Examiners on which private dental practitioners are represented.

Upon satisfactorily completing the required course of training, a student dental nurse is awarded a certificate of "Proficiency in Theory and Technique in Preventive and Operative Dental Care of Children", by the Department of Health. It reads:
This is to certify that ..................................................
has completed the course of training laid down for School Dental Nurses
by the Department of Health.

She has satisfied the examiners of her fitness to give preventive and
operative dental care to children, and of her knowledge of the principles
underlying dental health and oral hygiene.

And she is hereby appointed a School Dental Nurse in the employment
of, and under the supervision of, the Department of Health, and as such
is authorised to give such treatment, instruction and advice relating to
the dental care of children as the Department may from time to time direct.

In testimony whereof, this certificate has been awarded, and is
signed by order of the Minister of Health, this......................
day of..........................

Director, Division of Dental Health

Principal, Dominion Training School
for Dental Nurses

Director-General of Health.

She is also presented with a medallion which is worn on the uniform.
The medallion is inscribed with the Royal Crown denoting state service,
the New Zealand Arms, and the motto "Ut Prosin", meaning "that I may do
good".

RESIGNATION

Fulton ¹³ estimated that of every 100 dental nurses trained in New
Zealand, thirty would have resigned in five years, half of them would
have gone in seven years; seventy would have left in ten years, and only
seventeen would be still in the Service after twelve years.

Gruebba ¹⁸, basing his information supplied by the Division of
Dental Health, reported that the average length of service of the school
dental nurse is seven years and nine months. This applies only to those who have resigned. Gruebbel continued that of the dental nurses who resign their position, marriage accounts for approximately 95 per cent of such resignations. A number of dental nurses resign their position for higher salaries in other fields.

POSTGRADUATE TRAINING

At the time when Fulton 13 was reporting, postgraduate training for school dental nurses was not on a planned or organised level. Occasional meetings of field nurses on a district level are called at the discretion of the principal dental officers to discuss technique, material and new methods. Fulton suggested that two other media may serve for graduate training:

(a) The New Zealand School Dental Gazette, published bi-monthly, is sent to every nurse for reading and filing. The Gazette includes technical articles, official instruction and Division news, and dental health education material.

(b) The New Zealand State Dental Nurses Institute which is the professional society of the dental nurses. Regular meetings in each district is conducted to supply useful information for the benefit of the dental nurse.

This organisation is voluntary but most dental nurses are members.

SALARY AND ALLOWANCE

Source: Dr. G.H. Leslie 31, present Director of Dental Health in the Department of Public Health, New Zealand.

The various positions are grades in the General Division of the Public Service and salaries shown are as at the date of 26th August, 1964:
STUDENT DENTAL NURSES

First year

£ (New Zealand) 491

Second year

559

Lodging allowance payable to student nurses residing in hostels -

First year only - 43

SCHOOL DENTAL NURSES

First year (i.e. after completion of training) 780

Second year 849

Third year 926

Fourth year 997

Fifth and subsequent years 1061

*Merit Grade I 1091

Merit Grade II 1125

School Dental Nurses who have been at least one year on the maximum salary of a School Dental Nurse may be graded in the Merit Grade.

There are opportunities for appointment as Dental Nurse, Inspectors, Dental Tutor Sisters and Matrons of Schools at higher salaries.
B. DUTIES AND RESPONSIBILITIES

On successful completion of training, student dental nurses are promoted to the status of school dental nurses and are sent to work in dental clinics attached to a school or in the school ground.  

Berman \(^3\) reported that the school dental nurse may work at a main treatment centre as charge nurse with a second nurse under her, as a sole-charge nurse, or as a second nurse; or she may work at a sub-base. Usually a newly graduated dental nurse would work under the charge of an experienced nurse. With increased experience she is appointed in due time to sole charge positions. Experienced school dental nurses are eligible for appointment to charge-nurse position, or, going further, to dental tutor sister, nurse inspector or matron positions.

The dental nurse is a full-time officer of the Department of Health "attached for special study" to the school at which the clinic is located \(^3, 13\). She thus comes under the general jurisdiction of the local headmaster of the school but her actual controlling supervisor is a dental officer of the Health Department. She is under the supervision of the headmaster for attendance, hours of work, and general deportment. An article in the November 1949 issue of the School Dental Service Gazette (quoted by Gruebbel \(^18\)) described the dental nurse's place in the school as follows:

"Every School Dental Nurse is well aware that in certain respects she is regarded as being a member of the staff of the school at which her clinic is located. Not only is she at all times an officer of the Department of Health but necessarily she must, on account of the special nature of her position, be subject to the same rules of conduct which are imposed by the Head Teacher on members of the teaching staff.....the clinic may.....be regarded as a unit of the school itself, just the same as class-rooms and
staff-rooms are so regarded. It is in this connection that the School Dental Nurse owes equal loyalty and devotion to duty to the Headmaster. To assist him, School Dental Nurses should be punctual in their hours of work, whether the school classes are in operation or not. They should be courteous and friendly with parents and teachers, and, above all, enter into the life of the school whenever possible. Consideration in the making of appointments so that there is the least possible disruption of classes will always be appreciated.

Consideration can also be given to the time when a particular type of operation is to be performed - e.g. an extraction carried out at the end of the school day will often obviate distress to the child and inconvenience to the teacher."

The hours of duty of a school dental nurse are from 8:40 am. to 12 noon, and 1:00 pm. to 4:45 pm., five days a week (the same hours of duty apply to student dental nurses). As well as statutory holidays, school dental nurses (and student dental nurses) are entitled to the following holiday leave:

**December - January:** three weeks, plus the usual Public Service holidays at Christmas and New Year.

**May and August:** two weeks at the end of each school term.

In all, there are approximately eight weeks' holiday spread over a year.

As the object of the service is to provide dental care for children of school and pre-school age on the basis of regular and systematic treatment at six monthly intervals, the work of a school dental nurse involves
1. The issue of consent forms to the parents of all children who join the schools in her dental group, or bring pre-school children to the clinic for treatment;

2. The examination and execution of all necessary treatment six monthly for all children enrolled for treatment and for whom consent has been received;

3. Arrangements for all dental work beyond her scope of treatment to be effected by private practitioners and where applicable as free treatment under Social Security (Dental Benefit) Regulation;

4. The instruction of all patients in the use of the tooth-brush and the principles of oral hygiene;

5. Carrying out a dental health programme for all schools in her care;

6. Maintaining correct records for all patients under treatment and of all work performed, and presenting reports and returns of work at specified intervals to the principal dental officer of the district;

7. Cleanliness and up-keep of all equipment and furnishings in her charges, and if the controller of a clinic, the general cleanliness of the clinic itself.

More specifically, the school dental nurse maintains the dental health of a group of children, usually about 500, by regular dental inspection, treatment and health education.

The nature of treatment given by school dental nurses is standardised as far as possible and includes prophylaxis, topical application of sodium fluoride, fillings in both deciduous and permanent teeth and extractions of deciduous and permanent teeth where necessary using local anaesthesia. Copper amalgam is routinely used in
all deciduous teeth, silver amalgam in permanent posterior teeth, and for permanent anterior teeth silicate cements are used.

Root canal therapy is not within the scope of the treatment rendered by school dental nurses, but the capping of clean traumatic exposure is routine treatment that has proved successful.

School dental nurses are trained to recognise malocclusion but not treat them. In such cases parents are advised to consult a dentist in private practice, since orthodontic treatment does not normally come within the scope of the social security (Dental Benefit) Scheme.

Besides orthodontics, such matters of treatment as pulp or root canals, deep anterior cavities, fractured teeth, prosthesis, and multiple extractions requiring general anaesthesia are referred to dentists. Such referrals, with the exception of orthodontics, is accomplished by a suitable form, certifying the need for treatment, which is sent by the dental nurse to the district dental officer to whom she is responsible. He in turn enrolls the child under a special benefits category which permits the parents to take the child to a dentist for treatment which is paid by the State.

Clinical records are so designed as to bring the child's name to notice every six months. All examinations six monthly and, where necessary, treatment are duly recorded with all essential details.

School dental nurses are government employees, having no right to private practice. Their work are supervised by dental surgeons, but they decide on the course of treatment themselves. From his observation Fulton reported that without exception the dental nurses plan their treatment in this order:

1. eliminate acute pain and infection;
2. prophylaxis;
3. fill all savable teeth;
4. extract all teeth which are beyond repair.

The dental nurse has no X-ray facilities. Her method of diagnosis is based on the use of mirror and explorer, disclosing solutions and separation of teeth to examine proximal surface.

ELIGIBILITY FOR TREATMENT

According to these reports $3, 13, 38, 39, 53$ treatment in the first instance is restricted to children attending the primer (infant) classes of such primary schools as have been accepted by the Department of Health for dental treatment and secondly, children of pre-school age are also eligible for treatment. Generally speaking then, the service is offered to children from age $2\frac{1}{2}$ years to $13\frac{1}{2}$ years.

Children once registered for treatment remain under dental observation and continue to receive dental treatment until they graduate from their primary or intermediate school to a secondary school, or pass from the highest class of their school that is under treatment at the school clinic.

If a child who is in receipt of dental treatment moves into a school in another district, treatment is automatically continued there. When in the course of moving from one district to another, parents have neglected to secure adequate dental treatment for their children who previously have been under the care of the school dental service, the Department will not undertake to resume treatment until the children are made dentally fit at the parents' expense. This applies also to children who have completed the primer classes and entered the higher grades without enrolling for initial treatment.
No child is enrolled for treatment unless a parent or guardian has signed a form giving consent to whatever treatment may be necessary. Only rarely is consent withheld. Since the programme is a voluntary one, parents can withdraw their children from the register at any time. However, in all cases of withdrawal the dental nurse is required to procure a letter to that effect from the parents. Such a letter is filed with the child's chart and the date of withdrawal recorded in the clinic register.

**TREATMENT CENTRES**

The various reports 3, 38, 39, 52 indicate that treatment centres are usually located within a school's boundaries and considered as part of the school.

School dental clinics are established at selected centres on the recommendation of the principal dental officer of a district. A dental clinic committee, comprising representatives of the local school committees and parent groups, is set up to attend to local administrative matters. In deciding which schools are to be served by a clinic, the guiding principle is that when the work in the area is fully developed, one dental nurse should control 450 to 500 patients on a six monthly revision basis.

The normal procedure is to erect dental clinics in the school grounds of the largest and most central school in the group of schools to be treated. In areas where patients cannot be conveniently concentrated for treatment at one centre, one or more sub-bases are established. There should not be less than 100 children at anyone sub-base.

