

EXPERIMENT IN DENTAL CARE

Results of New Zealand's Use of School Dental Nurses

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	Page
1. Scope of report	1
2. Dental conditions of New Zealand schoolchildren	3
3. Objectives, policy, and administration	18
4. Extent and quality of treatment	27
5. Costs	34
6. Training of dental nurses	37
7. Dental profession in New Zealand	44
8. Development of the New Zealand National Dental Service	49
Annexes	59
Summary)	70
Résumé)	70
References	72

1. SCOPE OF REPORT

This study was made possible through a fellowship grant from the World Health Organization and was carried out in New Zealand during the period 15 February to 12 April 1950.

New Zealand's dental programme, operated by the Public Health Department, 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 operate school dental clinics after a two-year training period. Dentists supporting this plan have said that no country has enough 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 personnel is logical and necessary.

Critics state that the New Zealand system delegates children's dentistry to partially trained auxiliaries ; that this is an attempted shortcut to dental health ; and that it is a backward step which solves nothing but endangers the health of children.

Unfortunately, most of the argument has taken place in a vacuum, so to speak. Opinions and suppositions have been plentiful. Actual facts have been scarce.

This study was made to provide certain facts, but it has limitations which should be made clear at the outset. It is an investigation of the caries-control measures being used in New Zealand and their effectiveness as demonstrated in the mouths of a representative group of schoolchildren. It does not measure the state of health of the supporting tissues of the mouth or the extent of malocclusion. No attempt was made to evaluate the programme in terms of what is ideal care for the individual child, nor the results of the programme beyond the age of 14 years. These aspects, while important, do not lend themselves to a forty-day study. Such information is unrewarding with anything less than protracted observation of the same children throughout the period of growth and development.

What is disclosed here is a picture of the prevalence of dental caries in the average New Zealand schoolchild in the age-range of 7 through 14, the results of an attempt to cope with the problem by regular dental care in the form of fillings, and the extent of failure in this attempt as manifested in tooth mortality.

The method of examining the teeth and counting those which were decayed (D), missing (M), and filled (F) was chosen because it has become a standard measurement among public-health dentists, has been well tested for validity, and, most of all, because it can be verified independently and is therefore objective.

Briefly, it was found that the prevalence of dental caries is high in the average New Zealand schoolchild but much of it has been treated. At the age of seven, more than 5 of his deciduous molars have been attacked by decay, yet 95% of these attacked teeth are filled. Two of his permanent teeth have also been attacked but three-quarters of them have been treated by fillings. By the age of 14, the number of attacked permanent teeth has risen to 10, yet 86% of these teeth have been filled. Only 0.4 permanent teeth are missing.

The average rural child in New Zealand is in as good dental health as his urban counterpart ; that is, among rural children the proportion of decayed teeth which have been filled is equal to that among urban children.

In the second part of this report I have given a certain amount of information about the development of the programme in New Zealand, its organization and administration, the quantity and quality of the service, costs, the training of the dental nurse, and the dental profession itself. Since the examination of 4,000 children's mouths in 40 days left little time for other things, much of this general information came from publications and interviews. Some of it came through my direct observation.

The material was checked for accuracy with New Zealand officials, both at the time the study was made and after the report was written.

That, in outline, is the content of this report. It should be interpreted in other countries in the light of local standards of dentistry for children. It should in no way be interpreted as a plea in favour of the New Zealand system.

The planning of the study began with an all-day meeting of consultants in Washington, D.C., December 1949. This group included Dr. K. A. Easlick, Professor of Dentistry, University of Michigan ; Dr. R. M. Walls, private practitioner, Bethlehem, Pa. ; Dr. J. A. Salzman, orthodontist, New York City ; Dr. K. Bain, Acting Director, Division of Research, Children's Bureau ; Dr. J. W. Knutson, Chief, Division of Dental Public Health, Public Health Service ; Dr. G. Nevitt, Regional Dental Consultant, Public Health Service ; Dr. B. Price, Research Analyst, Children's Bureau ; and Dr. S. Herman and Mr. I. Altman, Division of Public Health Methods, Public Health Service. The outline developed by this group was the base of my study plan. Mr. B. Ladd, Division of Statistical Standards, Bureau of the Budget, was consulted on the sample design of the study. I am deeply grateful to these consultants for the time and effort spent on my behalf.

2. DENTAL CONDITIONS OF NEW ZEALAND SCHOOLCHILDREN

This study was based on the principle that the true story of dental need and the service rendered to meet that need would be found in the mouths of the children.

Once a tooth has been attacked by disease, the evidence remains to be observed, as an untreated carious lesion, as a dental filling, or as a space from which the tooth has been removed owing to advanced disease conditions.

Taking advantage of these facts, public-health dentistry has developed an accurate yet comparatively simple procedure for measuring these conditions. This is the method of counting DMF (decayed, missing, and filled) teeth. The method has been tested so thoroughly and found so practical that it has become a standard way of assaying dental health. It was decided to give a major portion of the study-time in New Zealand to examining the teeth of schoolchildren and applying the objective DMF method of analysing the dental conditions found.

Two considerations vital to this part of the work were :

(1) Dental caries are at once so prevalent and yet vary so widely from one individual to another that valid conclusions cannot be drawn from small numbers of examinations.

(2) Any sample of the population selected for examination should be representative. That is, the sample should be taken in such a way as to ensure that no serious biasing factors are involved.

2.1 Sampling

Upon arrival in New Zealand, a complete list of all the schools was obtained and a random sample was drawn. It soon became apparent, however, that transportation difficulties would make use of this plan impossible in the 40 working days which were available.

The latest census available in New Zealand (1945) gave the total population as 1,702,328, distributed over two islands and nine provinces. The available time permitted work to be done in only two of the nine provinces. Auckland Province in the North Island and Canterbury Province in the South Island were selected. In the opinion of those who know the country well, the populations of these two provinces, taken together, were fairly representative of the country's population as a whole, and yet access to the schools was far less time-consuming than if schools in every part of the country had been sampled. The Auckland and Canterbury Provinces comprised 52.1% of the country's total population and included typically rural as well as typically urban groups.

Compulsory school attendance is rigidly enforced in New Zealand from the age of seven.^a The decision was made to examine children aged 7-14 inclusive. By means of the census figures, the number of children aged 7-14 was obtained for the two provinces, and their proportions in the rural and urban areas were established. Assuming that an 8% sample of children aged 7-14 was desirable, the census data and the published average enrolments of the schools were used to estimate the number of schools in rural and urban areas that would be needed. As a further limitation dictated by time factors, it was found necessary to confine the survey to areas within a hundred-mile (160-km) radius of the principal city in each of the two provinces. Complete listings of schools in the selected areas were used in making an appropriate, but random, selection of schools, utilizing information on the sizes of the schools and their rural or urban locations.

Two days after the actual survey began, however, it became clear that the smallest schools would have to be eliminated, since the travel time that would be spent in reaching a reasonable number of these small schools would drastically cut down the available working time. Thus the final sample was limited to public schools which included at least 200 children in the age-range 7-14 years. The selection of the children in the individual schools was made by visiting the classrooms, asking children of the requisite ages to raise their hands, and having the desired numbers of children report to the examining room.

The programme staff in New Zealand took no part in this sampling process. I made all decisions on sample design, the limitations introduced,

^a School attendance is permissible at five years of age but not compulsory. The primer classes for five-year-old children have heavy enrolments.

TABLE I. NUMBERS OF CHILDREN IN SAMPLE BY AGE, REGION, RURAL-URBAN, AND SEX GROUPS: 4,072 NEW ZEALAND SCHOOLCHILDREN, 1950.

Group	Total	Age at last birthday							
		7	8	9	10	11	12	13	14
Auckland Province (rural, North) .	1,432	173	186	180	201	188	177	179	148
Canterbury Province (rural, South)	616	81	84	78	78	69	80	80	66
Auckland City (urban, North) . . .	973	118	130	121	111	124	130	115	124
Canterbury & Timaru (urban, South)	1,051	131	134	136	131	163	136	106	114
Total North	2,405	291	316	301	312	312	307	294	272
Total South	1,667	212	218	214	209	232	216	186	180
Total rural	2,048	254	270	258	279	257	257	259	214
Total urban	2,024	249	264	257	242	287	266	221	238
Total boys	2,040	248	259	245	265	266	274	254	229
Total girls	2,032	255	275	270	256	278	249	226	223
Grand total	4,072	503	534	515	521	544	523	480	452

and the selection of particular schools. The only exception was in getting the children from the classroom ; for this purpose "runners" assigned to me by the headmasters of the various schools brought the children to and from the examining rooms.

Table I gives the numbers of children in the sample according to age, province, island, rural or urban area, and sex. Since only 56 Maori children (most of whom probably had at least one grandparent of European origin)^b and 11 Orientals were found in the schools which were sampled, these 67 children have been included with the 4,005 children of European origin, and no breakdown of the data by race has been attempted.

As table I shows, the rural children were from the rural portion of Auckland Province in the North Island and the rural portions of Canterbury Province in the South Island. The urban children were from Auckland City in the North Island and from the cities of Christchurch and Timaru in the South Island.

Since Auckland's total population was nearly twice that of Canterbury's, it seemed important that the sample should approach the same proportions, and accordingly 60% of the children examined were in the North Island. As regards rural or urban residence, the census data showed that 44% of the population in the two provinces was classified as rural. The sample came out practically even as between urban and rural areas (table I), although in Auckland the sample was slightly weighted toward the rural side.

^b Maoris are the native Polynesians of New Zealand. Since they have complete autonomy, marriage with New Zealanders of European origin is common. The 1945 census lists only 98,744 (5.8% of total) Maoris, i.e., having half or more Maori blood.

**TABLE II. AVERAGE NUMBER OF ATTACKED TEETH PER CHILD :
4,072 NEW ZEALAND SCHOOLCHILDREN, 1950**

Age at last birthday								
	7	8	9	10	11	12	13	14
2,048 rural children :								
DMF	2.16	3.27	3.94	4.55	5.75	7.17	8.77	9.85
D	0.34	0.30	0.35	0.44	0.49	0.73	1.00	0.98
X	0.00	0.00	0.01	0.02	0.00	0.02	0.07	0.04
O	0.00	0.03	0.03	0.03	0.04	0.11	0.18	0.22
F	1.83	2.94	3.56	4.06	5.22	6.30	7.52	8.61
def	5.44	5.28	4.71	3.56	1.77	0.61	0.19	0.07
f	5.20	5.00	4.55	3.39	1.60	0.52	0.14	0.07
2,024 urban children :								
DMF	1.86	2.90	3.70	4.29	5.50	6.98	8.98	10.13
D	0.68	0.47	0.36	0.59	0.53	0.66	0.99	0.99
X	0.00	0.00	0.00	0.02	0.04	0.04	0.11	0.12
O	0.01	0.03	0.02	0.04	0.08	0.08	0.37	0.42
F	1.17	2.39	3.31	3.64	4.85	6.20	7.51	8.59
def	5.34	5.33	4.88	3.43	1.82	0.57	0.29	0.15
f	5.01	5.02	4.57	3.20	1.65	0.54	0.20	0.11
2,040 boys :								
DMF	1.77	2.92	3.65	4.24	5.34	6.71	8.32	9.48
D	0.54	0.39	0.33	0.44	0.46	0.61	1.00	0.99
X	0.00	0.00	0.00	0.02	0.02	0.03	0.08	0.07
O	0.00	0.01	0.01	0.02	0.06	0.06	0.23	0.27
F	1.23	2.52	3.31	3.76	4.80	6.00	6.99	8.14
def	5.24	5.22	5.01	4.02	2.11	0.70	0.32	0.14
f	4.85	4.88	4.80	3.75	1.92	0.64	0.21	0.12
2,032 girls :								
DMF	2.24	3.24	3.97	4.62	5.88	7.48	9.48	10.54
D	0.48	0.38	0.38	0.58	0.55	0.79	0.98	0.98
X	0.00	0.00	0.01	0.02	0.03	0.04	0.10	0.10
O	0.00	0.05	0.03	0.05	0.06	0.13	0.30	0.39
F	1.76	2.81	3.55	3.97	5.24	6.53	8.10	9.06
def	5.58	5.39	4.60	2.97	1.50	0.47	0.14	0.08
f	5.35	5.14	4.35	2.84	1.35	0.41	0.13	0.06
All 4,072 children :								
DMF	2.01	3.09	3.82	4.44	5.62	7.08	8.87	10.01
D	0.51	0.38	0.36	0.51	0.51	0.70	0.99	.99
X	0.00	0.01	0.01	0.02	0.02	0.03	0.09	.08
O	0.00	0.02	0.02	0.03	0.06	0.10	0.27	.33
F	1.50	2.67	3.44	3.87	5.03	6.25	7.53	8.60
def	5.42	5.31	4.80	3.50	1.80	0.59	0.24	0.11
f	5.11	5.01	4.57	3.30	1.63	0.53	0.17	0.09

Capital letters refer to permanent teeth : D means carious, X means needing extraction, O means missing, and F means filled. In respect to the deciduous teeth, def means the number of attacked molars, and f means filled.