The main advantage of erecting dental clinics in the vicinity of a school is the minimum of interference in the school work of children.
Fulton remarks that getting children to the clinic for treatment is a simple matter in schools where the clinic is located. The dental nurse calls the child she wishes to see from the classroom at the appropriate time. In the case of children from outlying schools, the method is more complicated. The dental nurse, setting a block of time, sends appointment cards or a list of names to the school headmaster who then arranges transportation to the clinic for the children.

If a school child does not turn up for an appointment, the dental nurse contacts the school. If the child cannot be contacted at the school, an appointment card is sent directly to the parents. If this card fails to be honoured another one is posted to the parents. When still no explanation is received a final card is forwarded to the parents, accompanied by a notice saying that if the clinic fails to hear from the parents, the child's name will be removed from the clinic register.

The clinics and service are tax supported. The Department of Education bears the cost of construction of the clinics, while the Division of Health assumes the responsibility of maintaining and staffing them.

The clinics are standardised and are of three types: an "A" type to accommodate two operators in one surgery of approximately 250 sq. ft; a "B" and "C" type for one operator with surgery space of approximately 160 sq. ft. The "A" and "B" type clinics have, in addition to the surgery, a staff room, waiting room and conveniences. While the "C" type clinic has almost the same surgery space, the auxiliary rooms are very much reduced. These smaller clinics are sometimes provided in very isolated areas where a child population is small.

In planning all clinics particular attention is paid to colour of the
interiors and to the sites where the buildings are to be erected.

The clinics are equipped with standard equipment of a simple type, but adequate for the purpose.

Sufficient funds are provided to meet the cost of all domestic expenses, such as lighting, heating, laundry and cleaning charges.
5. **DENTAL HEALTH EDUCATION**

Saunders recorded that ever since its initiation, the school dental service has placed considerable emphasis on the importance of dental health education to be taught to patients and parents alike.

In the early days, financial resources for this activity in the Health Department were meagre and health educational activities were restricted to the production of a few pamphlets. With the introduction of radio, the Dental Division was quick to take advantage of this form of media to convey its message to the public.

In 1940 the New Zealand Government voted a sum of £2,300 to be expended specifically on health education in the Department. Since then the vote has increased progressively over the years and in 1960 it has reached a sum of £30,000 a year.

Dental health has received its share of the vote and a wide variety of educational materials have been produced, including attractively illustrated pamphlets and folders, panels for trams and buses, newspaper advertisements, flannel art equipment and numerous coloured dental models, film strips, sound films and striking posters.

Today, according to Berman, within the Department of Health there is a Central Health Education Committee, which is represented by all divisions of the Department, under the Director of the Division of Health Education. The dental aspects are under the general control of the assistant director, assisted by dental tutor sisters (Health Education). More specifically the Assistant Director acts as liaison officer between the Division of Dental Health and the Departmental Committee for Health Education. He organises and directs dental health education in schools and for the community at large. He is responsible for planning and
supervising courses of instruction to student dental nurses on health education and directs the activities of the school dental nurse in this field. He supervises the preparation of such educational materials as films, filmstrips, models, posters and is responsible for the publicity in advertising agencies and in the press.

The dental tutor sisters instruct school dental nurses in the use of dental health education material and organise teaching programmes. They assist with the instruction of student dental nurses in the use of the material and in the development of individual initiative. They also assist with large exhibitions and displays and in the design and structure of health education material.

The work of the school dental nurses in the field of dental health education is notable for enthusiasm, initiative and originality. During their training school dental nurses receive formal courses of instruction in this work, both theoretical and practical. This is augmented by postgraduate instruction.

Saunders stated that the time is long past when chairside instruction constituted the sole method of dental health education. He continued that today, it is regarded as normal routine and the school dental nurses are expected to carry out, in addition, a range of activities which vary from talks to school classes to more ambitious undertakings such as the production of dental tableaux and plays, addresses to parent-teacher and similar organisations, and dental health displays at school functions.

For the year 1959 to 1960, Saunders reported that dental health education activities included 8,200 lectures and addresses to parents and children, the preparation of 513 dental health exhibits and stalls at schools and public functions and 5,844 other activities, giving a total of
14,557.

In one report it was stated that in the year 1961 to 1962, school
dental nurses gave more than 8,500 dental health education lectures, oral,
hygiene demonstrations, dental health displays and other dental health
projects.

Walsh reported that in 1963 to 1964, nearly 12,000 lectures to
parents and children in dental health education were given by the nurses.

Dental health education received added impetus when, in 1950, the
New Zealand Dental Association extended its organisation to include a
Dental Health Education Council on which the Division of Dental Health
is represented. The Council is provided with funds by the parent
body and it has produced over the years much attractive material for the
use of the dental practitioners. In order to ensure uniformity of
in between the profession and the Division of Dental Health, there is very close collaboration between the two bodies.

The School Dental Service Gazette, published bi-monthly, is an
important medium for stimulating dental health education. A considerable
portion of this publication is devoted to this subject.
6. **ADMINISTRATION AND ORGANISATION**

The New Zealand National Dental Service is organised into two divisions - the School Dental Service and the Adolescent Dental Service\(^35,39,51,53\). It is an integral part of the Division of Dental Health of the Department of Health.

The division of Dental Health has at its head a Director\(^(*)\) (present Director is Dr. G.H. Leslie, a dental surgeon), assisted by a Deputy Director, an Assistant Director and a dental research officer.

The service is organised in sixteen units, each of which is controlled by a senior dental officer, who is directly responsible to the Director. These officers are the principals of the Wellington, Auckland and Christchurch training schools for dental nurses and the principal dental officers in charge of the thirteen dental districts into which New Zealand is divided. Each district has a staff of from 60 to 120 dental nurses, each being responsible for the dental care of 450 to 500 children of pre-school and primary school age on a six monthly basis.

A dental clinic committee assists in the local administration of a school dental clinic. The committee consists primarily of representatives of the school committee in the area served, but may include representatives of other bodies and individuals. This committee assists in the local organisation and management of the work of the clinic on behalf of the parents in the community.

The principals of the training schools for dental nurses are responsible for the training of school dental nurses and the efficient running of the Children's Dental Clinic which is an essential part of each school. The principals are also entrusted with the duties of training dental attendants for operating room duties and to conduct short courses in service procedure and technique for newly-joined dental surgeons.
The principal dental officer in charge of each of the thirteen districts is responsible to the director for the establishment, maintenance and efficient operation of the adolescent and school dental clinics in his district. He also directs locally the operation of the Social Security (Dental Benefits) system, and generally represents the director in his district.

With the help of a dental nurse inspector, assigned full-time to his office, the principal dental officer in a district interviews all applicants for dental nurse training that live in his area, handles all requests for the establishment of services that come from local groups, deals with all requests for leave, transfers and resignations that come from the field staff and acts as the liaison with the local dental profession. Only on his recommendations is action taken by central office. He exerts direct supervision over the dental nurses in his area and is required to make at least three inspection tours a year to each dental clinic in his district. These inspections deal with,

1. The cleanliness and general appearance of the clinic and the correct and smart appearance of the school dental nurses in uniform;

2. Examination of clinical records to check their accuracy to ascertain the position of the group of patients attending the clinic;

3. Inspection of operative work for quality and completeness. This entails the selection of a representative groups of patients and the detailed examination of their mouths with mirror and explorer. The children are also questioned on the principles of oral hygiene to ascertain the effectiveness of the school dental nurse's teachings;

4. Maintaining close contact with the local organisations such as the headmaster of the schools and dental clinic committees.
The dental nurse inspector, assigned to assist the principal dental officer, is a school dental nurse of long experience and must have served in the training school as a tutor sister. She devotes about 80 percent of her time in the field as an inspector of school dental clinics. Her main duties are to see that the clinic is orderly and clean, that instruments and equipments are in good shape, that records are properly filled out and complete and that the dental nurse wears regulation uniform.

Once a year the dental nurse inspector meets each dental nurse to check all charts, revision lists, new entrants sheet, and registers to see that they are in balance. It is usually the dental nurse inspector to whom the school dental nurse appeals for help in troublesome cases of broken appointments, follow-up work with parents, referrals to dentists, transportation difficulties and the like.
Prior to 1947 there have been no effective means of ensuring that children, on leaving the school dental service, would receive continuing dental care from a private practitioner. In fact, very few children did so and this caused a serious economic waste to the nation.

With the introduction of the Social Security (Dental Benefits) Regulation in 1946, organised dental care was extended to include all children up to the age of sixteen years under government expenses 3, 9, 54.

When the adolescent dental service was first started, it was envisaged that dental care for eligible age groups would be provided by dental officers employed on a full time basis working in departmental clinics. To overcome the shortage of dentists to staff such a service, the government awarded bursaries to suitable men and women enabling them to undertake the course of dental study at the Otago University Dental School 40. A condition of the award was that on graduating such men and women were bonded to work in the Department for three years or less, depending on the term for which the bursary had been held.

According to the latest report 35 concerning such bursaries, they are of a value of £100 per annum for the first year, £125 per annum for the second and third years, £150 per annum for the fourth and fifth years plus tuition fees and are tenable for five years, subject to satisfactory reports from the University authorities concerning academic activities. An additional allowance of £80 per annum is payable to students who live away from home.

Pending the development of such a service the New Zealand Dental Association agreed to operate an "interim service", the idea being for private practitioners to contract with the Minister of Health to treat
adolescents in their own practices on a fee-for-service basis.

For a variety of reasons, the main ones being the difficulty of recruiting sufficient dental surgeons, and the shortage of materials and labour for building, the salaried service has made limited progress \(^{39}\). On the other hand, the "interim service" has proved both effective and acceptable to the New Zealand Dental Association and seems likely to be retained indefinitely.

Features of the private practitioner service ("interim service") are \(^{39,53}\):

1. There is free choice of dentists and dentists have the right to decline patients;

2. The authorised range of treatment which may normally be provided as Dental Benefits, together with the approved fees, is set out in the Schedule to the Social Security (Dental Benefits) Regulations;

3. Dentists are free to exercise their professional judgment and are encouraged to carry out all forms of treatment that are normally given in a good conservative practice. The aim is to maintain a high standard of dental health, and if in the opinion of the dentist a case demands a form of treatment that is not provided for in the Schedule, there is provision for such treatment (with the exception of specialist treatment) to be approved by the principal dental officer of the district as a charge on the fund;

4. The Department is empowered to inspect patients treated under these Regulations.

Approximately 73 percent of all registered dentists is reported to be providing the Social Security Service \(^{53}\). Walsh \(^{54}\) reported that in 1963-1964, 185,000 children received treatment from private practitioners
under this scheme, who were paid £1,167,000 (New Zealand) or roughly $18 (American) per patient in fees for their service.

The salaried service is staffed by qualified dentists who are officers of the Department of Health 53. They are in the main graduates fulfilling their contract under the terms of their bursary agreement.

Each dental officer has approximately 750 patients of the eligible age group under his charge. The service is conducted on a preventive basis and the following are the functions of the organisation:

1. Enrolled patients receive attention twice a year;
2. X-rays are used as a routine aid to diagnosis;
3. The necessary operative and other treatment is carried out in hard and soft tissues;
4. Orthodontic treatment is provided for patients referred from primary school clinics with in the limitations prescribed by the Policy;
5. Modern methods of caries control are adopted as facilities for these are developed;
6. The lay public is educated in the prevention of dental disease.

Eligibility for dental treatment as an adolescent is contingent upon a person having undergone regular dental care, either at a school dental clinic or at the patients' own expense, and possessing an adequate standard of dental and oral health 51,53.

The adolescent dental clinics, operated by the Department of Health have two surgeries, a consulting room, a sterilisation room, a dark room, a recovery room, a waiting room, an office and staff rooms 39, 53. They are modernly equipped and are furnished and decorated in an attractive manner.
8. EVALUATION AND DISCUSSION

New Zealand dental programme has been a controversial subject among dentists the world over, mainly because it entrusts a large part of the dental care of children to young women who work in school dental clinics after a two-year training course organised by the Division of Dental Health.

Fulton pointed out that dentists supporting the New Zealand Dental Nurses Scheme argued that no country has enough trained dentists to provide the needed hours of service to all children, that a marked increase in the number of dentists is unlikely and that the development of trained supplemental dental personnel is logical and necessary.

On the other hand, critics stated that the New Zealand system delegates children's dentistry to partially trained auxiliaries; that school dental nurses cannot be classified as professional personnel; that the dental nurses are not dental auxiliaries, but are actually sub-level practitioners who provide a restricted range of dental procedures for children; that this is an attempted short cut to dental health; and that it is a backward step which solves nothing but endangers the health of children.

In answer to some of these charges, Saunders recorded that as early as 1924 the dental nurses' status had been clearly defined, that is, school dental nurses are not to be regarded as lower grade dentists, but auxiliary workers enjoying professional standing in their own rights, performing their duties and responsibilities in clearly well defined boundaries, namely;

1. The improvement of the standard of dental health of school children and of pre-school children from 2½ years of age, by affording
them regular and systematic treatment at six monthly intervals;

2. the teaching of school children and the public in general in
the principles of oral hygiene and the preservation of teeth.

Hence, school dental nurses are fully trained auxiliaries and are
regarded as playing an important role in a dental health team.

Berman stated that in evaluating the School Dental Service in New
Zealand one cannot merely view it as a case for or against the utilisation
of dental auxiliaries. Arguments as to the use of partially trained
personnel, sublevel practitioners, etc. must forever remain an
emotional outburst when considered against a total health programme.

In evaluating whether the School Dental Service has lived up to the
challenge of its motto (Ut Prosim) and "done good" to the community,
certain considerations have to be looked at in details, that is, the
achievements of this service in the course of its forty-four odd years of
existence and the quality of the treatment rendered by school dental
nurses in this service.

Much of what the service has accomplished cannot be measured in
terms of statistics, although some can. Briefly, although the incidence
and prevalence of dental caries is high in the average New Zealand school
child, much of it has been treated and checked to prevent further
deterioration which could lead to the untimely loss of teeth. Dental
authorities are unanimous that the primary teeth should be shed at
normal exfoliation time and not extracted prematurely as a result of
untreated caries. In this way, much malocclusion can be avoided with
the minimum of orthodontic guidance. Also, the possibility of local
and systemic infection from advanced carious teeth is reduced.
Fulton, in an examination of 4072 New Zealand children in 1950, reported that at the age of seven, the average New Zealand school child had more than five of his deciduous molars attacked by caries, but 95 percent of these attacked teeth were filled. Two of the child's permanent teeth had also been attacked by decay, but three-quarters of them had been restored. By the age of fourteen, the number of attacked permanent teeth had risen to ten, yet 86 percent of these teeth had been filled. He reported that only 0.4 permanent teeth were missing. Furthermore, he observed that among rural children the proportion of decayed teeth which had been filled was equal to that among urban children. Fulton's survey clearly indicates that much of the dental caries in New Zealand school children have been treated and very few carious teeth are lost through extraction.

The amount of fillings done by school dental nurses each year has reached a staggering figure. A report from the October 1965 issue of the School Dental Service Gazette indicated that in 1964, some 984 school dental nurses gave 2,298,449 fillings to 431,941 children, while in 1965 1,045 dental nurses gave 2,324,017 fillings to 456,049 children. During the previous forty odd years tens of thousands of children had had the benefit of similar dental care.

The yardstick that may be applied to measure the effectiveness of this great volume of dental care by school dental nurses is the extraction-filling ratio over the years. The following table (2) is taken from the same issue of the School Dental Service Gazette.
TABLE 2. FALL IN THE RATIO OF EXTRACTIONS TO FILLINGS

<table>
<thead>
<tr>
<th>Year</th>
<th>Fillings</th>
<th>Extractions</th>
<th>Ratio of Extraction per 100 Fillings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925</td>
<td>59,322</td>
<td>43,181</td>
<td>72.6</td>
</tr>
<tr>
<td>1935</td>
<td>399,560</td>
<td>70,207</td>
<td>17.5</td>
</tr>
<tr>
<td>1945</td>
<td>1,017,290</td>
<td>76,335</td>
<td>7.5</td>
</tr>
<tr>
<td>1955</td>
<td>1,440,245</td>
<td>83,247</td>
<td>5.8</td>
</tr>
<tr>
<td>1965</td>
<td>2,324,017</td>
<td>81,030</td>
<td>3.4</td>
</tr>
</tbody>
</table>

As can be seen from the table such a ratio has dropped dramatically from 72.6 in 1925 to 3.4 in 1965. This in itself provides striking testimony to the effectiveness of the system.

Davies commented that the evidence from records of the School Dental Service shows a marked improvement in the dental condition of children presenting for initial examination on entry to primary school at the age of five years:

TABLE 3. DENTAL CONDITION OF FIVE-YEAR-OLD CHILDREN ON INITIAL EXAMINATION BY SCHOOL DENTAL SERVICE

<table>
<thead>
<tr>
<th>Year</th>
<th>Carious Teeth Per Child</th>
<th>Unsaveable Teeth Per Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>8.5</td>
<td>1.7</td>
</tr>
<tr>
<td>1950</td>
<td>6.8</td>
<td>0.7</td>
</tr>
<tr>
<td>1960</td>
<td>6.1</td>
<td>0.6</td>
</tr>
</tbody>
</table>

In addition, there are also intangible results which cannot be measured in terms of statistics. For example, it is extremely difficult to assess the effect of the great volume of work done by dental nurses in the field of dental health education.

Then again, each year the parents of hundreds of children have their
attention drawn to oral conditions by school dental nurses which require referrals to dental surgeons. During the course of their training, dental nurses are taught to distinguish between the normal and the abnormal. As soon as any abnormal condition is found, dental nurses refer the children to the principal dental officers for further examination and possibly treatment. The amount of pain, suffering and discomfort that has thus been averted by timely advice and skilled intervention cannot be assessed statistically.

Another important achievement is that over the years the attitude of children towards dental treatment has undergone a change in New Zealand. Nowadays dental care is regarded by children as a normal part of their life. All fears are banished and children attend their school dental clinic cheerfully, regarding it merely as part of school routine.

Also, today in the community there is a dental consciousness which was lacking before. Instead of regarding dental treatment in terms of extractions and artificial dentures, there is a healthy outlook in the community regarding the preservation of natural teeth. Thus Davies pointed out that the expanded conservative programme has decreased the need for dentures:

<table>
<thead>
<tr>
<th>Description</th>
<th>Percent Wearing Dentures</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 29 year old males in 1950</td>
<td>42%</td>
</tr>
<tr>
<td>20 - 29 year old males in 1956</td>
<td>32%</td>
</tr>
<tr>
<td>16 - 20 year old ante-natal women in 1951</td>
<td>45%</td>
</tr>
<tr>
<td>16 - 20 year old ante-natal women in 1956</td>
<td>25%</td>
</tr>
<tr>
<td>Compulsory Military Training recruits in 1952</td>
<td>29%</td>
</tr>
<tr>
<td>Compulsory Military Training recruits in 1958</td>
<td>11.4%</td>
</tr>
</tbody>
</table>
The following table briefly summarises some of the achievements accomplished by school dental nurses over the years in statistical terms:

**TABLE 4. GROWTH AND ACHIEVEMENTS OF THE SCHOOL DENTAL SERVICE UP TO 1963**

<table>
<thead>
<tr>
<th>Year and School Population</th>
<th>School Children under Treatment</th>
<th>Pre-School Children under Treatment</th>
<th>Total Children under Treatment</th>
<th>Field Staff including School Dental Officers</th>
<th>Ratio Extractions per 100 Health Education fillings</th>
<th>Dental Health Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925 231,100</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>42</td>
<td>72.6</td>
<td>NR</td>
</tr>
<tr>
<td>1930 245,265</td>
<td>NR</td>
<td>NR</td>
<td>60,289</td>
<td>101</td>
<td>37.2</td>
<td>NR</td>
</tr>
<tr>
<td>1935 228,617</td>
<td>NR</td>
<td>NR</td>
<td>83,433</td>
<td>166</td>
<td>17.5</td>
<td>425</td>
</tr>
<tr>
<td>1940 238,186</td>
<td>NR</td>
<td>NR</td>
<td>101,701</td>
<td>237</td>
<td>12.3</td>
<td>2,461</td>
</tr>
<tr>
<td>1945 243,590</td>
<td>168,464</td>
<td>22,876</td>
<td>191,340</td>
<td>450</td>
<td>7.5</td>
<td>11,569 #</td>
</tr>
<tr>
<td>1950 292,436</td>
<td>NR</td>
<td>NR</td>
<td>226,636</td>
<td>494</td>
<td>7.0</td>
<td>45,842 #</td>
</tr>
<tr>
<td>1955 366,068</td>
<td>215,566</td>
<td>44,976</td>
<td>265,640</td>
<td>625</td>
<td>5.8</td>
<td>350,000 #</td>
</tr>
<tr>
<td>1960 389,000</td>
<td>311,098</td>
<td>63,018</td>
<td>374,116</td>
<td>921</td>
<td>3.8</td>
<td>8,713 +</td>
</tr>
<tr>
<td>1963 465,221</td>
<td>346,439</td>
<td>73,158</td>
<td>419,592</td>
<td>982</td>
<td>3.1</td>
<td>9,895</td>
</tr>
</tbody>
</table>

NR Not Recorded

# The marked increases in 1945, 1950 and 1955 are due to a change in the method of assessing dental health education activities and including instruction given to all parents individually on completion of each six-monthly treatment. It was later ruled that the latter was to be regarded as routine procedure and was not to be counted in assessing dental health
education activities.