2.2 Examination and Recording^c

Each child's teeth were examined with a plain mouth mirror and a sharp single-end explorer. The child was seated facing good natural light. I made all the examinations. They were carried out at the schools, between the hours 9 a.m. and 3 p.m. Each child's age, sex, race, and school grade were noted as well as whether or not he was registered in the programme.

The dental conditions recorded for the permanent teeth of each child were :

- D or number which were untreated or both decayed and filled ;
- X or number indicated for extraction : these were teeth in which the caries had penetrated to the pulp ;
- O or number actually missing ;
- F or number filled ;
- DMF or total of D, X, O, and F teeth.

Since teeth indicated for extraction are lost to the child so far as function is concerned, M teeth are defined in this report as the sum of X and O teeth. This definition makes M slightly larger than would be the case if the teeth indicated for extraction had been grouped with D teeth, as is the practice in some surveys. However the X and O teeth are shown separately in the tables to permit comparisons with data of other surveys.

With respect to the deciduous teeth, counts were made only for the attacked molars present in the mouth. The conditions recorded for each child were :

- de or the number of molars which were untreated or both decayed and filled ; the number of e molars, or those indicated for extraction, was very small and was not recorded separately ;
- f or the number filled ;
- def or total of de and f teeth.

Any tooth with a pit or fissure in which the explorer made a definite catch was recorded as carious (D or de).

2.3 Findings

The chief results of the survey are shown in fig. 1-4. All data for these charts are given in tables II-V.

In fig. 1 there are three shaded areas which, added together, represent the average number of attacked permanent teeth per child (DMF). The lowest band shows the average number of M teeth per child ; the middle band shows the average number of D teeth ; and the upper area portrays the average number of F teeth.

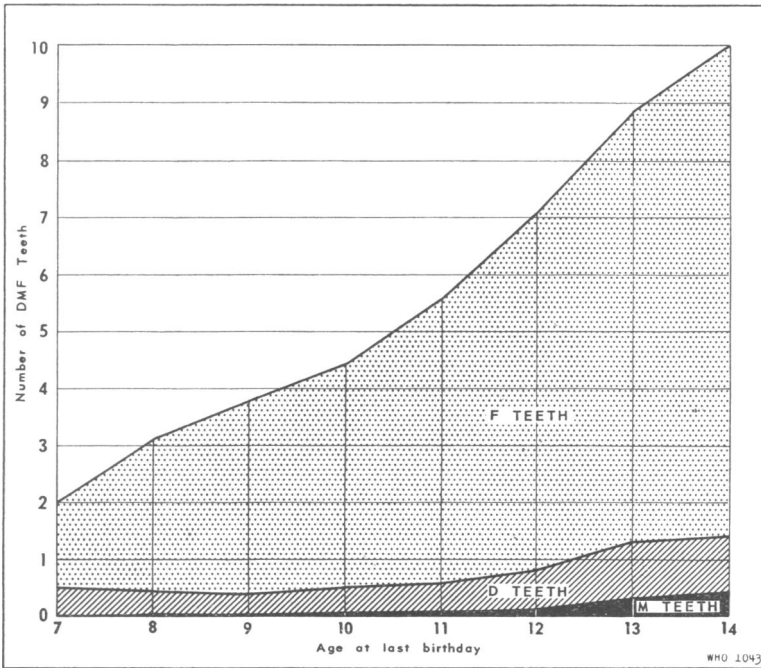
^c See Annex 4 for the record form.

Fig. 2 shows the percentage of D, M, and F teeth in the total average number of attacked permanent teeth at each age, i.e., the bands show the percentage composition of DMF in terms of its components.

In fig. 3 the total of the two shaded areas represents the average number of attacked deciduous molars (def) in the children's mouths at the time of examination. The lower band shows the number of such teeth needing treatment (de) while the area above it gives the number that were filled (f). These findings are restated as percentages in fig. 4.

These data reveal the magnitude of the dental caries problem in New Zealand. The average seven-year-old child had 2 permanent teeth attacked

FIG. 1. AVERAGE NUMBER OF DECAYED, MISSING, AND FILLED TEETH PER CHILD : 4,072 NEW ZEALAND SCHOOLCHILDREN, 1950 *



D = decayed

M = missing

F = filled

* See bottom of table II

by caries, the average 14-year-old had 10 (fig. 1). Over a seven-year span the permanent teeth were being attacked by caries at an average rate of slightly more than 1 tooth per child per year. In addition, the average seven-year-old child had 5.4 deciduous molars attacked by caries (fig. 3) out of a normal complement of 8. There can be no doubt that the dental caries problem among New Zealand children is serious.

However, fig. 1 certainly belies the supposition that dental caries is a far more serious problem in New Zealand than in any other area of the world. The average New Zealand child of 14 had 10 permanent teeth showing evidence of caries attack. Comparable values found for 14-year-old children in northern areas of the USA are as follows : Minnesota, 7.8 (Knutson¹⁰), New York, 8.6 (Finn³), Pennsylvania, 8.4 (Grace⁵) and Massachusetts, 10.7 (Wellock⁴⁷). With respect to the deciduous teeth, average def for seven-year-olds was 5.7 among New York children (Finn³) and 5.3 among Massachusetts children (Wellock⁴⁷).

Public-health dentists consider the number of missing permanent teeth ("tooth mortality") to be the most objective index of the effectiveness of a caries-control programme. Since it is not uncommon to find this index exceeding 1 tooth per child at the age of 14, the lowest band of fig. 1 is strikingly low. Including teeth present but indicated for extraction, the average number of missing permanent teeth at the age of 14 in New Zealand is 0.4 per child.

The lightly shaded area of fig. 1, representing the number of permanent teeth filled, is also very significant. It shows the large amount of needed care that has actually been given to the children. It also explains the relatively small number of missing teeth. Numerous DMF surveys have shown that the number of missing teeth varies inversely with the number of filled teeth.

It is not surprising that the middle band of fig. 1, showing the number of untreated teeth, amounts to about one-half tooth per child through age 11, after which it increases to about one tooth per child. On the average, each child was receiving treatment every nine months (see table VII). Since I examined the children at all stages between treatments, the interval of time between my examination and the last treatment received by the child averaged approximately four and one-half months. As the average yearly increment of attacked teeth is 1.14, the increment at the time of examination would average 0.43. Thus the dental care of these children seems to be maintained at about as high a level as could reasonably be expected.

The findings on attacked deciduous molars, presented in fig. 3, reflect almost continuous care, since the band for filled teeth amounts to almost 95% of the total area up to the age of 10. After the age of nine there is a rapid fall in the number of deciduous molars owing to exfoliation. In the earlier ages, however, the maintenance of the deciduous molars in serviceable condition is considered to be very important to the child's dental health. Nevertheless, surveys of schoolchildren usually show that the deciduous teeth have received little care. For example, among Massachusetts children aged seven, the average number of filled deciduous teeth per child was 0.8 (Wellock⁴⁷) and among Maryland children, nearly 40% of the deciduous teeth present contained unfilled cavities (Klein).⁹ Since

**TABLE III. PERCENTAGE COMPOSITION OF TOTAL DMF AND def TEETH:
4,072 NEW ZEALAND SCHOOLCHILDREN, 1950**

Age at last birthday								
	7	8	9	10	11	12	13	14
2,048 rural children :								
DMF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	15.7	09.2	08.9	09.7	08.5	10.2	11.4	10.0
X	00.0	00.0	00.3	00.4	00.0	00.3	00.8	00.4
O	00.0	00.9	00.8	00.7	00.7	01.5	02.1	02.2
F	84.7	89.9	90.4	89.2	90.8	87.9	85.7	87.4
def	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
f	95.6	94.7	96.6	95.2	90.4	85.2	73.7	100.0
2,024 urban children :								
DMF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	36.6	16.2	09.7	13.8	09.6	09.5	11.0	09.8
X	00.0	00.0	00.0	00.5	00.7	00.6	1.2	01.2
O	00.5	01.0	00.5	00.9	01.5	01.1	4.1	4.1
F	62.9	82.4	89.5	84.8	88.2	88.8	83.7	84.8
def	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
f	93.8	94.2	93.6	93.3	90.7	94.7	69.0	73.3
2,040 boys :								
DMF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	30.5	13.4	9.0	10.3	8.6	9.1	12.0	10.4
X	00.0	00.0	00.0	00.5	00.4	0.4	1.0	0.7
O	00.0	0.3	0.3	0.5	1.1	0.9	2.8	2.8
F	69.5	86.3	90.7	88.7	89.9	89.4	84.0	85.9
def	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
f	92.6	93.5	95.8	93.3	91.0	91.4	65.6	85.7
2,032 girls :								
DMF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	21.4	11.7	9.6	12.6	9.4	10.6	10.3	9.3
X	0.0	0.0	0.2	0.4	0.5	0.5	1.1	0.9
O	0.0	1.6	0.8	1.1	1.0	1.7	3.2	3.7
F	78.6	86.7	89.4	85.9	89.1	87.3	85.4	86.0
def	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
f	95.9	95.4	94.6	95.6	90.0	87.2	92.9	75.0
All 4,072 children :								
DMF	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
D	25.4	12.3	9.4	11.5	9.1	9.9	11.2	9.9
X	0.0	0.3	0.3	0.5	0.4	0.4	1.0	0.8
O	0.0	0.6	0.5	0.7	1.1	1.4	3.0	3.3
F	74.6	86.4	90.1	87.2	89.5	88.3	84.9	85.9
def	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
f	94.3	94.4	95.2	94.3	90.6	89.8	70.8	81.8

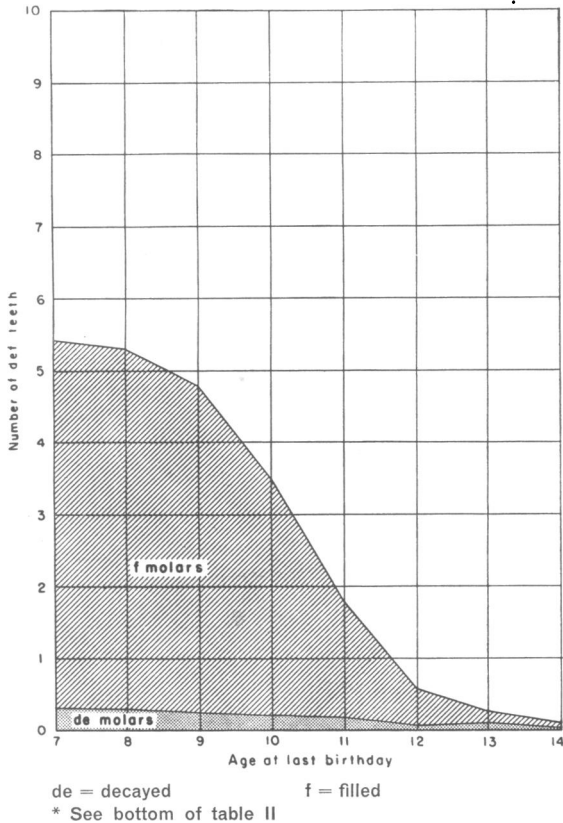
The basic data in this table are the same as in Table II except that the DMF or the def for each group in Table II is here taken as 100%. The D, X, O, or F components are computed as percentages of DMF, and the f is computed as a percentage of def

TABLE IV. NUMBERS AND PERCENTAGES OF CHILDREN HAVING SPECIFIED NUMBERS OF DM TEETH, de DECIDUOUS MOLARS AND DMF TEETH: 4,072 NEW ZEALAND SCHOOLCHILDREN, 1950

DM, de, or DMF grouping	Age at last birthday															
	7		8		9		10		11		12		13		14	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total children	503	100.0	534	100.0	515	100.0	521	100.0	544	100.0	523	100.0	480	100.0	452	100.0
With no DM teeth	344	68.4	394	73.8	391	75.9	363	69.7	364	66.9	306	58.5	227	47.3	216	47.8
With 1 or 2	137	27.2	126	23.6	113	22.0	130	24.9	152	27.9	170	32.5	181	37.7	146	32.3
With 3 or 4	22	4.4	14	2.6	10	1.9	23	4.4	22	4.1	35	6.7	43	9.0	61	13.5
With 5 or more	0	0.0	0	0.0	1	0.2	5	1.0	6	1.1	12	2.3	29	6.0	29	6.4
Total children	503	100.0	534	100.0	515	100.0	521	100.0	544	100.0	523	100.0	480	100.0	452	100.0
With no de molars	423	84.1	440	82.4	439	85.3	454	87.2	454	83.5	454	87.0	454	94.6	454	100.0
With 1 or 2	62	12.3	79	14.8	65	12.6	57	10.9	57	10.5	57	10.9	57	11.9	57	12.6
With 3 or 4	13	2.6	11	2.1	10	1.9	8	1.5	8	1.5	8	1.5	8	1.7	8	1.8
With 5 or more	5	1.0	4	0.7	1	0.2	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
Total children	503	100.0	534	100.0	515	100.0	521	100.0	544	100.0	523	100.0	480	100.0	452	100.0
With no DMF teeth	154	30.6	49	9.2	26	5.0	9	1.7	7	1.3	3	0.6	3	0.6	2	0.5
With 1	55	11.0	42	7.9	15	2.9	8	1.5	5	0.9	4	0.8	2	0.4	1	0.2
With 2	83	16.5	70	13.1	33	6.4	28	5.4	7	1.3	2	0.4	10	2.1	5	1.1
With 3	53	10.5	62	11.6	41	8.0	21	4.0	14	2.6	14	2.7	5	1.0	6	1.3
With 4	157	31.2	286	53.5	312	60.6	291	55.9	205	37.7	108	20.6	42	8.8	27	6.0
With 5	1	0.2	13	2.4	32	6.2	49	9.4	81	14.9	55	10.5	31	6.5	16	3.5
With 6	0	0.0	9	1.7	43	8.3	67	12.9	75	13.8	92	17.6	47	9.8	38	8.4
With 7	0	0.0	3	0.6	6	1.2	23	4.4	42	7.7	55	10.5	51	10.6	29	6.4
With 8	0	0.0	0	0.0	6	1.2	20	3.8	45	8.3	57	10.9	55	11.4	42	9.3
With 9	0	0.0	0	0.0	1	0.2	2	0.4	23	4.2	28	5.3	46	9.6	50	11.1
With 10 or more	0	0.0	0	0.0	0	0.0	3	0.6	40	7.3	105	20.1	188	39.2	236	52.2

Fig. 6 shows the facts with respect to the permanent teeth. The lightly shaded area shows that the proportion of children who did not need attention at the time of examination increases from about two-thirds at the age of seven to approximately three-quarters at the age of nine. Thereafter this proportion decreases to slightly less than half at the age of 14. In view of the heavy attack-rates shown in fig. 5, it is remarkable that nearly half the 14-year-olds were found, at the time of examination, to be without any

FIG. 3. AVERAGE NUMBER OF DECAYED AND FILLED DECIDUOUS MOLARS PER CHILD : 4,072 NEW ZEALAND SCHOOLCHILDREN, 1950 *



permanent teeth needing attention. At the same age, less than a third of the children had 1 or 2 teeth which were D or M, while only one-fifth of the children had 3 or more such teeth.

Fig. 7 shows analogous data with respect to the deciduous molars. Since the majority of these molars are exfoliated by the age of 11, the tabulation was made only for the children aged 7 to 10. The results show that

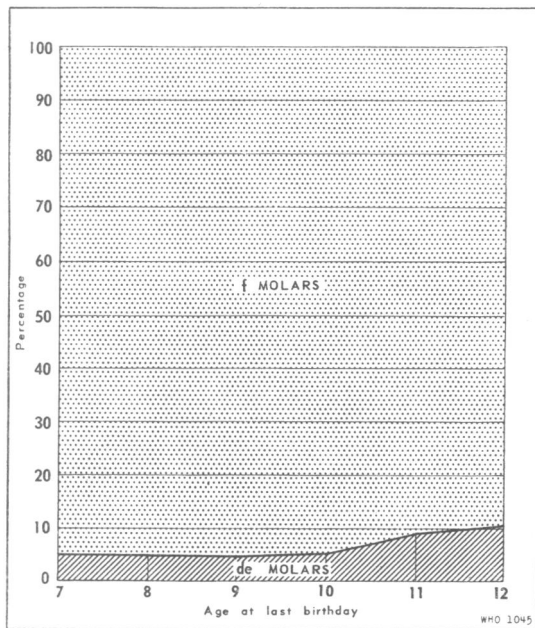
TABLE V. NUMBERS AND PERCENTAGES OF CHILDREN HAVING SPECIFIED NUMBERS OF DM TEETH, OF DECIDUOUS MOLARS, AND DMF TEETH IN 139 NEW ZEALAND SCHOOLCHILDREN NOT REGISTERED IN THE OFFICIAL SCHOOL DENTAL SERVICE, 1950

DM de, or DMF grouping	Age at last birthday															
	7		8		9		10		11		12		13		14	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of children	9	100.0	13	100.0	13	100.0	7	100.0	21	100.0	22	100.0	18	100.0	36	100.0
With no DM teeth	5	55.6	5	38.5	5	38.5	2	28.6	8	38.1	8	36.4	3	16.7	12	33.3
With 1 or 2	3	33.3	5	38.5	5	38.5	3	42.8	8	38.1	7	31.8	5	27.7	6	16.7
With 3 or 4	1	11.1	3	23.0	2	15.3	2	28.6	4	19.0	3	13.6	3	16.7	10	27.8
With 5 or more	0	00.0	0	00.0	1	7.7	0	0.0	1	4.8	4	18.2	7	38.9	8	22.2
Total number of children	9	100.0	13	100.0	13	100.0	7	100.0								
With no de teeth	6	66.7	6	46.1	9	69.2	4	57.1								
With 1 or 2	1	11.1	4	30.8	1	7.7	0	0.0								
With 3 or 4	1	11.1	2	15.4	3	23.1	2	28.6								
With 5 or more	1	11.1	1	7.7	0	0.0	1	14.3								
Total number of children	9	100.0	13	100.0	13	100.0	7	100.0	21	100.0	22	100.0	18	100.0	36	100.0
With no DMF teeth	3	33.4	3	23.1	0	0.0	0	0.0	1	4.8	1	4.6	0	0.0	0	0.0
With 1	2	22.2	0	0.0	2	15.4	1	14.3	0	0.0	0	0.0	0	0.0	0	0.0
With 2	1	11.1	2	15.4	1	7.7	1	14.3	2	9.5	0	0.0	1	5.6	1	2.8
With 3	1	11.1	2	15.4	1	7.7	0	0.0	1	4.8	3	13.6	1	5.6	3	8.3
With 4	1	11.1	6	46.1	5	38.4	3	42.8	6	28.5	5	22.7	2	11.1	2	5.6
With 5	0	00.0	0	00.0	3	23.1	0	0.0	3	14.3	5	22.7	1	5.6	1	2.8
With 6	0	00.0	0	00.0	1	7.7	1	14.3	5	23.8	5	22.7	3	16.6	1	2.8
With 7	0	00.0	0	00.0	0	0.0	1	14.3	2	9.5	0	0.0	1	5.6	6	16.7
With 8	0	00.0	0	00.0	0	0.0	0	0.0	2	9.5	1	4.6	2	11.1	5	13.9
With 9	0	00.0	0	00.0	0	0.0	0	0.0	1	4.8	3	13.6	3	16.6	5	13.9
With 10 or more	0	00.0	0	00.0	0	0.0	0	0.0	0	0.0	0	0.0	4	22.2	12	33.3

close to 85% of the children of these ages had no deciduous molars needing attention at the time of examination, and that the percentage of children with 3 or more such molars needing treatment was very small.

It will be seen from table II that the rural children have slightly higher DMF values than the urban children up to the age of 12. After that age the urban children have the slightly higher DMF values. Neither these differences in average DMF nor any other differences between corresponding figures in the upper sections of tables II and III seem to be significant. The striking fact is rather that the rural children appear to have received quite as good care as the urban children.

FIG. 4. PERCENTAGE OF DECAYED AND FILLED TEETH IN TOTAL ATTACKED DECIDUOUS MOLARS: NEW ZEALAND SCHOOLCHILDREN, 1950 *



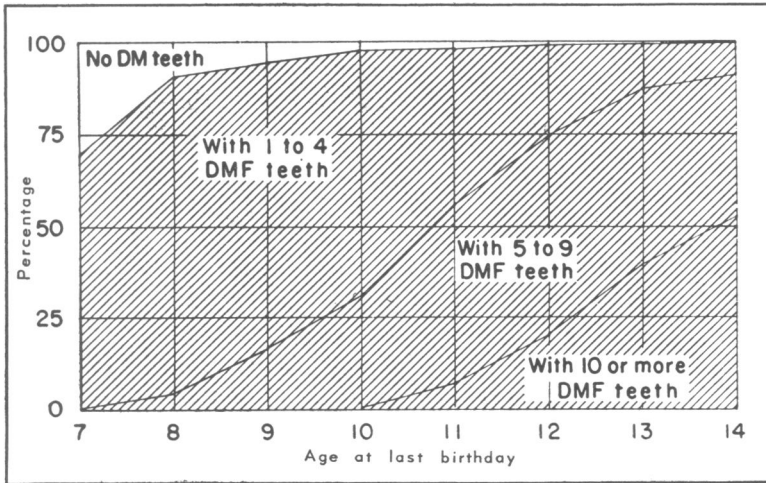
de = decayed

f = filled

* See bottom of table III

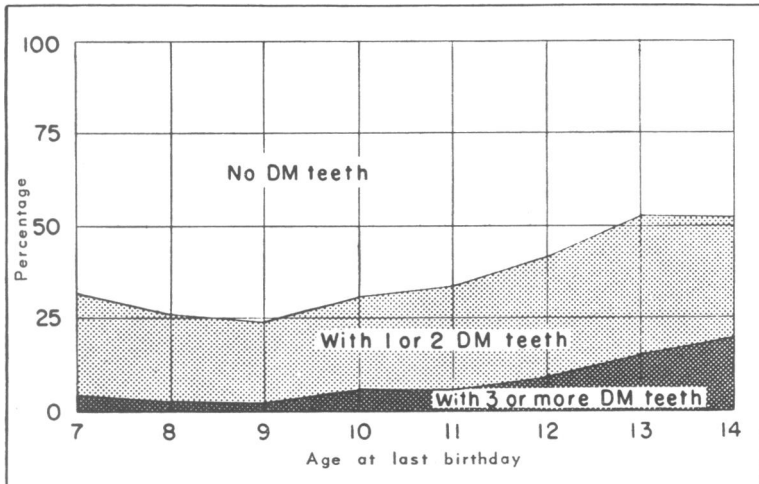
The middle sections of tables II and III show the data separately for boys and girls. The sex differences in average DMF (table II) are in the usual direction. That is, the DMF values are higher for the girls at all ages, owing, of course, to the earlier eruption and consequent earlier exposure to attack of the permanent teeth among girls. Accordingly, too, the def curve falls somewhat more rapidly for the girls, owing to the relatively early exfoliation of the deciduous teeth in that sex group. However, plotting the data separately for the boys and girls has shown that the percentages of the components, D, X, O, F and f, are closely similar for the two sex

FIG. 5. PERCENTAGE OF NEW ZEALAND SCHOOLCHILDREN WITH SPECIFIED NUMBERS OF ATTACKED PERMANENT TEETH, 1950 *



DMF = attacked permanent teeth
 * See bottom of table IV

FIG. 6. PERCENTAGE OF NEW ZEALAND SCHOOLCHILDREN WITH SPECIFIED NUMBERS OF DECAYED OR MISSING PERMANENT TEETH, 1950 *

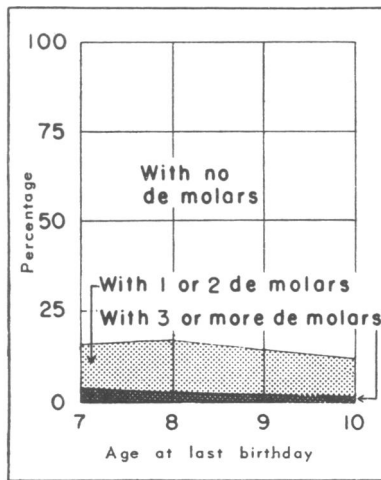


DM = decayed or missing permanent teeth
 * See top of table IV

groups. Considering this circumstance and the fact that approximately equal numbers of boys and girls were examined at each age, it is admissible to present the main findings for the total group of children irrespective of sex, as shown in fig. 1-5 and tables IV and V.

As indicated earlier, a note was made for each child as to whether or not he was registered in the programme. Among the total group of children in the sample, only 139 children were found to be not registered in the programme. It is possible that this number would have been larger if strictly random sampling had been used from a list of pupils at each school.

FIG. 7. PERCENTAGE OF NEW ZEALAND SCHOOLCHILDREN WITH SPECIFIED NUMBERS OF DECAYED DECIDUOUS MOLARS, 1950



de = decayed deciduous molars

* See middle of table IV

However, so far as the data on effects of the programme are concerned, it seems unlikely that the findings would have been perceptibly different if strictly random sampling had been possible.

In any case, a separate but complete tabulation analogous to that shown in table IV was made for the 139 non-programme children. The results are shown in table V. The number of cases in any one age-group is small but the general picture is clear. The non-programme children received less care than those registered in the programme, yet they received a substantial amount of care. The non-programme children in New Zealand may be a selected group, or it is possible that an indirect effect of the programme was the stimulus given to parents to see that their children's teeth were cared for, even though the parents did not wish to have the care provided by the school clinics.

3. OBJECTIVES, POLICY, AND ADMINISTRATION

The Division of Dental Hygiene, New Zealand Department of Health, states : " The primary aim of an organized dental service is to maintain the highest possible standard of dental health in the community in which it operates. " ⁴⁰

3.1 School Dental Clinics

The specific functions of the School Dental Service are :

(1) To improve the standard of dental health of schoolchildren and of pre-school children from 2½ years of age, by affording them regular and systematic treatment at six-monthly intervals over a period of years.

(2) To instruct the schoolchildren and also the general public in the principles of oral hygiene and the preservation of the teeth.