This figure appears in the following context in the Annual Report of 1960: "Apart from many other activities carried out in the field of dental health education during the year, school dental nurses gave more than 8,200 lectures and addresses to parents and children, and prepared 513 health exhibits and health stalls at schools and public functions". In addition to these 8,713 activities, there were 5,844 under other headings, making a total of 14,557 for the year.

To evaluate the quality of operative treatment rendered by school dental nurses to children of school and pre-school ages, references would be made to the observations made by Fulton 13 and Gruebbel 16,18 in this regard. In general Fulton's report is favourable while Gruebbel's less so.

Fulton 13 personally inspected amalgam fillings in 207 teeth with respect to outline and contour, smooth margins, good carving and polish. Of that number, 170 (82 percent) had been placed by school dental nurses. He was impressed by the standard of the fillings he examined, and concluded that New Zealand dental nurses are capable of producing amalgam fillings of good quality.

On two occasions during his tour-inspection he had opportunity to inspect cavity preparations by student dental nurses in the training clinic. Altogether about fifty Class II cavities in deciduous molars were examined by him on these occasions. In his opinion he regarded these cavity preparations as quite acceptable in such respects as outline form, removal of all carious dentine and extension for prevention.

Fulton also noted that office hygiene was excellent and the clinics were clean, neat and orderly. He reported that patient management
seemed to present no problems and the nurses had the respect and confidence of both children and parents. He was highly impressed by the efficiency of the dental nurses, their work being carried out with the minimum of noises and confusion and for the most part according to schedule.

Gruebble 16, 18 gave a less favourable account on the work of the New Zealand school dental nurses. His estimation of the quality of operative treatment performed by dental nurses was based on four points - poor restoration of tooth form, faulty margins, fractured fillings and fracture of tooth around filling.

Of 3,220 fillings examined by him, he reported that 27.9 percent were defective for one or more reasons. He stated that in 10.2 percent there was poor restoration of tooth form; in 11.0 percent, the fillings had faulty margins; in 4.7 percent the fillings were fractured; and in 2.0 percent the tooth-structure around the fillings was fractured.

He remarked that school dental nurses failed to observe the principles of cavity preparation advocated by G.V. Black, although they were taught such principles. He also noted that an unusually large number of teeth filled by school dental nurses had two, three, four and five separate fillings and suggested that this may be due to

1. The high incidence of caries;
2. Haphazard operative techniques as a result of inadequate supervision;
3. A desire on the part of the school dental nurse to report the performance of a large volume of work.

Summarising the quality of dental care rendered by school dental nurses, Gruebble accorded the following gradings to the various procedures
performed.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination and diagnosis</td>
<td>Poor</td>
</tr>
<tr>
<td>Treatment Planning</td>
<td>Poor</td>
</tr>
<tr>
<td>Observation of growth and development</td>
<td>Poor</td>
</tr>
<tr>
<td>Amalgam fillings</td>
<td>Mediocre</td>
</tr>
<tr>
<td>Oral prophylaxis</td>
<td>Good</td>
</tr>
<tr>
<td>Extractions</td>
<td>Mediocre</td>
</tr>
<tr>
<td>Preventive orthodontics</td>
<td>Poor</td>
</tr>
<tr>
<td>Appraisal of diet and nutrition</td>
<td>Poor</td>
</tr>
<tr>
<td>Child management</td>
<td>Good</td>
</tr>
<tr>
<td>Dental health education</td>
<td>Mediocre</td>
</tr>
</tbody>
</table>

Dunning 9 stated that even if 28 percent of fillings received by New Zealand children are defective, as reported by Gruebel and if none of the fillings placed by American dentists are considered defective (an almost impossible optimistic assumption) the New Zealand children in both Fulton's and Gruebel's surveys still had more good fillings in their mouths than any known comparable group of American children.

Walsh 54 commented that it is doubtful if any country anywhere provides a more complete dental service to all its school children than New Zealand does. As a result, in spite of a high caries prevalence, an increasing number of young people are growing into adult life with all their own teeth.

The provision of dental treatment to school children in New Zealand by the employment of school dental nurses have long passed the experimental stage. Forty-four years of experience has proved that with careful selection and specialised training, young women quickly develop an
excellent approach to children, become expert operators in their defined field and capable of successfully managing the dental health of large groups of children.

In appraising the adequacy of training of the New Zealand dental nurses, Dunning stated that it is important to bear in mind how many difficult dental subjects they do not have to learn - endodontics, periodontics, much of oral surgery and the entire field of prosthetics, to mention the most important. This allows more time than at first is imagined for good training in operative dentistry.

The cost of New Zealand's National Dental Service is given in detail in Appendix I (page 99). In the Appendix comparisons are made of the relative costs of the various health services in New Zealand in terms of the country's gross national product and total government revenue.
III. SCHOOL DENTAL NURSES IN OTHER COUNTRIES

The school dental service, staffed by school dental nurses, after being firmly established and proved a success in New Zealand has been a subject of world wide interest.

Saunders recorded that ever since the very early days of the Service, eminent visitors from other countries have regarded with interest the work carried out in the training schools and field clinics. In many cases a close study of this unique system has been the prime reason for such visits, while in others an inspection of this service is incidental to the main purpose of their presence in New Zealand. As a result of such visits the training of young women to care for the dental health of children, patterned after the New Zealand system, has been introduced into various countries.

The popularity of the New Zealand type of school dental nurses is reflected by the utilisation of such auxiliary personnel in the following countries: 1, 3, 15, 40, 43.

MALAYSIA - School dental nurses are widely used throughout the eleven states of Malaya and Sabah and Sarawak. Malaya was the first overseas country to put the New Zealand dental nurse system in active operation. A training school was established in Penang in 1949.

CEYLON - The visit to New Zealand of the Director of Health Services of Ceylon led to the utilisation of school dental nurses in Ceylon. In 1950 the Ceylon government applied, under the Colombo Plan, for the assistance of the New Zealand Government in establishing a school dental service. This was
granted and an institution for the training of such personnel was established.

**INDONESIA** - A delegation from Indonesia visited New Zealand in 1952, led by the President of the Dental Association. This and Mr. Saunders' visit to Indonesia resulted in the establishment of a school for dental nurses in Djakarta.

**HONG KONG** - School dental nurses are utilised in Hong Kong.

**THAILAND** - Dental hygienists and school dental nurses are used in the country.

**BURMA** - Dental nurses are employed in this country.

**SINGAPORE** - A school dental service manned by school dental nurses is in operation in Singapore.

**UNITED KINGDOM** - The training of school dental nurses of the New Zealand type has only come into operation in recent years (1960). Students on graduation entered the employment of local authority health departments in England, Scotland, Wales and Northern Ireland.

The chief difference between the role of the dental nurse in New Zealand, Malaya and the United Kingdom is that in the latter country, the dental nurse has no authority to diagnose and plan treatment for her patient. The dental nurse in the United Kingdom may not proceed with treatment until her supervising officer has given consent to the treatment to be carried out by each patient.

The scheme in Britain is still regarded as
being in the experimental stage.

The New South Wales Public Health Department has pressed for the introduction of school dental nurses in the state and recently the state government has authorised the utilisation of this group of auxiliary workers in the school dental service. The New South Wales State branch of the Australian Dental Association has supported the government in this issue. To the author's knowledge there are plans to set up a training school for such auxiliary personnel under the direction of the Public Health Department.

Tasmania has joined the ranks of the countries utilising the New Zealand type of dental nurses for the dental care of children. The author understands that a training course has commenced early this year (February 1966) with an intake of ten student dental nurses.

Of the countries where dental nurses are employed only Malaysia, Ceylon, Indonesia, United Kingdom and recently Tasmania have their own training schools. In the Asian countries where this group of auxiliary workers is recognised and where there are no training schools, the training of such personnel is undertaken in New Zealand or Malaysia, most of them with the financial assistance of World Health Organisation or Colombo Plan being used. In no country are dental nurses practising privately or in private dental offices.
IV. THE SCHOOL DENTAL NURSE IN MALAYSIA

Following the successful use of the school dental nurses in New Zealand, Malaya was the first overseas country to adopt the system. This is an attempt to provide an efficient treatment service to meet the dental needs of school children in the country. This section shows very briefly the magnitude of the dental caries problem in the country with limited dental manpower resources. This is followed by a detailed consideration of the school dental nurses that are trained in Malaya.
1. **DENTAL CONDITIONS IN MALAYSIA**

Malaya comprises eleven states and together with Sarawak and Sabah (both formerly British colonies in Borneo) is part of Malaysia. The significant demographic features of Malaysia are its multi-racial character, its youthful population and a high rate of population increase.

In keeping with many Asian countries there is a paucity of statistics related to the prevalence of dental disease in Malaysia. However, even these meagre data suggest a high incidence and prevalence of dental disorders in the country.

Studies made by McCombie \(^{32,34}\) and McCombie and Chan \(^{35}\) showed that dental caries is a problem of considerable magnitude, especially among the Chinese population of the country. In one of these reports, a dental survey was made on 449 National Servicemen with an average age of 21.4 years. Of these, 198 were Chinese, 180 Malays and 73 Indians and Pakistanis. A significant difference in dental caries was demonstrated in the different racial groups studied. The Chinese had a DMF rate of 13.30, the Malays 8.41 and the Indians and Pakistanis 8.85. It was recorded that results of this survey suggested that:

1. Up to the age of twenty-one the Chinese (born in Singapore or Malaya) have dental caries to no greater degree than citizens of Canada and the United States, and the Malay, Indian and Pakistani groups considerably less;

2. The Chinese, Indians and Pakistanis (born in Singapore or Malaya) at the age of twenty-one, have dental caries to a greater degree than some residents of comparable age groups in their respective countries of origin.