3.1.1 *Establishment of clinics*

School dental clinics are established in selected centres throughout New Zealand upon recommendation of the principal dental officers of districts. The guiding principle used in this selection is that each clinician should be responsible for 450 to 500 children on the basis of regular dental care of each child at six-monthly intervals. In areas where 450 to 500 patients cannot be conveniently concentrated at one centre, one or more subcentres are established. There should be not less than 100 children at any one subcentre, and the total number of patients for the area should not exceed 500 per operator. It is common for several schools to send their children to the same centre for treatment. Such grouping is arranged by agreement between the various schools involved, subject to the approval of the Department of Health.

3.1.2 *Eligibility for treatment*

All children in schools which have been officially included in a dental group are eligible for treatment, subject to the following restrictions :

Treatment in the first instance must begin when the child is attending the primer (infant) classes of the school or at pre-school age. Children once registered continue to receive dental treatment until they graduate from their primary or intermediate school or pass from the highest class of their school that is under treatment at the clinic. If a child who is registered for treatment transfers to a school in another district, the treatment is continued there. Where a child who has been under treatment does not return for re-examination or further treatment on the correct date, or within six months of grace, treatment is liable to be discontinued by the Health Department. Children who have completed the primer

classes and entered the higher grades without enrolling for initial treatment are not accepted in a school dental clinic unless they are first made dentally fit at the parents' expense. No child is enrolled for treatment unless a parent or guardian has signed a form consenting to whatever treatment may be considered necessary, since such enrolment is entirely voluntary.

3.1.3 *Financial support*

School dental clinics are tax-supported entirely. No charges are levied against the individual child or parent. The clinics are housed, for the most part, in buildings on the school grounds erected especially for that purpose.^d The Department of Education bears the cost of this construction. The Health Department assumes responsibility for maintenance, equipment, and staff. (In the early days of this programme the local committee was required to finance non-technical furnishings, such as chairs, writing-tables, and rugs, and pay for water, lighting, and heating. In 1936 these requirements were discontinued. The local committee still pays for such items but is furnished a yearly grant by the Health Department for the purpose.)

3.1.4 *Role of dental nurse*

Dental treatment in the school clinics is given by dental nurses. The dental nurse is a full-time officer of the Department of Health "attached for special duty" to the staff of the school at which the clinic is located. 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. The dental nurse is selected, trained, and employed by the Department of Health. She obtains no degree or licence and is required to spend her entire professional career in State service. At one time it was necessary that she be unmarried, but of late years, owing to increasing difficulties in filling all positions, married nurses are employed, a few on a part-time basis.

The nature of the treatment given by the dental nurse is rigidly standardized. It includes fillings in both deciduous and permanent teeth, the extraction of deciduous and permanent teeth where necessary (using local anaesthetics only) and prophylaxis.^e No root treatment is undertaken. Pulp capping is used as well as simple gum treatments. Copper amalgam is the filling material for all deciduous teeth, silver amalgam for permanent posterior teeth, and silicate cement for permanent anteriors. Dental nurses are trained to recognize malocclusions but not to treat them. In such cases the parents are advised to consult a dentist.

^d Seven mobile units (trailers) are used in outlying districts. Five of these trailers are operated by dental nurses.

^e Topical application of sodium fluoride has been used in the training school clinics (four applications, following a prophylaxis) for about one year. It is planned that it should be made routine in all school dental clinics.

Dental health education is a part of the regular duties of the dental nurse. Her training includes formal courses in this work, both theoretical and practical, and she is required to complete two units of dental health education each month as part of her routine duties at the clinic. (See Annex 1.)

Most of the clinics are staffed by one school dental nurse, but a considerable proportion have two, one of whom is designated as charge nurse. As a rule there are not more than two nurses in a clinic.

3.1.5 *Local administration*

A dental clinic committee assists in the local administration of a school dental clinic. It consists primarily of representatives of the school committee in the area served but may include representatives of other bodies, and individuals. The object is to build as strong and influential a group as possible. This committee assists in the local organization and management of the work of the clinic, particularly on behalf of the parents in the community.

The Division of Dental Hygiene has established six districts to administer the School Dental Service. They comprise various combinations of the 13 health districts in New Zealand. Each dental district office is under the nominal supervision of the district medical officer of the Health Department. However, the active direction originates from the Division of Dental Hygiene in Wellington. The division is under the control of a director, who is responsible to the Minister of Health through the Director-General of the Health Department. There is a deputy director, an assistant director for training, a principal dental officer in charge of dental health education, and a principal dental officer for orthodontics. A senior executive officer is responsible for the secretarial services. Also attached to the director's office is a dental field-research officer, who is seconded from the New Zealand Medical Research Council.^f

The service is organized in seven units, each controlled by a senior dental officer, who is directly responsible to the director. These officers are the principal of the Dominion Training School for Dental Nurses, and the principal dental officers in charge of each of the six dental districts.

The principal of the training school is responsible for the training of the school dental nurses, the training of dental attendants (assistants),^g and the conducting of orientation courses for "newly-joined" dentists. He is also charged with operating, as a public institution, a children's dental clinic, which is an integral part of the training school.

^f Dr. R. E. T. Hewat. He is furnished office space by the Division and works co-operatively with the staff but is responsible to the Medical Research Council. Among his publications are field studies of dental caries, regional variations in the incidence of dental caries, and the control of dental caries by topical applications of sodium fluoride.

^g A one-month course to prepare assistants to work with dental officers. To date 25 have been trained but most of them resign after a short time because of higher wages offered by practitioners. A summary of the course is given in Annex II.

The principal dental officer in charge of each of the six districts is responsible to the director for the establishment, maintenance, and efficient operation of the National Dental Service in his district.

The division has annual staff meetings, which, over the years, have developed a set of standing instructions under which the programme operates. Authority for operation of the day-to-day programme is largely delegated to the district officers within the framework of these standing instructions. All matters arising locally are dealt with through them.

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 the 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 nurse in uniform.

(2) Examination of the records to check their accuracy and to ascertain the position of the work.

(3) Inspection of the operative work for quality and completeness.^h

(4) Maintaining close contact with the local organizations such as the headmasters of the schools and dental clinic committees.

The dental nurse inspector, assigned to the district office, is a school dental nurse of long experience (the youngest of the seven on duty in New Zealand, February 1950, had 10 years of service) and must also have served in the training school as a tutor sister (instructor in the clinic). She spends approximately 80% 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 equipment are in good shape, that records are properly filled out and complete, and that the dental nurse wears the regulation uniform. Once a year the dental nurse inspector meets each dental nurse to check all the charts, revision lists, new-entrant sheets, and registers to see that they are in balance. Also each year she takes an inventory of clinic equipment and checks it against the office records. 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. In

^h Usually, 12 to 20 children from the clinic rolls are selected at random for inspection. The number varies according to circumstances and knowledge of the nurse's capability. A copy of the inspection report is usually given to the dental nurse. The principal dental officer's inspection trips are unannounced and are supposed to be in the nature of surprise visits.

the district office, the dental nurse inspector checks the monthly returns from the clinics and summarizes them for the periodic reports required by the division.

The final link in this chain, and the most important in day-to-day operations, is the school dental nurse. As has been said, the dental nurse is a member of the school staff and under the supervision of the headmaster for attendance, hours of work, and general deportment. Her hours of duty include 8.40 to 12 noon, and 1.00 to 4.45 in the afternoon, five days a week. Her year begins two weeks ahead of the first school term, usually the middle of January. The New Zealand school year consists of 3 terms of about three months each, with two weeks' vacation after the first and second terms, and a longer holiday after the third. The dental nurse's year follows the same pattern except that her vacation is limited to four weeks at the end of school. The year also includes the usual holidays such as Christmas, Easter, and Labour Day.

3.1.6 *Registration and appointment procedure*

In establishing the case-load and getting children under care, the school dental nurse uses the following procedure :

(1) Consults the headmaster's register of the primer classes and obtains the names of all new entrants.

(2) Sends consent forms to the parents of all the new entrants.

(3) Lists the names of these children on the list of new entrants and the primer register as soon as the consent forms are returned.

(4) Examines the children on this list and fills out the examination and history chart for each child. This chart is kept in a new file until work is completed.

(5) Arranges a series of appointments until needed work is completed.

(6) At completion, enters child's name on the revision list for the sixth month after completion.

(7) Consults the revision list at the beginning of each month for the children due back for that month.

Getting the 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. This procedure is accepted as routine by the school administration.

In the case of children from outlying schools, the method is more complicated. The dental nurse, setting aside 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 child does not appear for a scheduled appointment, the dental nurse contacts the school involved. If no explanation is available, an appointment card is sent directly to the parents. If this card fails to be honoured, another is mailed to the parent.

When no action develops at this stage, a final card is sent home accompanied by a notice saying that if the clinic fails to hear from the parent, the child's name will be removed from the dental clinic register.

Since the programme is voluntary, a parent can withdraw his child from the register at any time.ⁱ In all cases of withdrawal, however, the dental nurse is required to procure a letter to that effect from the parent. Such letters are attached to the child's clinic chart and the date of withdrawal clearly recorded in the clinic register.

Pre-school children are registered in the clinic upon the request of parents. Their appointment procedure is similar to that used for outlying schools. At one time definite efforts were made to enlist the pre-school child but now that most of the five-year-olds enter the primer classes of the school system, and that the number of these new entrants has increased tremendously in late years, younger children are not actively solicited by the clinics. None who applies for treatment is turned away, however.

Since the operative scope of the dental nurse is rigidly defined, such matters of treatment as orthodontics, pulp or root canals, deep anterior cavities, fractured teeth, prosthesis, and multiple extractions requiring general anaesthesia are referred to dentists. Such referral, with the exception of orthodontics, is accomplished by a suitable form, certifying the need for treatment, that is sent by the dental nurse to her district dental officer. He in turn enrolls the child under a special benefits category which permits a parent to take the child to a dentist for treatment which is paid for by the State.^j Orthodontics is not included in special dental benefits. In these cases the nurse sends a notice of needed care directly to the parents. Such care must be provided by private resources. The dental nurse is expected to follow up this referred treatment by correspondence or asking the parent to call and talk it over. If the child appears at the clinic for the next regular visit with the referred work still uncompleted, the dental nurse again contacts the parent, either by letter or interview. It is always a question whether or not any more clinic service should be rendered until the referred treatment is accomplished. If the matter drags on unduly, the child is suspended from further clinic service.

The dental nurse notifies the parent before she extracts any tooth for a child. If the parent does not respond in a reasonable length of time, usually one week, consent is assumed and the extraction is made.^k Occasionally parents prefer to get the extraction done by a dentist. In such cases the parents must pay for the service. It is a cardinal rule of the School

ⁱ Judging from conversations with the dental nurses and the professional men themselves, many dentists and physicians prefer to have their own children treated by the dental nurse. Most of the private schools in New Zealand are enrolled for the dental clinic service.

^j In 1949, 9,015 children were enrolled for special dental benefits (see p. 26). This figure represents 3.8% of the 235,746 children treated by the dental nurses in 1949.

Since orthodontic cases are not included, the figure of 3.8% is the minimum of cases referred by the dental nurses.

^k Surprisingly, I could find no record of a court action being filed against the Division of Dental Hygiene. The director could recall only one serious accident during his 25 years in the service.

Dental Service that no treatment which can be given at the dental clinic is paid for when the parent chooses to go elsewhere.

School dental nurses perform their duties under very nominal supervision, being taught to be self-sufficient and to move without close direction. They are free to consult with their dental officer and dental nurse inspector at any time but are not rigidly watched by these supervisors. Apparently, experience has shown that the dental nurse does not attempt to decide matters beyond her competence.

She does not have clerical or operating assistance but carries out the entire clinic programme alone.¹

3.2 Adolescent Dental Service

The Adolescent Dental Service is administered by the State Department of Health, under the Social Security (Dental Benefits) Regulations 1946.⁴¹ These regulations require that such dental service must be provided by (a) a registered dentist or state dental nurse in a state clinic, (b) a contracting dentist, or (c) a contracting authority in the dental department of a public hospital or a dental school.

Actually, dental nurses do not work in the adolescent service. All service rendered to adolescents, in February 1950, by State personnel was being furnished by full-time dental officers. However, in the two years that the service has operated, great difficulty has been experienced in securing an adequate number of dentists, as well as buildings and equipment. Only eight clinics were operating despite the fact that recruitment had been expanded to include the entire United Kingdom.

As a result, the great bulk of the adolescent service, provided under dental benefits, comes from private dental practitioners. Of the 672 such dentists practising in New Zealand in 1949, 488 (72.6%) had contracted to provide treatment under the dental-benefits system.

Although the Dental Association originally wanted the adolescent part of the State dental service to be staffed by full-time Department officers, the two years' operation of dental benefits has caused a change in the dentists' thinking. Judging from many personal conversations and discussions heard at two meetings of Association members, the present system is popular with New Zealand dentists and any effort to change it will be vigorously fought.

3.2.1. *Eligibility for treatment*

Dental benefits under the Adolescent Dental Service are available to all persons in New Zealand who :

- (1) have not reached their 16th birthday ;

¹ Assistants for dental nurses have been tried but found unsatisfactory. The dental nurse prefers to work alone and her production is better. The clerical duties seem to give her relaxation between seeing patients.