3. At the age of twenty-one, adults of Singapore (or Malaya) have periodontal disease to a greater degree than men aged twenty-two
to twenty-five in the United States.

In a survey of 263 seven-year-old Malaysian school children from a Malay school in Penang, Sundram (cited by Karim 25) reported an average of 4.8 DMF teeth and 3.7 d.e.f. teeth per child. In another study of 620 children of all racial groups in Penang, he reported that 95.8 percent had their teeth attacked by caries, and in a further study of 4,037 children aged from eight to twelve years, he found that 7.9 percent required treatment of some form for malocclusion. The combined odonto thanatotic rate of a group of 594 Chinese, Malayan and Indian children aged seven to eleven was reported to be 23.2 (lost permanent teeth per 100 children). For the same group 21.4 percent were said to have "affected gums" requiring treatment.

Although no statistical data pertaining to the dental conditions of the people of Sarawak and Sabah (the two Malaysian states in Borneo) is available, it is reasonably safe to say that the incidence and prevalence of dental disease parallel that in Malaya and Singapore. According to Allwright, Tickle and Matsumiya 1 in their publication of Dentistry in Asian Countries, dental caries and periodontal disease are serious problems among all age groups in Sarawak and Sabah, and that osteomyelitis is prevalent.

These reports, although not properly standardised, clearly reflect the high prevalence of dental disease in Malaysia.

DENTAL MANPOWER

Like many other emerging countries of Asia, Malaysia is faced with a paucity of qualified dentists. Furthermore, there is no immediate prospects of improving the situation.

The following table (5) prepared by Karim 25 shows the acute
shortage of trained dentists in mainland Malaysia, that is, the Malay Peninsula (Malaya).

**Table 5. Registered Dentists in Malaya in 1962 and 1963**

<table>
<thead>
<tr>
<th>Year</th>
<th>Registered Dentists</th>
<th>Total</th>
<th>Population</th>
<th>Ratio of Division I Dentist to Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Division I</td>
<td>Division II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1952</td>
<td>584</td>
<td>73</td>
<td>657</td>
<td>5.5 million</td>
</tr>
<tr>
<td>1963</td>
<td>436</td>
<td>167</td>
<td>603</td>
<td>7.2 million</td>
</tr>
</tbody>
</table>

* Registered, but unqualified dentists. They are a legacy of occupation days and are liable to annual inspection by government-employed dentists.

From the table, it can be seen that the ratio of Division I dentist to population in 1952 was 1:75,000, while in 1963 this ratio was 1:43,000.

As for the two Malaysian states in Borneo, Allwright, Tickle and Matsumiya reported that in 1960, Sabah (then called North Borneo) had an estimated population of 401,000 with one qualified dentist and 60 unqualified dentists. (The present author learned that three other qualified dentists have recently been added to the government service.) For Sarawak, they reported an estimated population of 600,000 with five qualified and 131 unqualified dentists. In a more recent report, Yim stated that there are six qualified dentists, 148 unqualified dentists and two dental nurses in Sarawak, serving a population of 654,656 people. He gave an estimated dentist-population ratio of 1:4,200 (unqualified dentists included).

In the report by Karim, he commented that the prospects of obtaining more dental graduates in the country is not bright. An examination of the annual student intake and graduate output in the Dental School of the University of Singapore from 1953 to 1963 shows an average dental graduate output of twelve per year. These dental
graduates are absorbed by all the territories comprising Malaysia. He continued to say that the number of dental graduates who have been overseas for their basic dental education and subsequently been employed in Malaya, number about twenty-four over this same ten year period. This averages out to be about two dentists per year graduated outside Malaya.

Sundram 47 worked out that in order to attend a dentist-population ratio of 1:2,000, Malaya would require some 4,200 dentists. He reported that even if 100 dentists are trained in one year (the output in Malaya is given by him as about 20 per year) it would require 42 years, not taking into account increases and loss to the profession by death and retirement and population increases.

It is therefore not surprising that resource has been made to additional manpower, that is, the utilisation of the New Zealand type of dental nurses. They form the background of the school dental service, and without them thousands of school children would not have complete dental treatment.

**DENTAL TREATMENT POLICY**

According to Berman 3 and Karim 25, there are no social benefits as such in Malaya and the main points in the treatment policy are:

1. Priority of full dental treatment on a systematic organised basis is given to as many school children as possible between the ages of from four to twelve years;

2. Pre-school children are to have priority in dental treatment;

3. Emergency type of dental treatment may be given to children above twelve years of age, but below fourteen years of age;

4. Adequate dental treatment is to be given to hospital cases;

5. Adequate dental treatment is to be provided for ante-natal
cases;

6. Emergency dental treatment for the relief of pain, and in some instances dentures, are made available to eligible members of the poorer segment of the population.
2. THE MALAYAN SCHOOL DENTAL NURSE

A. INTRODUCTION

Sundram reported that in introducing the New Zealand type of school dental nurses in any country it would appear necessary to evolve what he termed a "functional-type" of dental nurse best suited to the country's needs and stage of development.

An appraisal of the development of dentistry in a country, apart from the assessment of its economic, social and cultural background is regarded as of paramount importance. He remarked that dentally, the problems in Malaysia are quite different from that in New Zealand. For instance, New Zealand, with a population of about 2½ million, has a Social Security (Dental Benefits) Scheme in operation. Such a scheme secures the services of about 800 private practitioners in the government for the adolescent population on a fee-for-service basis. In contrast, Malaya has about 200 dental surgeons (inclusive of private practitioners) serving a population of about seven million people.

Sundram pointed out that as a result of such differences, dental nurses cannot be used exactly in the same fashion as in New Zealand. In Malaya, the extraction of the permanent tooth is a responsibility that has been withdrawn from the dental nurse. He stated that this is because the occurrence and frequency of complicated caries of permanent teeth in Asians (within the age group cared for by the school dental nurse) would reduce a dental nurse to the role of a tooth-extractor.

Sundram concluded that "in keeping with the evolutionary concept, it is axiomatic that the responsibilities of a dental nurse are shifted to meet the needs of the dental service of a country. Hence, the Malayan dental nurse, though basically a prototype of the New Zealand
dental nurse, differs in certain areas of her functions, training and subsequent employment."
B. HISTORICAL BACKGROUND

The Malaysian School for Dental Nurses was started in July 1949. This was at the original suggestion of Dr. Roy Anderson, former Malayan Director of Medical Services and on the initiative of Mr. Charles F. Mummery, former chief dental officer in Malaya.

Dr. Anderson was holidaying in New Zealand in 1946 and, quite by chance, met Dr. Bruce Rice who showed him round the Willis Street Dental Clinic in Wellington. He was most impressed with what he saw, and on returning to Malaya spoke enthusiastically about the New Zealand system to Mr. Mummery, who was concerned at that time with the problem of increasing dental treatment facilities for the children in Malaya.

Mr. Mummery corresponded with Mr. J.L. Saunders, who was then Director of the New Zealand Dental Service and in July 1949 the Malayan School for Dental Nurses was initiated.

Dr. Chellie Sundram was duly appointed principal of the training school and had the assistance of a New Zealand trained tutor sister, Miss Barbara Grumitt, who at the time was holidaying in Penang and happened to see a newspaper advertisement for dental nurse instructor in the newly established school.

In July 1953, Dr. Sundram had the opportunity of spending a year in New Zealand to study the dental system in New Zealand first hand.

Dr. Sundram is still the principal of the training school in Penang after fifteen years since its initiation. In a recent report, he stated that the training and use of school dental nurses for the dental care of children, which commenced in Malaya as an experiment in 1950, is now a reality. Malaya has a new centre for the training of school dental
nurses and dental technicians, the project, including a hostel to house 100 student dental nurses, cost the Malaysian government 1.5 million dollars.
C. **TRAINING**

The training of school dental nurses in Malaya has been documented in details in the reports of Sundram\(^45,47\) and Berman\(^3\).

When this scheme was first inaugurated in Malaya, applicants were selected from among general nurses and given one year's training. This arrangement proved popular with the nurses and most unpopular with hospital authorities and was, therefore, abandoned. Since 1952 students have been selected from among suitable applicants of senior Cambridge School Certificate standard. Only women of aged seventeen, but under twenty-five years are considered.

Sundram\(^46\) pointed out that the Malayan dental nurse is appointed by the Public Services Commission which is responsible for all employment in the public service. Actual selection of suitable candidates is made by a selection board composed of the head of the Malayan Dental Service and two senior members of the teaching staff of the training school.

Aptitude tests, personal interviews and a scrutiny of the applicant's scholastic and other attainments form the basis for the selection. In his same report, Sundram commented that about 15 percent of the total applicants have been able to gain admission to the training school so far.

Sundram\(^45\) recorded that the education of school dental nurses can be conveniently divided into three phases, extending over a period of forty months.

During the **FIRST** phase of the training, which is termed the pre-clinical phase and extending over four months, the student dental nurse does not have contact with patients. The nurse trainee receives training in the production of standard dental health education models
in plaster of paris; carving of teeth out of plaster blocks; the preparation of cavities in normal sized acrylic teeth embedded in dummy jaws; and the basic instruction in the use and care of instruments. Dental health education activities, such as the designing and production of dental health posters, the making of hand puppets from coloured cloth, etc. are all part of the curriculum.

Lectures at this stage are confined to basic instruction in general anatomy and physiology of the human body, preliminary operative dentistry, the properties and use of amalgam and cement and anaesthetics and drugs that are commonly used.

Instructions in dental anatomy is confined mainly to the study of the morphology of human deciduous and permanent teeth, and dental histology is limited to fundamental essentials.

The first phase of the training is so designed as to give the nurse trainee the development of manual dexterity in the shortest possible time. Manual dexterity is acquired by cutting cavity forms in large plaster teeth and graduating to the preparation of cavities in acrylic teeth with conventional bur and handpiece.

The SECOND phase of education, termed the clinical phase, begins in the fifth calendar month and is extended over a period of twenty months. During this phase, the nurse trainee actually works on child-patients. She is expected to complete a minimum of 1,200 silver amalgam fillings on permanent teeth and 800 amalgam fillings in deciduous teeth. Pulp capping with calcium hydroxide is also performed by student nurses.

Every stage of her work - cavity preparation, cement lining, amalgam fillings and polishing - is checked by instructors.

Instructions in the use of local anaesthesia (local infiltration
technique) and extractions of carious deciduous teeth are taught.

Child management in the dental chair, together with the management of handicapped children (deaf, blind, mentally retarded, etc.) form an important part of her training. Instructions on parent management are also given.