- (2) are not eligible to receive treatment at a school dental clinic ;
- (3) are eligible to attend a school dental clinic but require service which the clinic cannot provide ;
- (4) have received regular dental care, either at a school clinic or by a private practitioner ;
- (5) can establish that circumstances beyond their control made it impossible to maintain their dental and oral health at a satisfactory standard.

3.2.2 *Enrolment*

(1) When a child completes the highest class treated by a school dental clinic, the dental nurse submits the name to her principal dental officer. He enters the name on an enrolment form and forwards this form to the parent or guardian. If the parent wants the child to receive the adolescent service, he must reach an agreement with a contracting dentist^m to accept the child as a patient. Both the parent and the dentist must sign the enrolment form.

When the completed form is returned to the district office of the Health Department and checked for eligibility, a dental-benefits card is issued to the child, which he must present to the dentist at every visit.

The dentist is notified that the child has been enrolled with him for dental treatment. The record of any treatment given is submitted to the Department of Health for payment. (See Annex 3.)

(2) Children who are not ex-school-clinic patients are enrolled in the same manner except that applications to the Health Department are made by the parent directly.

(3) Special benefits patients (those with conditions beyond the scope of the dental nurse) are so certified by the dental nurse to the district office. The parent and dentist are notified, except that only the special condition or conditions are authorized. At the next clinic examination of the child the dental nurse is required to check that special treatment has been completed.

3.2.3 *Operation of services*

The services available under dental benefits and the fees for these services are listed on the record form D. H. 61 (Annex 3). When any dentist thinks that work outside this schedule of fees is necessary he must obtain the approval of the Health Department.

The patient has a free choice of dentists and the dentist has the right to decline patients.

^m All dentists who work in the dental benefits system must enter into a contract with the Ministry of Health.

Patients are expected to attend for treatment as required by the contracting dentist ; to apply to the dentist whenever they become aware that treatment is needed ; to apply for examination at approximately six-monthly intervals ; and to carry out faithfully such instructions as to oral hygiene and dental health as the dentist may give.

Temporarily the dental benefits system has been used to relieve the pressure of work on the school dental nurses. The greatly increased birth-rate in recent years has caused a corresponding jump in the numbers of children entering the primer classes of the schools. In order to adjust this work-load and keep the dental nurse's rolls to manageable size, the policy has been to cut a corresponding number of upper-grade children from the rolls. Children thus made ineligible for further school clinic service are placed on dental benefits. A 1949 report covering 453 schools showed that the highest class under treatment in 274 schools (60.4%) was Standard IV. The predominant age of Standard IV children is 10 years. This fact suggests that over half of the school dental clinics are limiting their case-load to children under 11 years of age and that the dental benefits system is servicing numbers of primary school children.

The 1949 figures on the dental benefits programme are as follows : ⁿ

Number of persons enrolled under the Social Security (Dental Benefit)
Regulations as of 31 March 1949 :

for general dental benefits	67,945
for special dental benefits.	9,015
	76,960

Number of persons who during the year under review ceased to be enrolled for dental benefits :

general benefits : patients who attained the age of sixteen years before 31 March 1949 . .	9,674
special benefits : patients whose treatment was completed before 31 March 1949	9,330

Number of completed treatments :

general dental benefits	64,566
special dental benefits	9,345

Since there were 488 dentists under contract during 1949, the average of completed treatments was about 150 per dentist.

Of further interest is a study made from 1949 records of a cross-section of dental benefit patients. Ten records, selected at random from each of 68 dentists' files, were tabulated for the total number of fillings required in the first treatment after leaving the school dental clinic. The 680 records showed a total of 2,136 fillings so needed, or an average of 3.1 fillings per patient.

ⁿ Extract from the Annual Report of the New Zealand Department of Health, Division of Dental Hygiene.³⁹

4. EXTENT AND QUALITY OF TREATMENT

The quantity of work produced by the School Dental Service was studied for the latest available year, ending 31 March 1949. Two sources furnish the material for this section : (1) the overall picture, as presented in the annual report of the Department of Health, and (2) the summary of operations, obtained from the district offices, for the 19 clinics which serviced the areas where the dental caries survey was made.

4.1 Statistics for 1949

According to the 1949 annual report, the School Dental Service operated 508 treatment centres with a staff of 451 dental nurses in the field. In all, 2,333 schools were serviced, with 235,746 children under regular treatment. Such treatment encompassed a total of 1,674,125 operations, including 1,139,729 fillings and 69,718 extractions.³⁹

Since, on 31 December 1948, there were 2,400 primary schools in New Zealand^o with a total roll of 279,419³⁸ it appears that the School Dental Service treated 84% of the children and 97% of the primary schools in the country.

From a personal inspection of the summaries compiled in each of the six dental districts for this same period, it was evident that little variation, except in numbers of staff and treatment centres, owing to population density, existed in the coverage and operations of the programme. The average number of patients treated annually per staff member in the smallest district was 450, in the largest district, 506. The ratio of fillings to extractions ranged between extremes of 14 : 1 and 18 : 1.

4.2 Data for Nineteen Clinics

To get a more detailed picture of yearly operations, pertinent material was collected (via the district office) for the 19 clinics visited during the survey. Table VI shows that 83% of the eligible children in these areas (i.e., all children enrolled in the primary schools) attended the clinics during 1949 and that practically every child's treatment was completed. Table VII presents data on the patient-load and performance records of these clinics. On the average, each dental nurse worked 1,455 hours in the clinic and treated 714 children. Each child received two hours of service which encompassed more than six operations, four of them in the form of fillings. Extractions were few, the average for each 100 children being 4 permanent teeth and 30 deciduous teeth so treated. Furthermore, operations differed very little between rural and urban clinics.

^o This figure includes 309 registered private schools and 159 Maori schools. The native Maoris are eligible to attend any public school but many of them live in extremely remote areas from which the conveyance of school pupils presents serious problems. The Maori schools, for the most part, are located in remote areas.

Maintenance care (i.e., regular and periodical treatment) is considered to be the basic ingredient of dental care for children. These 19 clinics in New Zealand averaged about 1½ completions per child. Since the clinic registers are not static (new cases being added and old cases dropped at various times throughout the year) this completion figure does not necessarily reflect a breakdown of the six-monthly revision system. It was possible, in the time available, to check some of these maintenance care problems for 10 of the clinics. Each dental nurse keeps a project of work record in which, for each month, is placed the number of "revision" patients due at that time. As the treatment of these patients is completed, the original number in the column for each month is adjusted accordingly. Such a

TABLE VI. NUMBERS OF CHILDREN REGISTERED AND TREATMENTS COMPLETED IN NEW ZEALAND DENTAL CLINICS, 1949

Item	7 urban clinics	12 rural clinics	total 19 clinics
Eligible children	7,355	9,273	16,628
Registered children	5,847	7,896	13,743
Percentage registered	79.4	85.1	82.6
Examined, initial*	1,160	1,534	2,694
Examined, revision†	5,820	9,464	15,284
Treatment completed, initial	1,074	1,498	2,572
Treatment completed, revision	5,816	9,459	15,275
Percentage completed, initial	92.5	97.6	95.4
Percentage completed, revision	99.9	99.9	99.9
Total visits	17,706	21,587	39,293
Visits per completed treatment	2.57	1.97	2.20

* Initial — children coming to clinic for first time.

† Revision — children returning to clinic for maintenance care.

record enables the dental nurse or a supervisor to tell at a glance how the progress of the revision work stands at any time. An examination of these project records for the 10 clinics revealed that, in December 1949, five of the clinics were practically up to date, three were about six months in arrears, and two still had a few patients who had received no service since 1948. Both of these last mentioned clinics had had a non-operating period owing to resignations of dental nurses and the lack of immediate replacements. All clinics in arrears were located in schools where roll numbers were showing sharp increases.

These records seemed to bear out the fact (attested to by everyone connected with the School Dental Service) that the years of the 1940's engendered serious staffing problems. A rapid rise in the birth-rate has now resulted in a greatly increased school population, at a time when trained personnel, dislocated by war marriages and resignations, does not fill all the vacancies, let alone make possible any expansion. Under these conditions, the record of the School Dental Service appears very good.

4.3 Estimation of Quality

Measuring the quality of dental service is hazardous because of the lack of standard criteria which could be used as a basis for an objective study. In the last analysis, the primary purpose of dental care for children is to assure a well functioning dental apparatus during the growth and development period. In this case the important question is whether the programme saved teeth.

TABLE VII. OPERATIONS PER CHILD AND PER CLINIC HOUR, NEW ZEALAND SCHOOL DENTAL CLINICS, 1949

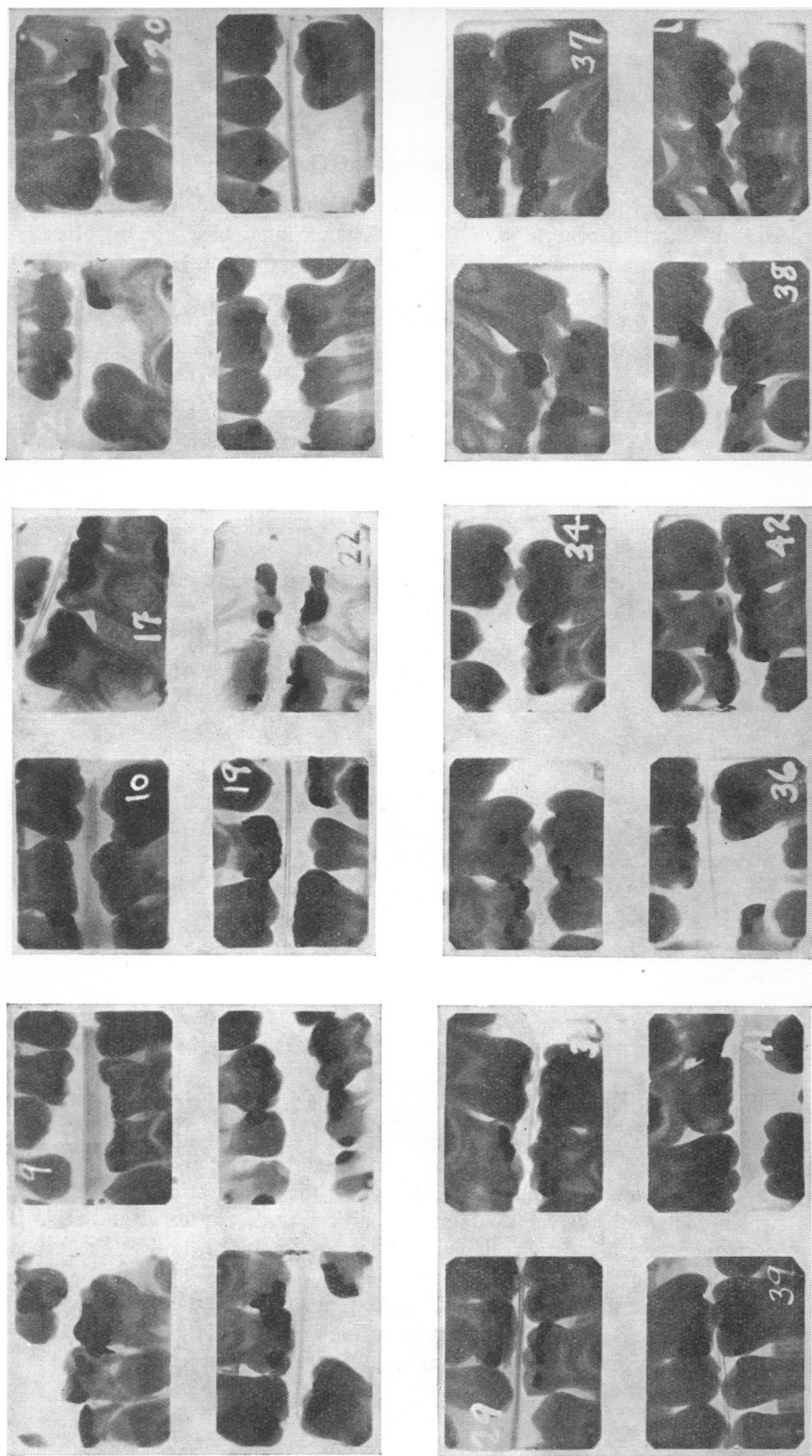
Item	7 urban clinics	12 rural clinics	total 19 clinics
Children registered	5,847	7,896	13,743
Children completed	6,890	11,507	18,397
Total operations	48,760	70,625	119,385
Fillings, permanent	10,638	15,439	26,077
Fillings, deciduous	18,707	28,866	47,573
Extractions, permanent	18	68	86
Extractions, deciduous	2,114	3,362	5,476
Clinic hours	16,183	21,283	37,466
Number of clinicians	11½	14 ½	25¾
Per completed child			
Fillings, permanent	1.54	1.34	1.42
Fillings, deciduous	2.72	2.51	2.59
Extractions, permanent	0.002	0.005	0.004
Extractions, deciduous	0.31	0.29	0.30
Other operations	2.51	1.99	2.18
Total operations	7.082	6.145	6.494
Total hours	2.35	1.85	2.04
Per clinic hour			
Completed children	0.43	0.54	0.49
Fillings, permanent	0.66	0.73	0.70
Fillings, deciduous	1.16	1.36	1.27
Extractions, permanent	0.001	0.003	0.002
Extractions, deciduous	0.13	0.16	0.15
Other operations	1.07	1.08	1.07
Total operations	3.01	3.32	3.19
Per clinician			
Hours	1,438.49	1,467.79	1,454.99
Completed children	612.4	793.6	714.4

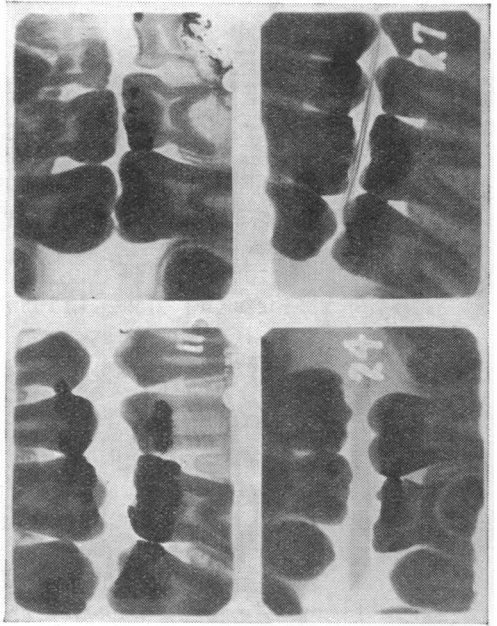
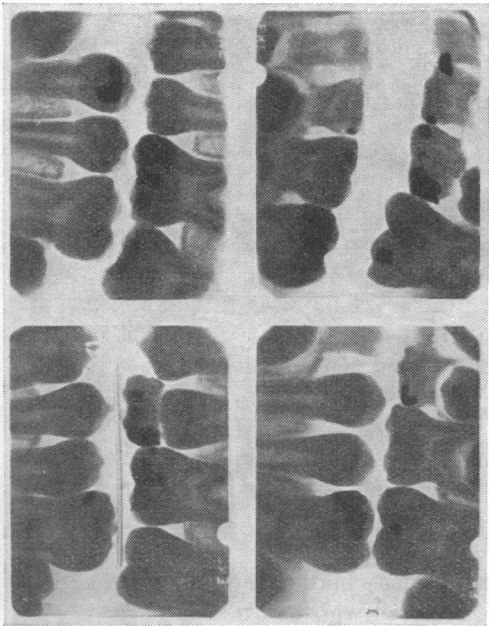
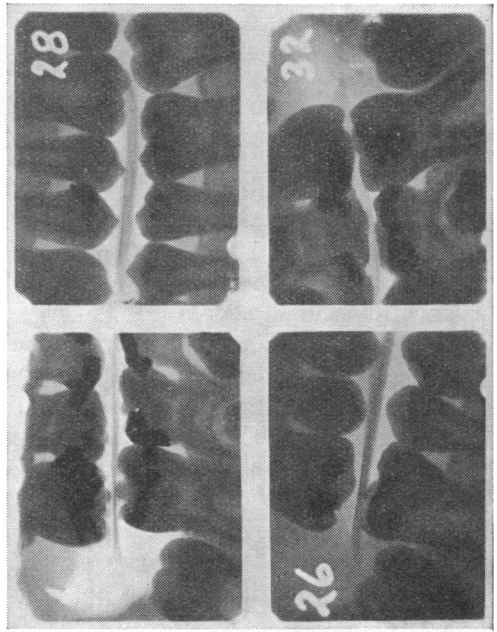
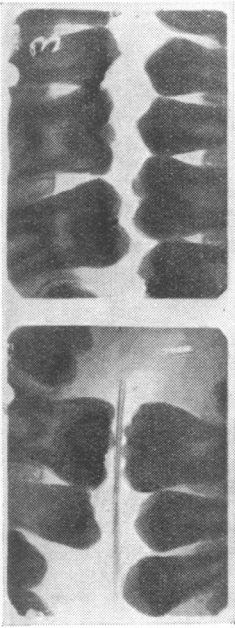
4.3.1 Survey data

Fortunately, tooth mortality-rates can be measured objectively and, therefore, the best clue to the quality of dental service given to the school-children in New Zealand can be found in the first section of this report which deals with the survey data. As can be seen from fig. 1, and table II, permanent-tooth mortality is zero at the age of seven, and at the age of 14 averages less than one-half tooth per child, even though, by that time, 10 permanent teeth have been attacked by disease. On this basis, the quality of the School Dental Service in New Zealand is high.

Two other methods of gauging quality are fairly objective.

FIG. 8. BITE-WING RADIOGRAPHS, NEW ZEALAND SCHOOLCHILDREN, 1950





4.3.2 *Bite-wing radiographs*

These have been widely used by dentists to discover hidden defects in the teeth and to diagnose conditions which cannot be observed otherwise. Fig. 8 contains reproductions of 38 bite-wing radiographs which were taken as part of this study. I took 20 of these at a clinic in Christchurch and 18 in Auckland. No particular method was used in selecting the children except to assure that dental nurses had placed the fillings and that the sample was not all the work of one nurse. These two items were verified from clinic records.

The radiographs are from 38 children, almost equally divided as to sex, most of whom were in the age-range 7 to 10 years. Since these radiographs show the fillings done by six different dental nurses, they could probably be considered typical, although the sample was not selected on a truly random basis. Also, untreated caries, disclosed in these films, should be judged with caution, since no attempt was made to select children who had just been dismissed as completed cases. The films do present evidence, however, that many teeth are filled in New Zealand, and that teeth, particularly deciduous teeth, are retained thereby.

4.3.3 *Treatment plan*

Some assay of the treatment plan was provided for in the routine questions which were asked at all clinics (Annex 8). A summary of the replies indicates that, without exception, the dental nurses plan their treatment in this order : (a) eliminate acute pain and infection, (b) prophylaxis, (c) fill all savable teeth, (d) extract all teeth which are beyond repair. Since any treatment is limited by the operator's ability, it should be made clear that the dental nurse has no x-ray equipment. Her method of diagnosis is based on the use of mirror and explorer, disclosing solutions (such as silver nitrate), and separation of teeth to examine proximal surfaces. Her training includes courses in the pathology of dental caries, signs and symptoms of dental caries, and the diagnosis of carious lesions.

The thoroughness of treatment is likely also to be limited by the time available for each patient. In this respect, table VII shows that the average child whose treatment was completed received two hours of treatment in 1949. This amount of time seems equitable, particularly for maintenance care.

4.3.4 *Inspection*

Personal inspection of quality is much more subjective since it depends on the observer's experience, judgement, training, and, in some degree, to individual taste. Two facets of my personal observation of the dental nurse's work may be noted.

(a) Since the survey in New Zealand included children through the age of 14, many examinations were made of children who had passed beyond the limits of the dental nurse service and were currently receiving care from

dentists. As the source of treatment was unknown to me at the time of examination, the following device was used to form a judgement of quality. When a tooth presented a filling of exceptional merit (such as sound outline and contour, smooth margins, good carving and polish) the recorder was told to place the number of this tooth in the margin of the record form opposite the child's name. At the close of the examination period for that day, each tooth so marked on the record forms was checked against the clinic record of the child to ascertain whether a dentist or a dental nurse had filled the tooth in question. Amalgam fillings in 207 teeth were noted in this manner. Of that number, 170 (82%) had been placed by dental nurses. This simple test suggests that the New Zealand dental nurses are capable of producing amalgam fillings of good quality.

(b) On two occasions (once during a practical examination) I was invited to inspect cavity preparations as they were completed by dental nurses in the training clinic. Altogether, about 50 Class II cavities in deciduous molars were inspected on these occasions. In my judgement these cavity preparations were quite acceptable in such respects as outline form, removal of all carious dentine, and extension for prevention. In three of them I had reservations about adequate retention form, and in two, some question about the provision for bulk at the isthmus.

* * *

Two final observations on matters affecting the quality of dental service for children may be of interest :

(1) Office hygiene is excellent. The clinics were invariably clean, neat, and orderly, with a place for everything and everything in its place. The service has rigid rules concerning the housekeeping of the clinics and inspectors are meticulous on this score. Furthermore, instruments must be sharp and sterilization must be routine. The field clinics do not have units or pump chairs (such equipment is on order but not delivered as of March 1950) so that the dental nurses use foot engines, and hand basins as a substitute for cuspidors. Despite this, the clinics have an impressive hygienic appearance.

(2) Patient management seems to present no problems. The dental nurses obviously have the respect and confidence of the children. They appear to stand in the same relation to the children as the school teacher. The work is carried out with a minimum of noise and confusion, and for the most part according to schedule. It was possible to observe several children of three and four years undergoing treatment, with the same results.^p These latter children were accompanied by their mothers, from whom we got the impression that parents also have confidence in the nurses.

^p In one clinic, I watched a dental nurse prepare a cavity on the mesial of a lower left deciduous lateral incisor of a 4-year-old boy. When all the decay was removed, the pulpal wall of the cavity reflected the colour of the pulp. The cavity was lined with zinc oxide and eugenol and filled with copper amalgam. The entire operation was accomplished without incident.

5. COSTS

A personal analysis of the cost of the National Dental Service was impractical owing both to the lack of competence in cost-accounting and to the lack of time. The following materials were prepared by the Division of Dental Hygiene.

5.1 Net Cost of the School Dental Service, 1948-49

<i>Training school and annex</i>	£
Salaries—professional staff, nurses, etc.	53,000
Stores, equipment, stationery, fuel and light, etc. . .	2,000
Cleaning and caretaking	2,280
Telephones	150
Interest on capital	3,500
Depreciation	1,800
Rental (Annex).	560
	63,290
<i>Residential hostels</i>	
Provisions, repairs, heating, salaries and wages, etc.	15,439
Interest on capital	1,666
Depreciation	1,685
	18,790
Less recoveries of board and lodgings from nurses . .	9,067
	9,723
<i>Field school dental clinics</i>	
Salaries of dental officers and nurses	180,000
Stores, equipment and miscellaneous	63,000
Travelling expenses	2,487
	245,487
<i>Administration</i>	
Salaries of clerical officers (Dental Division and Training School)	3,500
	322,000

5.2 Cost of Treatment per Patient

Net cost of school dental service	£322,000
Number of patients under systematic treatment	235,746
Cost per patient per annum.	£1. 7s. 3d.

Field dental clinics are built by the various Education Boards and costs are met by grants made by the Education Department. The foregoing figures, therefore, do not include the erecting of dental clinic buildings in the schools, nor the painting or repairing of these buildings. No precise figures are readily available, but it would appear that interest on capital, depreciation, and maintenance can be assessed at £15,000 to £20,000 per annum, which at the higher figure represents approximately an additional 1/8 of the cost per child per annum. This, added to the figure of £1. 7s. 3d. makes the total cost per child per annum approximately £1. 8s. 11d.

5.3 Adolescent Dental Service, 1948-49

Amounts paid for dental benefits for the year ended 31 March 1949

	£	s.	d.
For general dental benefits	203,128	14	11
For special dental benefits	23,244	9	6
Total	226,373	4	5
Average cost per completed treatment	3	2	11
Special dental benefits	2	9	10

5.4 School Dental Clinic Buildings

	£
“ A ” type (2 officer) clinic	1,400
“ B ” type (1 officer) clinic	1,000
Initial equipment for “ B ” type clinic	180

5.5 Cost of Training a School Dental Nurse

(a) In this instance it was possible to make a personal estimate by using the data obtained from the records of the training school on student enrolment and the costs reported by the Division of Dental Hygiene in 5.1.

Cost to Department of Health for one year, 1948-49 :

	£
Training school and annex	63,290
Residential hostels	9,723
	73,013

Number of students in training for one year, 1948-49 :

Complete year 97	97
Nine months 48 ($48 \times \frac{3}{4}$)	36
Six months 82 ($82 \times \frac{1}{2}$)	41
	174

Cost per student per year £419.6

(b) The Division of Dental Hygiene prepared the following statement :

The department’s method of accounting does not provide a ready and accurate answer to the question as to how much it costs to train a school dental nurse. However, figures have been provided from which the approximate cost can be calculated. These include interest, maintenance, and depreciation on buildings and equipment, salaries of teaching staff and of the student dental nurses themselves, cost of conducting hostels, etc.

The gross cost of training a dental nurse works out at approximately £600 for the two years, of which £300 is paid to her as salary. Then there is the value of clinical services which she gives during the second year of her training. At a very conservative estimate, this can be assessed at £200.

5.6 Salaries

The following salary scales were also furnished by the Division of Dental Hygiene and represent the amounts paid as of 1 April 1950 :

<i>Student dental nurses</i>	<i>Per annum £</i>
First year	177
Second year	202
Lodging allowance (payable to students whose home is not in Wellington)	
First year	55
Second year	45
 <i>School dental nurses</i>	
First year (i.e., after completion of training)	300
Second year	337
Third year	367
Fourth year	392
Fifth and subsequent years	417
 <i>Dental nurse inspectors and dental tutor sisters</i>	
First year	482
Second and subsequent years	507

There are efficiency bars in the above scale at £337 and £392 per annum, beyond which point salaries do not extend unless the school dental nurse has been specially recommended for a salary increase.