The dental nurse trainee is made aware of the necessity of preventive measures in the control of dental diseases.

In addition, the student dental nurse attends lectures in clinical dental pathology, anatomy of the head and neck, and dental health education throughout these twenty months.

The THIRD phase, also termed the field-work phase, extends over a period of sixteen months, during which time the trained dental nurse is posted to work under the "direct supervision" of a dental officer in the public health service and in the same premises. The school dental nurse is expected to initiate and organise a treatment group and concentrate on completing cases in this group. The dental officer studies her conduct and skills and assesses her standard of the completed work.

At the end of the third phase, she is certified as a staff dental nurse.

The following table (6) prepared by Sundram 45, shows the subjects and requisite hours of the forty months course for the Malayan school dental nurse:
<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>PRINCIPAL &amp; THEORETICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST PHASE - PRECLINICAL - 4 MONTHS</strong></td>
<td><strong>REQUISITE HOURS</strong></td>
</tr>
<tr>
<td>1. History &amp; Ethics of Nursing</td>
<td>10</td>
</tr>
<tr>
<td>2. Chairside Assisting</td>
<td>20</td>
</tr>
<tr>
<td>3. General Nursing: Parts 1-4 &amp; Hygiene</td>
<td>20</td>
</tr>
<tr>
<td>4. Outline of Duties &amp; General Instructions</td>
<td>10</td>
</tr>
<tr>
<td>5. General Pathology, Bacteriology &amp; Histology</td>
<td>20</td>
</tr>
<tr>
<td>6. General Anatomy &amp; Physiology</td>
<td>20</td>
</tr>
<tr>
<td>7. Handwork &amp; Models for Dental Health Education</td>
<td>60</td>
</tr>
<tr>
<td>8. Poster Work</td>
<td>30</td>
</tr>
<tr>
<td>9. Materia Medica</td>
<td>20</td>
</tr>
<tr>
<td>10. Anatomy Head &amp; Neck, Mainly Drawing Classes</td>
<td>30</td>
</tr>
<tr>
<td>11. 'Tooth Carving' Related to Dental Anatomy</td>
<td>25</td>
</tr>
<tr>
<td>12. Dental Anatomy Lectures</td>
<td>40</td>
</tr>
<tr>
<td>13. Dental Histology</td>
<td>10</td>
</tr>
<tr>
<td>15. Prelim. Operative 'Carving' Cavity in P.O.P.</td>
<td>30</td>
</tr>
<tr>
<td>16. Use and Care of Instruments</td>
<td>20</td>
</tr>
<tr>
<td>17. Prelim. Operative Work on Dummy Jaws</td>
<td>200</td>
</tr>
</tbody>
</table>

CERTIFICATION BY SCHOOL AUTHORITIES FOR FURTHERANCE OF COURSE
<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>PRACTICAL &amp; THEORETICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SECOND PHASE — CLINICAL — 20 MONTHS</strong></td>
<td></td>
</tr>
<tr>
<td>18. Operative Dentistry on 'Graded' Patients</td>
<td>120</td>
</tr>
<tr>
<td>19. Clinical Records</td>
<td>30</td>
</tr>
<tr>
<td>20. Child Management &amp; Pedodontia (Theory &amp; Practical)</td>
<td>150</td>
</tr>
<tr>
<td>21. Dental Surgery and Pathology — Lectures</td>
<td>70</td>
</tr>
<tr>
<td>22. Dental Surgery &amp; Pathology — Demonstrations</td>
<td>30</td>
</tr>
<tr>
<td>23. Anatomy Head &amp; Neck (Theory &amp; Practical)</td>
<td>50</td>
</tr>
<tr>
<td>24. Preventive Dentistry (Inclusive I.O.H. at the Chair)</td>
<td>153</td>
</tr>
<tr>
<td>25. Orthodontics (Theory &amp; Demonstration)</td>
<td>12</td>
</tr>
<tr>
<td>26. Organisation &amp; Administration (of Treatment Group)</td>
<td>60</td>
</tr>
<tr>
<td>27. Local Anaesthesia &amp; Extractions (Theory &amp; Practical)</td>
<td>120</td>
</tr>
<tr>
<td>28. General Nursing: Parts 5-9, Including First-Aid</td>
<td>30</td>
</tr>
<tr>
<td>29. Pediatrics — Common Children's Diseases</td>
<td>30</td>
</tr>
</tbody>
</table>
| 30. Clinical Operative Dentistry — Conservative Work Requirements on Child Patients  
1,200 Silver Amalgams (Permanent Teeth)  
800 Silver Amalgams (Deciduous Teeth) | 2,000 |
| 31. Tutorials | 60 |

**CERTIFICATION BY BOARD OF EXAMINERS FOR FIELD WORK**
TABLE 6. (Cont.)

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>PRACTICAL &amp; THEORETICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>THIRD PHASE - FIELD WORK - 16 MONTHS (Under Direct Supervision of Dental Officer i/o Field Clinic)</td>
<td>NUMBER</td>
</tr>
<tr>
<td>32. 'Initial Completions' checked by D.O. *</td>
<td>200</td>
</tr>
<tr>
<td>33. 'Revision Completions' (6 monthly) checked by D.O. *</td>
<td>300</td>
</tr>
<tr>
<td>34. Organisation Ability (Confidential report by D.O.)</td>
<td></td>
</tr>
</tbody>
</table>

CERTIFICATION BY DENTAL OFFICER i/o FOR POSTING TO A SCHOOL DENTAL CLINIC

According to Sundram 45, the ratio of instructors to student dental nurses during the first and second phases of the prescribed course is:

1. one dentist instructor to twenty-five students, fragmented as in (2), (3) and (4);
2. one dental sister to twenty-five students;
3. one dental tutor sister to twenty-five students;
4. one dental nurse instructor to give student dental nurses.

Specially selected and trained staff dental nurses supervise the education in the first and second phases of the course.

The salaries of dental nurse trainees and staff members of the training school are given in Appendix II (page 102).
DUTIES AND RESPONSIBILITIES

Sundram 46, in defining the school dental nurses of Malaya stated that "...women employed specifically to deal with pre-school and school children and function as members of the dental health team with a minimum number of dental surgeons directing, controlling and complementing their work." Hence, like their counterparts in New Zealand, they are basically trained to care for the dental health of children.

The scope of dental care that the school dental nurse gives is limited by the age-factor of the child patient and by the type of work she may do. As in New Zealand and elsewhere, the dental nurse in Malaya is not a substitute for the fully qualified dentist, but she supplements and complements the work of the dental officer in the public health service.

The role and functions of the school dental nurse in Malaya are contained in the reports of Karim 25, Sundram 46 and Berman 3. The dental nurse has to maintain the dental health of a group of school-children aged from four to twelve years and numbering 550 to 650 by regular dental inspection, treatment and health education. In addition, she must keep up-to-date clinical records, maintain public relation and see to the cleanliness of the clinic and the maintenance of equipments.

Her aim is a monthly "output" of

(a) fifteen new entry "completions";
(b) fifty revision "completions";
(c) two hundred fillings.

More specifically the work of the school dental nurses in Malaya includes:

1. Standard cavity preparation and the insertion of silver amalgam
fillings in permanent posterior teeth;
2. Amalgam fillings in deciduous teeth;
3. Extraction of deciduous teeth using local anaesthesia;
4. Relief of pain in the form of dressings;
5. Pulp capping for traumatic exposures;
6. Instructions in oral hygiene;
7. The teaching of dental health education;
8. Treatment of very simple gum conditions, e.g. marginal
  gingivitis by scaling, dressings and institution of good oral hygiene;
9. Scaling and polishing;
10. Zinc oxide dressing or temporary cement fillings for
    permanent anterior teeth if the case cannot be referred immediately
    to a dental officer;
11. Making topical application of preventive medicaments;
12. Recognising malocclusion and lesions whose treatment is
    beyond her scope and referring them to a dentist in the dental health
    team;
13. Disciplining the child-patient to accept dental treatment at
    frequent and regular intervals.

The types and number of government dental clinics, in Malaya up to
December 1963 were given by Karim as follows:

Dental clinics in full charge of dental officers   74
Dental clinics in general hospitals             7
School dental clinics manned by dental nurses   68
Dental clinics in health centres (part-time)    95
Mobile motorised dental clinics                 12
Marine dental clinics                           2
Special clinic in the Upper Settlement

(Dental Technicians' Laboratories)
E. ADMINISTRATION AND ORGANISATION

According to Karim, the Public Dental Health Service in Malaya is headed by the Deputy Director of Medical Services (Dental), who is a dental surgeon himself. The person holding this position at present is Dr. Abdul Karim bin Nawab Din. He is advisor to the Minister of Health and the Director of Medical Services on all dental matters. He is responsible for the efficient running of the service and under him are various dental personnel who carry out his orders.

Each of the eleven states of Malaya has a principal dental officer who directs and supervises public dental health activities in the various states. The principal dental officers are directly responsible to the Deputy Director of Medical Services (Dental). Working under each of these principal dental officers are specialist dental officers, dental officers and house dental surgeons.

Specialist dental officers, working in hospital premises, render consultant services for patients referred to him by dental officers and private practitioners. They are directly responsible to the principal dental officers in the State and the Medical Superintendent in-charge of the government hospital.

Dental officers, working under the direction of principal dental officers, are responsible for out-patient dental care and for supervising dental auxiliaries (e.g. school dental nurses) under their charge. They may work in a hospital, clinic, health centre, school clinic, main dental clinic or in clinics that render specialised dental services.

House dental surgeons are new graduates working in government service for a year before they are absorbed into the Public Dental Health Service.
The Principal of the Dental Training School (at present Dr. Chellie J. Sundram) is directly responsible to the Deputy of Medical Services (Dental) for the training of dental auxiliaries - school dental nurses and dental technicians. Assisting him are dentist-instructors, dental sisters, dental sister tutors, dental nurse-instructors and dental technician instructors.

Dental sisters in the Public Health Service act as liaison officers between the dental officer and the dental nurse. They assist in dental health educational programmes and are responsible for the non-clinical aspects of the dental nurses' work.

The school dental nurse is regarded as a member of the dental health team with the dental officer as head of the team and thus remains under his professional control and supervision. Basically, she is trained to care for the dental health of school children and children of pre-school age.

The administrative organisation of Dental Public Health Services in the two Malaysian states in Borneo - Sabah and Sarawak - are, to the knowledge of the author, not under federal control at present.

In Sabah there is a senior dental officer who is responsible for the dental service of the state. Working under him are a small group of dental personnel.