Allowances

(a) An allowance at the rate of £15 per annum is payable to school dental nurses who are appointed to take charge of clinics in which there is a staff of more than one school dental nurse.

(b) An allowance at the rate of £5 per annum is payable to student dental nurses who are selected for appointment as section leaders at the Dominion Training School.

(c) A remote allowance of £15 per annum is payable to school dental nurses who are appointed to clinics approved for such an allowance by the Public Service Commission.

(d) An allowance of £15 per annum is payable to school dental nurses who are appointed to take charge of clinics which are regarded as difficult centres.

Note : Only two of the above allowances may be paid to any one school dental nurse.

(e) Travelling allowances are also paid according to the Public Service scale to officers whose duties require them to travel or to reside temporarily away from their headquarters.

Dental officers

£638. 4s. 0d. to £928. 4s. 0d. by £50 increments

Senior dental officers

£978. 4s. 0d. to £1,100 by approximately £50 increments. (A minimum of 5 years' postgraduate experience is a prerequisite for appointment to this grade.)

Principal dental officers

£1,200 to £1,350 by £50 increments.

Assistant director (training)

£1,350 to £1,450 by £50 increments

Deputy director

£1,450 to £1,550 by £50 increments

Director

£1,650 to £1,850 by £50 increments

5.7 Gross salary increases

<i>Designation</i>	<i>1922</i>	<i>1950</i>
Student dental nurses	£80 + £35	1st yr. £177 and £55 lodging allowance
	lodging allowance	2nd yr. £202 and £45 lodging allowance
School dental nurses	£195 to £225	£300 to £507
Dental officers	£485 to £750	£638 to £1,850

5.8 Comparative salaries

(a) The average salary of the woman teacher in the primary schools of New Zealand, 31 December 1948, ranged from £395 for assistant teachers to £556 for head teachers. The average for all women teachers was £404.³²

(b) The salaries of public-health nurses in New Zealand : as of 31 March 1949, the nurse inspector in a district office had a salary of £535, and the district health nurse's salary ranged from £350 to £435.³⁸

No attempt is made here to express costs and salaries in terms of other currency. The New Zealand pound, in February 1950, had an exchange value of \$2.80. Even so, there is no way of assessing (short of skilled study) whether \$2.80 buys as much in the USA as a pound does in New Zealand.

6. TRAINING OF DENTAL NURSES

The training of school dental nurses is pursued 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 organize and carry out the dental care of children and the teaching of preventive principles."³⁷

6.1 Recruitment

An announcement of vacancies for student dental nurses is issued by the Public Service Commissioner of New Zealand in all the principal newspapers of the Dominion in August or September of each year. Application forms are made available at the principal post offices. An applicant must be female, over 17 years of age, possess a school certificate^a or its equiva-

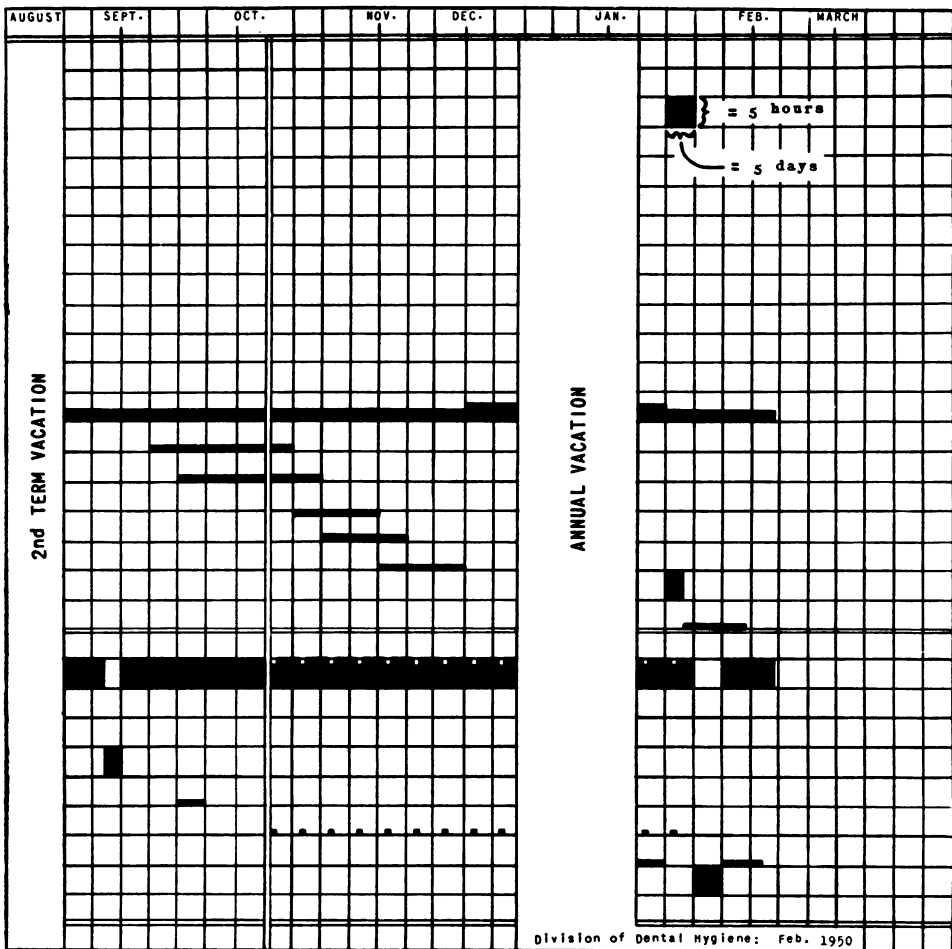
^a The New Zealand school certificate is granted to students who have successfully completed three years of secondary school education. It entitles the holder to enter a normal school but not the university. To qualify for the latter a student must pass a university entrance examination.

included in the survey of 19 clinics. (See Annex 8.) Reasons given by 14 of the school dental nurses are summarized in Annex 9.

6.2 Selection

All applicants who meet the general requirements are referred to the principal dental officer of the Health Department in the district where the applicant resides. This officer, with the assistance of his dental nurse inspector, conducts a personal interview with the applicant and then submits a confidential report to the central office. This report covers physique, general appearance, speech, temperament and nervous disposition, person-

TRAINING SCHOOL FOR DENTAL NURSES



ality, standard of education, adaptability, and environmental influences, and ends with one of the following recommendations : eminently suitable, very suitable, suitable, unsuitable.

These confidential reports are reviewed by a selection committee, which makes the final selections. Usually this committee consists of the director of the Dental Division, the assistant director for training, and the principal of the training school. Preference is given to candidates with previous experience of an appropriate nature, such as schoolteacher, dental assistant, hospital aide or social worker. Candidates between the ages of 18 and 25 are preferred. They are favoured if they have passed the university entrance examination.

All appointees must pass a rigorous physical examination and agree to :

- (a) stay in the service for five years (including two years of training),
- (b) serve anywhere in New Zealand,
- (c) reside in a hostel (dormitory) during the training period, unless the candidate's home is in Wellington.

6.3 Training

When accepted, the student dental nurse enters the training school either in March or September of the year following her application. All expenses are borne by the State. When she enters training she becomes a full-time employee of the State Health Department, with the rights and privileges provided by the Public Service Act, including superannuation, at a starting salary of £177. In addition she receives a £55 boarding allowance.

The training period for the dental nurse is two calendar years including about eight weeks' vacation each year. A scheme of the training plan and curriculum content is presented in fig. 9. A total of 1,608 hours is spent on this course ; 824 hours for the first year, divided into 294 hours of lecture and 530 hours of laboratory instruction ; and 784 hours for the second year, comprising 84 lecture hours and 700 clinical hours. Fig. 9 shows that four formal examinations are conducted during the two years : a primary examination, given about five months after training begins ; an intermediate examination, conducted at the end of the first year ; a qualifying examination, held during the seventh month of the second year ; and a final examination, held before the completion of the training period.

The examinations during the first year consist of written papers and grading in all branches of manual work ; the qualifying and final tests demand :

- (a) a practical examination : preparation and filling of a prescribed cavity,
- (b) a three-hour written examination, and
- (c) an oral examination.

In addition, the student is required to present a paper on patient management and a prescribed exercise in dental health education, before the qualifying test. In the six months before the final examination, the senior students are required to take an examination in dental health education. Copies of questions asked in recent examinations are shown in Annex 10.

TABLE VIII. NEW ZEALAND TRAINING SCHOOL FOR DENTAL NURSES: RECORDS OF INDIVIDUAL CLASSES, 1937-1947.

Year of entry	Number entering	Number that completed training in 2 years	Number that resigned or failed	Number requiring 2½ years' training	Number requiring 3 years' training	Finally trained from beginning class	
						Number	%
1937 Fall	40	29	4	3	4	36	90.0
1937 Spring	30	22	3	5		27	90.0
1938 Fall	41	29	6	6		35	85.3
1938 Spring	36	29	2	4	1	34	94.4
1939 Fall	39	25	7	6	1	32	82.0
1939 Spring	35	24	4	5	2	31	88.5
1940 Fall	38	25	9	4		29	76.3
1940 Spring	37	23	7	4	3	30	81.0
1941 Fall	41	35	4	2		37	90.2
1941 Spring	29	24	3	2		26	89.6
1942 Fall	40	32	4	4		36	90.0
1942 Spring	32	20	11	1		21	65.6
1943 Fall	36	32	3		1	33	91.6
1943 Spring	36	32	1	3		35	97.2
1944 Fall	41	32	6	3		35	85.3
1944 Spring	37	30	4	3		33	89.1
1945 Fall	54	31	11	12		43	79.6
1945 Spring	51	38	5	8		46	90.1
1946 Fall	55	42	5	8		50	90.9
1946 Spring	42	31	6	5		36	85.7
1947 Fall	54	40	8	6		46	85.1
Totals	844	625	113	94	12	731	86.6

The regular training period is two years.

I had an opportunity to examine the enrolment and progress records of the Dominion Training School for Dental Nurses. These records revealed that since March 1937, when the "two entering classes a year" system began, 1,045 student dental nurses had commenced training, up to and including the entering class of March 1949.

Table VIII gives the records of 21 of these classes. It may be summarized as follows :

The table is based on data for 10 years, from 1937 to 1947, which includes 21 entering classes ; 87% of the entering students will complete their training : 74% in the regulation 2 years, 11% in 2½ years, and 2% will require about 3 years' training ; 13% will either resign or fail to pass the various courses.

6.4 Faculty Staff

As of March 1950, the faculty of the Training School for Dental Nurses consisted of the principal (who is also the assistant director for training),

the vice-principal, who further acts as a roving lecturer, an orthodontist, eight dental officers, who serve as lecturers and clinical instructors, 12 dental tutor sisters, who supervise groups of students on the clinic floor, and two matrons, one for the main school and one for the annex.

Six of the dentists, including the principal and vice-principal, are male. They have the degree of Bachelor of Dental Surgery, New Zealand ;^r one of these dentists, the orthodontist, has two additional degrees from London. Of the four women dentists on the staff, two have Bachelor of Dental Surgery degrees and two have Certificates of Proficiency in Dental Surgery, all from New Zealand. One of these women has just completed a period of study in California devoted mostly to orthodontics. The two matrons, as well as all of the tutor sisters, are dental nurses of long experience. One of the tutor sisters has a Bachelor of Arts degree.

Both the principal and vice-principal have had extensive field experience as principal dental officers of Health Department districts, and as a matter of record, the entire faculty has served the programme for a long time. The total years of service for the dentists aggregate 115 and that for the dental nurses 192.

Until 1927 the faculty staff comprised one matron and two dental officers, one of whom served only half time. In that year a second full-time dentist was added. Starting from 1930, three full-time dentists were teaching, although in 1933 and 1934, one of them went back to a part-time status. During the period 1927-1935, the average enrolment of students was 59. In 1938, with the annex opened and two classes entering each year, the faculty had increased to nine dental officers, two matrons, and three tutor sisters, all full-time. The 1938 enrolment reached 121. By 1944 there were ten dentists, two matrons, and seven tutor sisters, teaching a group of 149 students. In 1949 there were 11 dentists and 12 tutor sisters, in addition to the two matrons, teaching 202 students.

A last important point concerns faculty status. The entire school dental service, including the training school, is and always has been included in the programme of the State Health Department. The training of dental nurses has, from the beginning, been deliberately kept separate from the University Dental School training. The faculty members are all Health Department employees and there is no integration or interchange of faculty with the University. The director of the Division of Dental Hygiene and his deputy are both former principals of the training school. Faculty positions are considered as "grade promotion" steps in the Service. The tutor sister positions are used as promotions for outstanding field dental nurses and from them a dental nurse moves into the dental nurse inspector grade.

^r The various dental degrees are fully discussed in section 7 of this report.