In Sarawak, according to Yim, there is a Director of Dental Services who is responsible for the dental health of the state. Like Sabah, the staff in the Service is small and comprises qualified and unqualified dentists and (two) dental nurses.

In both states the dental services are under the Medical Department.
F. DENTAL HEALTH EDUCATION AND PREVENTION

According to Karim, the major portion of dental health education activities in Malaya are carried out by the staff of the Public Dental Health Service.

He reported that the nature, type and intensity of such activities varies in each of the eleven states. In some states a dental officer is delegated the duties in this field and his main function would be the dissemination of dental health information to school children, and nursing and expecting mothers attending health clinics. He is also responsible for dental health exhibitions in fairs, demonstrating the features of good dental health with the aid of posters and models.

In the field of dental health education, the school dental nurses play an important part in such activities. During their training period they receive instructions in the basic principles of designing and execution of dental health posters. They are also taught the production of standard dental health education models and the making of handpuppets. Dental nurse trainees are given group and individual instruction in the use of such puppets and the most effective way of stressing a dental health matter to young children.

Karim reported that during their two year formal course, student dental nurses receive fifty lectures in teaching methods and a further 150 hours are spent in producing and learning the use of different types of educational aids.

As a result of this training in dental health education, both theoretical and practical, school dental nurses are equipped to undertake the teaching of dental health to school children and it is estimated that she spends at least twenty percent of her time in such activities. They
often assist school teachers with production of posters, charts, models, and maps for use in the schools.

In the field of prevention, Karim reported that of the eleven states in Malaya, only Johore and Penang have their drinking water fluoridated. No assessment is made so far in the amount of fluoride present in the natural water of the other states.

He stated that topical application of children's teeth using fluoride compounds is carried out by school dental nurses at the completion and at six-monthly "revision" stages.
G. EVALUATION AND DISCUSSION

Following the successful use of dental nurses to care for the dental health of school and pre-school children in New Zealand, Malaya was the first country outside New Zealand to adopt this system 40, 44.

In July 1953, Sundram 43, Principal of the training school at Penang, had the opportunity to spend a year in New Zealand studying the dental nurse system first hand. He was well aware that conditions - dentally, economically, socially and culturally - were not comparable with that in New Zealand and it would be quite impossible to introduce the system in toto into Malaya. He 44 evolved what he termed a "functional-type" of dental nurse best suited to the country's needs and stage of development. Hence the Malayan dental nurse, though basically a prototype of the New Zealand dental nurse, differs in certain areas of her functions, training and subsequent employment. For example, Malayan trained dental nurses are not permitted to extract permanent teeth; no mention is made about silicate fillings in anterior teeth and presumably this responsibility is also withdrawn from them; she has to maintain the dental health of a group of 550 to 650 school children (New Zealand dental nurse cares for 450 to 500 children) and her aim is a monthly "out-put" of:

(a) 15 new entry "completions";
(b) 50 revision "completions";
(c) 200 fillings.

As for the curriculum in the training of dental nurses, although the types and number of subjects comprising the course are nearly identical in the two countries, there is a difference in the emphasis placed on the various subjects as is evidenced from the number of clock hours allotted
to the subjects in both countries. Also, a comparison of the two
courses (see pages 32-33 and 79-89) will reveal the differences in their
practical requirements. Malayan trained dental nurses, after com-
pleting two years of intensive training have to work for sixteen months
under the rigid "direct supervision" of a dental officer in the field.
This extra sixteen months is regarded as the third phase of the training
course and it is only at the end of the third phase that she is certified
as a staff dental nurse, when the dental officer is satisfied with her
conduct, skills and standard of work.

The achievements of school dental nurses in Malaya are not
comparable with those in New Zealand because of the relatively short
span of its existence when compared with the New Zealand scheme. Even
then, after only fifteen years since it first started, the achievements
made by the Malayan school dental nurses are significant. In an
editorial, Sundram 44 stated that the training and use of school dental
nurses for the dental care of children, which commenced in Malaya as an
experiment in 1950, is now a reality.

Karim 25 and Berman 3 reported that the 1962 annual report of the
Dental Department (Public Health) showed that 348,191 fillings were
placed in adults and children by dentists and school dental nurses.
Of this number they indicated that 186,969 fillings were placed by school
dental nurses in pre-school and school children, representing more than
half the total number. Berman 3 commented that in comparing the amount
of work done by dental nurses and dentists one should bear in mind that
the dentists have to perform additional procedures such as orthodontics
and surgery which dental nurses are not allowed to do - and besides, the
dentists have to spend time supervising dental nurses. Berman\(^3\) added that even so nearly 200,000 fillings, over 23,000 sodium fluoride applications, 40,000 miscellaneous treatments and 130,000 primary extractions and over 2,790 hours on dental health education were carried out by the dental nurses in one year.

On the whole, although the great majority of the population throughout Malaysia is still not dentally orientated as far as the preservation of natural teeth goes, much has been done in the way of dental health education by dental nurses and public health dentists alike in changing the attitude of the people regarding the value of sound dental health. As times goes on the attitude of children towards dental treatment would undergo a similar change as in New Zealand.

In evaluating the quality of operative treatment performed by school dental nurses, Berman\(^3\) noted with interest that all the work he viewed at random was of a very high standard. He was also much impressed by the high degree of discipline, tidiness and professional presentation displayed by dental nurses both in the training school and in the dental clinics. He reported that the dental nurses were greatly appreciated by the parents he interviewed and the supervising dental officers he consulted.

This group of dental auxiliaries form the backbone of the school dental service in Malaysia as in New Zealand and without them thousands of school children would not have had complete dental care.
V SUMMARY

A detailed consideration has been given to this unique, controversial group of dental auxiliary personnel - the school dental nurses - in New Zealand and Malaysia and the part they play in the school dental services of the two countries.

The following main points have been developed in this thesis:

1. A general introduction pointing to the increase awareness in many countries, within recent years, of the need for extended dental care to be included in their national health programmes has been presented. It has been pointed out that because of a general shortage of trained dentists in many parts of the world, many studies have been made by the World Health Organisation concerning the effective utilisation of dental auxiliary personnel in a dental health team in order to provide a more efficient dental service. The utilisation of various dental auxiliary groups will also greatly help to reduce the dental manpower requirements.

The different dental auxiliary groups listed are: chairside assistants, dental laboratory technicians, dental hygienists, school dental nurses, dental licentiates, and dental aides. Brief mention has been made of their duties and responsibilities.

It has been stressed that whichever group of dental auxiliary is used there can be no doubt that such personnel are trained to supplement and complement the work of the dentist and not to supplant him.

2. A brief, general discussion of the dental caries problem in New Zealand and Malaysia, especially the ravages of this disease in the children of the two countries has been considered. Studies made by various investigators showed the serious nature and magnitude of the problem in both countries.
However, much of the dental needs of these children in the two countries, especially in New Zealand, have been met by the utilisation of dental nurses in the dental school service through a system of regular and systematic dental care.

3. A historical background coverage of the school dental nurses in New Zealand and Malaysia has been presented.

In New Zealand, through the untiring efforts of men such as Thompson, Cox, Dunn, Hunter, Saunders, Bibby, Leslie and others, this unique system which was commenced in 1921 as an experiment has proved a reality. The success of this system owes it to these men who deserve full credit.

In Malaya, the establishment of this system in 1949 was mainly the work of Dr. Anderson and Mr. Charles Mummery. Full credit should be accorded to them and to Dr. Chellie J. Sundram and his staff for the striking progress made throughout the years.

The courage, foresight and ingenuity of these men in the two countries deserve the highest praise and admiration.

4. A detailed consideration of the training, duties and responsibilities and subsequent employment of school dental nurses in New Zealand and Malaysia has been discussed.

Student dental nurses undergo a two-year intensive, carefully planned, scientific course which is directed specifically towards the work the dental nurse will undertake on graduation, namely the routine dental care of children of pre-school and school age. On successful completion of their training, dental nurses work in school dental clinics run by the government. In New Zealand, such clinics are erected by the Department of Education and are maintained and staffed by the Health Department.
School dental nurses are regarded as members of a dental public health team, working under the general professional control and supervision of qualified dentists. They are full-time officers of the Department of Health "attached for special duty" to the school at which the clinic is located. They thus come under the supervision of the headmaster of the school for attendance, hours of work and general deportment.

There are slight differences with regards to the training, and duties and responsibilities of school dental nurses trained in Malaya when compared with those trained in New Zealand. These minor modifications have been particularised to meet with local conditions in Malaya. Basically, the school dental nurses of both countries are the same, and the training they receive is adequate for them to perform their work successfully.

5. A general coverage of the administration and organisation of the Public Dental Health Services of the two countries has been considered.

   In New Zealand, the present Director of the Division of Dental Health is Dr. G.H. Leslie. Under his charge are various dental personnel of different ranks - Deputy Director, Assistant Director, Research Dental Officer, Senior Dental Officers (the three principals of the training schools and the thirteen principal dental officers in charge of the thirteen dental districts into which New Zealand is divided) and School Dental Nurses of different grades and ranks.

   In Malaya, the head of the Public Dental Health Service is Dr. Abdul Karim bin Nawab Din. Under him are Principal Dental Officers, Specialist Dental Officers, Dental Officers, House Dental Surgeons, the Principal of the training school and School Dental Nurses.

6. A full coverage of the dental health education activities of the two countries, which are carried out mainly by school dental nurses and
various other dental personnel of the Public Dental Health Services, has been presented.

The work of the school dental nurses in the field of dental health education is notable for enthusiasm, initiative and originality. During their training they receive formal courses of instruction in this work, both theoretical and practical. Besides chairside instruction, school dental nurses are expected to carry out a range of activities which vary from talks to school classes, addressed to parent-teacher and similar organisations to assist in dental health displays and the production of dental health education materials.

A tremendous volume of work has been done in this field and various medium and aides have been utilised to convey an effective message to the public.

7. A general discussion of the Adolescent Dental Service in New Zealand, following the introduction of a Social Security (Dental Benefits) Scheme by the government in 1947, has been considered. Under this scheme dental care to school children is extended to the age of sixteen years. The Service is provided by dental officers working in departmental clinics and private practitioners who contract with the Minister of Health to treat adolescents in their own practices on a fee-for-service basis.

This Service has proved to be an effective way of ensuring that regular dental care is maintained on after a child is no longer eligible to be treated by school dental nurses.

8. A brief consideration of the school dental nurse in the international field has been presented. Following the successful use of this group of dental auxiliary workers in New Zealand, several overseas countries have since then adopted this system.
School dental nurses are now being used in Ceylon, Indonesia, Hong Kong, Thailand, Burma, Singapore and the United Kingdom, besides New Zealand and Malaysia. More recently the New South Wales and Tasmanian governments have approved of their use in these two states.

In no country are dental nurses practising privately or being used in private dental offices.

9. An evaluation and discussion of the successful use of this group of dental auxiliary personnel in New Zealand and Malaya has been presented. Much of what the school dental nurse has accomplished cannot be measured in statistical terms, although some can.

The yard-stick taken to measure the effectiveness of the great volume of dental care done by School dental nurses is the extraction-filling ratio and over the years this ratio has dropped dramatically. In New Zealand the ratio of extraction per 100 fillings has dropped from 72.6 in 1925 to 3.4 in 1965.

The volume of dental health education activities carried out by school dental nurses is tremendous in the two countries. It is extremely difficult to assess the effectiveness of these activities, and it is virtually impossible to represent them in statistical terms. However, throughout the years, the attitude of children (and the community at large) towards dental treatment has undergone a change because the fear of such treatment has been dispelled by the dental nurse.

In evaluating the quality of operative treatment rendered by school dental nurses, references are made to the reports of Fulton, Gruebbl, and Berman. Except for Gruebbl's unfavourable account, the consensus of opinion is that the school dental nurse is capable of performing good quality operative work. They are also noted for their high degree of discipline, efficiency, tidiness, professional presentation and striking
patient- and parent- management.
VI. CONCLUSION

In both New Zealand and Malaysia, school dental nurses have been used with considerable success in providing regular and systematic dental care for children of pre-school and school age. The achievements of school dental nurses in the two countries lend evidence to the fact that young women, carefully selected and trained for two years, are capable of performing the work they are specifically trained to do.

Technically, a school dental nurse is able to fill children's teeth to a high standard. That the standard of her work is high has been recorded by different investigators. This high standard also includes capability of the school dental nurse to conduct effective dental health education, the maintenance of dental clinics in a clean, neat and orderly fashion, a high sense of discipline and professional presentation, and a very efficient manner in the management of patients and parents.

Without them, thousands of children in the two countries would not have received complete dental care and great difficulties would be experienced to staff the school dental services in both countries.

It is fair to say that this unique and rather controversial group of dental auxiliary personnel has been used successfully in New Zealand, Malaysia and other countries. They have greatly supplemented and complemented the dentist in his work and have proved to be valuable members in a dental public health team.
### VII. APPENDIX

**APPENDIX 1**

ESTIMATED COSTS OF THE VARIOUS HEALTH SERVICES IN NEW ZEALAND

Source: Davies 7

#### I. GOVERNMENT EXPENDITURE ON HEALTH SERVICE IN NEW ZEALAND

<table>
<thead>
<tr>
<th></th>
<th>1949</th>
<th>1954</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross National Product (€M)</td>
<td>489</td>
<td>838</td>
<td>1230</td>
</tr>
<tr>
<td>Total Government Revenue (€M)</td>
<td>137.5</td>
<td>224.2</td>
<td>324.5</td>
</tr>
<tr>
<td>Government Revenue as % of G.N.P.</td>
<td>28.1%</td>
<td>26.7%</td>
<td>26.5%</td>
</tr>
<tr>
<td>Total Social Services (€M)</td>
<td>64.7</td>
<td>101.9</td>
<td>171.6</td>
</tr>
<tr>
<td>All Health Services (€M)</td>
<td>15.6</td>
<td>25.6</td>
<td>41.5</td>
</tr>
<tr>
<td>Total Social Services as % of G.N.P.</td>
<td>13.2%</td>
<td>12.2%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Total Social Services as % of Revenue</td>
<td>47.0%</td>
<td>45.4%</td>
<td>52.9%</td>
</tr>
<tr>
<td>All Health Services as % of G.N.P.</td>
<td>3.2%</td>
<td>3.1%</td>
<td>3.6%</td>
</tr>
<tr>
<td>All Health Services as % of Revenue</td>
<td>11.3%</td>
<td>11.3%</td>
<td>13.8%</td>
</tr>
<tr>
<td>All Health Services as % of Social Service</td>
<td>24.1%</td>
<td>25.1%</td>
<td>26.1%</td>
</tr>
<tr>
<td>School Dental Service (€M)</td>
<td>0.3</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Social Dental Services Benefits Scheme (€M)</td>
<td>0.2</td>
<td>0.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Dental Service</td>
<td>0.5</td>
<td>1.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Total Dental Service as % of G.N.P.</td>
<td>0.10%</td>
<td>0.14%</td>
<td>0.16%</td>
</tr>
<tr>
<td>Total Dental Service as % of Revenue</td>
<td>0.36%</td>
<td>0.53%</td>
<td>0.61%</td>
</tr>
<tr>
<td>Total Dental Service as % of Health Services</td>
<td>3.1%</td>
<td>4.7%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Total Dental Service as % of Social Services</td>
<td>0.8%</td>
<td>1.2%</td>
<td>1.2%</td>
</tr>
</tbody>
</table>
II. **Cost of National Dental Service per Head of Total Population**

<table>
<thead>
<tr>
<th>Service</th>
<th>1949</th>
<th>1954</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Dental Service</td>
<td>3/5d.</td>
<td>5/2d.</td>
<td>8/9d.</td>
</tr>
<tr>
<td>Dental Benefits</td>
<td>1/3d.</td>
<td>6/4d.</td>
<td>8/5d.</td>
</tr>
<tr>
<td>National Dental Service</td>
<td>4/8d.</td>
<td>11/6d.</td>
<td>17/2d.</td>
</tr>
</tbody>
</table>

III. **Cost of the National Dental Service per Treated Patient**

<table>
<thead>
<tr>
<th>Service</th>
<th>1949</th>
<th>1954</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School Dental Service</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number children treated</td>
<td>233,981</td>
<td>240,772</td>
<td>374,116</td>
</tr>
<tr>
<td>Cost</td>
<td>£322,000</td>
<td>£538,942</td>
<td>£1,042,341</td>
</tr>
<tr>
<td>Cost per treated child</td>
<td>£1.8.0</td>
<td>£2.4.0</td>
<td>£2.16.0</td>
</tr>
<tr>
<td><strong>Dental Benefits Scheme</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number children treated</td>
<td>67,945</td>
<td>168,496</td>
<td>160,121</td>
</tr>
<tr>
<td>Cost</td>
<td>£105,159</td>
<td>£663,950</td>
<td>£988,873</td>
</tr>
<tr>
<td>Cost per treated child</td>
<td>£1.10.0</td>
<td>£3.18.0</td>
<td>£6.4.0</td>
</tr>
<tr>
<td><strong>National Dental Service</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number children treated</td>
<td>301,926</td>
<td>409,268</td>
<td>534,237</td>
</tr>
<tr>
<td>Cost</td>
<td>£427,159</td>
<td>£1,202,892</td>
<td>£2,031,214</td>
</tr>
<tr>
<td>Cost per treated child</td>
<td>£1.8.0</td>
<td>£2.18.0</td>
<td>£3.16.0</td>
</tr>
</tbody>
</table>

IV. **Cost of Dental Service per Dental Nurse and Per Contracting Dentist**

<table>
<thead>
<tr>
<th>Service</th>
<th>1949</th>
<th>1954</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School Dental Service</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Nurses</td>
<td>451</td>
<td>595</td>
<td>896</td>
</tr>
<tr>
<td>Cost (including training costs)</td>
<td>£322,000</td>
<td>£538,942</td>
<td>£1,042,241</td>
</tr>
<tr>
<td>Cost per nurse</td>
<td>£714</td>
<td>£906</td>
<td>£1,163</td>
</tr>
<tr>
<td><strong>Dental Benefits Scheme</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Contracting Dentists</td>
<td>488</td>
<td>540</td>
<td>589</td>
</tr>
<tr>
<td>Cost</td>
<td>£105,149</td>
<td>£663,950</td>
<td>£988,873</td>
</tr>
<tr>
<td>Cost per Contracting Dentist</td>
<td>£215</td>
<td>£1,229</td>
<td>£1,679</td>
</tr>
<tr>
<td>Description</td>
<td>1962</td>
<td>Percent of Total</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>School Dental Service</td>
<td>£1,244,977</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dental Benefits: Scheme</td>
<td>£1,032,513</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Treatment</td>
<td>£2,277,490</td>
<td>99.13%</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>£9,800</td>
<td>0.42%</td>
<td></td>
</tr>
<tr>
<td>Dental Health Education</td>
<td>£9,000</td>
<td>0.39%</td>
<td></td>
</tr>
<tr>
<td>Fluoridation at Hastings</td>
<td>£1,500</td>
<td>0.06%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100.00%</strong></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 2.

SALARIES OF PERSONNEL OF THE DENTAL TRAINING SCHOOL, PENANG, MALAYA

Source: Dr. Chellie Sundram, Principal of Training School for Dental Nurses, Penang, Malaya.

PERSONNEL OF DENTAL TRAINING SCHOOL, PENANG

**Principal**

- Superscale "H" $1,360/-
- Grade B.

**Dental Officer**

- $32x34-934/Efficiency Bar/982 x 34 - 1,254

**Dental tutor sister**

- $522 x 19 - 560/579 x 19 - 655 (Scale No. 46, F.E.O. Circular 8 of 1955)

**Dental sisters (superintending school dental nurses)**

- $452 x 19 - 585 (Scale No. 381, F.E.O. Circular of 1955)

**Staff (School) Dental Nurses**

- $277 x 12 - 361/Efficiency Bar/373 x 12 - 409 (Vacancy Bar) (Scale No. 204 amended F.E.O. Circular 8 of 1955)
- Amended F.E.O. Conf. 471/88

**Student (School) Dental Nurse**

- $137.50 x 7.50 - 152.50 (Examination Bar) (Scale No. 204 F.E.O. Circular 8 of 1955)

This post which carries with it a superscale "H" (Grade B) similar to that of Principal Dental Officers in the field. The Principal, Dental training School has duties and responsibilities similar to that of the Head at the Dental Department, University of Malaya. He, by virtue of his special training and experience cannot compete with the Principal Dental Officers in the field for promotions. This grading of the post of Principal, Dental Training School should, therefore, be higher than that of Principal Dental Officers.

A special "Teaching Allowance" should be given to Dental Officers.
attached to the Dental Training School.

This scheme is similar to the Scheme of Service for General Nurses. Revision of salaries of the General Nurse Service should affect the Dental Nursing Service similarly (Ref: MH/0. 8994/33).
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