6.5 Postgraduate Training

Postgraduate training for the dental nurse is not on a planned level so far as this study could determine. There are occasional meetings of the field nurses, called at the discretion of the principal dental officers, on a district level, at which techniques, materials, and new methods are discussed. (I attended one such meeting, held in Christchurch, at which two films from the United States Bureau of Standards were shown. These films concerned the properties and correct use of amalgam and silicate cement. There was also a discussion of the topical application of sodium fluoride at this meeting.)

Two other media may serve for graduate training :

(a) The *New Zealand School Dental Service Gazette* which is published six times a year by the Division of Dental Hygiene, and which every nurse is required to read and keep on file in the clinic. It carries technical articles as well as official instructions and Division news. This journal features dental health education material particularly.

(b) The New Zealand State Dental Nurses Institute which is the professional society of the dental nurses. Membership in this society is voluntary but most of the dental nurses belong. There are regular meetings of this organization in each district and the programmes are intended to supply useful information for the benefit of the dental nurse. Attendance at the meetings follows the pattern of most organizations of this kind.

6.6 Resignations

One of the problems connected with training is the number of withdrawals from the field service, since such resignations and the need for replacements take precedence over expansion plans. By using some of the information obtained from the enrolment records of the training school, in combination with the listing of the employees on the Public Service register

**TABLE IX. YEARS OF SERVICE AND RESIGNATIONS,
NEW ZEALAND DENTAL NURSES, 1937-48**

Year of entering service	Number of nurses	Accumulated years to 1949	Number in service March 1949	Resignations	Resignations %
1937	63	12	11	52	82.5
1938	70	11	17	53	75.7
1939	65	10	20	45	69.2
1940	59	9	13	46	77.9
1941	63	8	22	41	65.0
1942	57	7	28	29	50.8
1943	68	6	50	18	26.4
1944	68	5	47	21	30.8
1945	93	4	77	16	17.2
1946	86	3	82	4	4.6
1947	98	2	98	0	0.0
1948	90	1	90	0	0.0

(*New Zealand Gazette*, 17 August 1950), it is possible to present some data on this resignation of the dental nurses. This material is found in table IX.

The *New Zealand Gazette* lists the names of 657 dental nurses (including students in training) in the employ of the Health Department, March 1949. Using the data in table IX, the statement can be made that of every 100 dental nurses trained in New Zealand, 30 will have resigned in five years ; half of them will be gone in seven years ; 70 will have left in ten years and only 17 will still be in service after twelve years. It is of interest to point out here that the *Gazette* listed the length of service of each employee. Among the 657 dental nurses so listed, 26 had been in service for twenty or more years, and 79 had served more than ten years.

7. DENTAL PROFESSION IN NEW ZEALAND

According to information furnished by the Health Department, there were 832 registered dentists in New Zealand in February 1950. Since the law requires an annual registration, it was possible to check the dental manpower over a period of years. Table X lists the number of dentists on the register for 11 years, from 1939 through 1949, and also the number of dental nurses, dental nurse graduates, and dentist graduates for the same

**TABLE X. NUMBER OF DENTISTS AND DENTAL NURSES
IN NEW ZEALAND, 1939-49**

Year	Registered dentists *	Dentist graduates **	Field dental nurses †	Dental nurse graduates ††
1939	820	26	213	54
1940	831	13	245	73
1941	828	23	283	61
1942	808	14	287	56
1943	816	16	373	68
1944	824	19	408	58
1945	830	10	389	69
1946	833	10	390	65
1947	847	20	415	84
1948	874	43	440	89
1949	833	36	451	99

* Data furnished by senior executive officer, Division of Dental Hygiene.

** Data from Executive Office of University of Otago Dental School.

† Data furnished by senior executive officer, Division of Dental Hygiene.

†† Data collected by author from records of the Dominion Training School of Dental Nurses.

period. Of interest is the static condition of the dentists' register while the number of field dental nurses has more than doubled. Furthermore, the average annual output of dentists was 21, during these 11 years, while the number of dental nurses averaged 71. Population estimates suggest that the 1940 ratio of dentists to population was 1 dentist to 1,943 people ; in 1950 it is probably 1 to 2,400.

The distribution of dentists appeared to be fairly even over the country, with no area heavily favoured. A detailed analysis might change this picture somewhat but it is doubtful whether the striking differences observed in other countries would apply to New Zealand. The distribution of dentists is known to follow the economic status of the population and New Zealand is quite homogeneous in this respect.

As far as could be determined, the great majority of the dentists are general practitioners, their work encompassing the usual prosthetic, restorative, operative, and surgical procedures. Since the inception of the dental benefits system most of them spend a considerable amount of time in dentistry for children.

7.1 Qualifications

Information on the academic degrees of 571 New Zealand dentists²⁵ shows that a large part of the profession (90%) received training in New Zealand. Of these dentists, 55% possessed a Bachelor of Dental Surgery degree from the University of New Zealand, 12% had a Certificate of Proficiency in Dental Surgery from the same school, and 33% had no registered degree. These latter dentists had apparently qualified for registration by private tutoring, or apprenticeship: common in New Zealand at one time, but not operative for many years. About 8% of the dentists registered foreign degrees, more than three-quarters of them Doctors of Dental Surgery, and the others Licentiates of Dental Surgery. There were 28 dentists on the register who had two or more degrees,^s three of whom had the Doctor of Dental Surgery degree from New Zealand.

7.2 Laws

The original Dentists' Act, regulating the practising of dentistry, was passed in 1880. In 1904 a new Dentists' Act was passed which clarified the definition of dental practice and called for the registration of all practitioners. In 1908, following the founding of the Dental School at the University of Otago in 1907, a law was enacted which set up certification by the Senate of the University as a condition of registration. The present Dentists' Act came into force in 1937, establishing the Dental Council of New Zealand which consists of the Director-General of Health, two dentists recommended by the Minister of Health, one dentist from the University faculty, one dentist elected by the practitioners of the South Island, one dentist elected by the practitioners of the North Island, one physician from the University faculty, and one physician nominated by the New Zealand Branch of the British Medical Association.⁴² The Director-General has always been represented on this council by the Director of Dental Hygiene. The Dental Council of New Zealand controls the registration of dentists

^s Increasing numbers of New Zealand dentists are seeking postgraduate training and study in the United States. The shortage of dollars has made this prohibitive at the present time.

and determines whether the qualifications of the applicant entitle him to registration. It can demand an examination of a candidate if it thinks fit. The council also polices the dental law and recommends the removal of names from the register (the actual removal order is made by the supreme court). This act requires the annual registration of dentists and provides for provisional practising certificates at the discretion of the council.

This brief summary of the dental laws shows the gradual, steady progress made in raising the standards of dental practice. The pages of the *New Zealand Dental Journal* over the years mirror these efforts of the dentists to improve their profession.

7.3 The Dental School

The dental school has always been a unit of the University of Otago, which is, in turn, a part of the University of New Zealand. It is located at Dunedin in close proximity to the medical school from whose staff comes the basic science instruction. The first dean, as well as the present one, had both medical and dental degrees and there has always been interaction between the two faculties.

The dental course requires five academic years in residence and leads to a Bachelor of Dental Surgery degree. The first year is a pre-professional one devoted to science subjects and terminates with a medical intermediate examination which must be passed by all medical or dental students before they can enter professional study. The four professional years conform to the standard pattern of basic science, dental science, and clinical and laboratory practice and cover 3,765 hours.

The general organizational pattern of the dental school is departmental. The 1949 report of the faculty covers departments of conservative dentistry, preventive dentistry, prosthesis, orthodontics, oral surgery, periodontics, basic sciences, hospital, and library. The department of preventive dentistry includes public-health activities and research and also specializes in the teaching of dentistry for children as a separate entity.[†] In addition to the dean, each department head is a full-time man. The 1950 prospectus of the dental school lists 55 faculty members.⁴⁴

The income of the dental school for the year ending 31 March 1950, totalled £50,720 which, with the exception of £8,170 from students' fees and £6,500 paid for services by patients, came from government sources. Expenditure during this period totalled £50,491, which included some £25,000 for salaries, and £2,500 for research.

As of November 1949, the student enrolment included 69 first-year, 51 second-year, 54 third-year, 46 fourth-year, and 44 fifth-year students : a total of 264.

[†] Dentistry for children first appears in the 1948 prospectus. Preventive dentistry, as a separate subject, is listed in 1946 for the first time, although it is linked with orthodontics from 1940 to 1945.

The University of New Zealand offers graduate work in dentistry. The degree of Master of Dental Surgery requires a Bachelor of Dental Surgery and three academic terms of full-time residence in a selected course of advanced study and research approved by the dental faculty. This degree work originally appeared in the 1912 catalogue and was offered every year through 1923. No record could be found of its success nor why it was discontinued. The Master's degree has been reinstated and the first student is scheduled to begin in 1950.

The degree of Doctor of Dental Surgery has been available since 1924. It also requires the Bachelor of Dental Surgery and a minimum of four years of dental practice (not in residence) and study. The candidate must present a dissertation upon original work done in dentistry or an allied science having a bearing on dental research. It is possible to complete this degree in three years if the time has been spent in full-time teaching.

The dental school instituted a series of two-week refresher courses for practising dentists in February of 1950, and expects to make this a continuing postgraduate feature of its programme. The first series covered conservative dentistry, orthodontics, preventive dentistry (mostly dentistry for children), and applied dental pathology.

The Certificate of Proficiency in Dental Surgery is no longer offered by the University but its history deserves some comment. Apparently it was first offered in 1906 to enable men who studied by apprenticeship to qualify for registration. As time went by the course developed into a resident course of four academic years. It differed from the Bachelor of Dental Surgery in requiring less basic and theoretical dental science, and concentrating on practical clinical and laboratory work. In 1916, the Dean of the Dental School, H. P. Pickerill, suggested replacing the Certificate of Proficiency of Dental Surgery because the conditions for obtaining it were too similar to the Bachelor of Dental Surgery and neither was producing enough dentists to meet the country's needs. He advocated a diploma course which could be completed in three years.¹²

The dean's proposal stirred up considerable debate which ended in approval by the Dental Association, but nothing apparently came of it until 1918. At that time the announcement was made that new regulations for the Certificate of Proficiency in Dental Surgery had been passed by the Senate of the University. The course would still require four years, but only two in residence. It would be necessary to pass the matriculation examination and register as a dental student. Then the first two years, spent in practical mechanical dentistry, could be done under a registered dentist or at a dental hospital. The final two years must be spent at the University.¹⁴ Students have not been accepted by the University for the Certificate of Proficiency in Dental Surgery since 1943.

7.4 Dental Bursaries

In 1917, the fact that the University was not attracting dental students caused great concern. Since the war, then in progress, was increasing the great shortage of dentists, the profession was afraid that, if students were not attracted to the course in sufficient numbers, the educational requirements for registration of dentists might be rescinded. (The law of 1908, which gave the University of New Zealand power to dictate the qualifications for registration, had greatly restricted admittance to the register.) The dentists were asked to assist interested students in financing their dental education. On 22 August 1917, a dental bursary fund¹³ of £251. 19s. 6d. was subscribed by dentists. This fund eventually reached £529 and in March 1918 the University granted bursaries to 16 students.

The success of this venture caused the Dental Association¹⁵ to approach the Government for the financing of 20 dental bursaries a year.

In January 1919, the Minister of Public Health announced that the Government would provide 10 dental bursaries of £50 each for the coming year. Upon graduation, the bursar would be required to work under the State, or an approved hospital board, for a period of one year for each year a bursary was held.⁴³

New Zealand has subsidized dental education in this form each year since 1943. It is a main source of recruitment for junior positions in the National Dental Service of the Health Department. In November 1949 there were 65 Government bursars in the dental school.

7.5 New Zealand Dental Association

Founded in 1905, this organization has a history of long and steady growth. Its membership in 1949 was 573,²⁵ approximately 70% of the registered dentists in New Zealand. It has 17 branch associations completely covering the Dominion, each of which is represented on the executive council, the governing body of the association. The council meets periodically (nine times during 1949) and the entire association holds an annual scientific and business session. The *New Zealand Dental Journal*, now in its forty-fifth year, is published by the association. Judging by the material in this journal, the association has always stood for high standards of dental care and been alive to its responsibilities concerning public health. The association listed its 1949 assets at £5,783.²⁵

7.6 Attitude toward the National Dental Service

The pages of the *New Zealand Dental Journal* offer abundant evidence that the National Dental Service is approved by most of the profession. My personal contacts corroborated this fact. Discussions were possible with many practising dentists which included all of the members of the

Executive Council of the Dental Association, the officers of six of its branches, and the present Dental Council of New Zealand. All of them think that the programme has been of great benefit to the children. Some criticism was voiced concerning materials used and techniques employed but nowhere was there any thought of discontinuing the Service.

Of particular interest were the views of older dentists who were practising before the dental-nurse system began. They were positive that the children of today are vastly superior dental patients, with better mouths, better discipline, and better attitudes toward dental hygiene.

8. DEVELOPMENT OF THE NEW ZEALAND NATIONAL DENTAL SERVICE

8.1 School Dental Service

The impetus for a New Zealand School Dental Service came in 1912. During that year a programme for the medical inspection of schools and schoolchildren was brought into operation under the joint control of the New Zealand Departments of Education and Public Health. A medical inspector in each of the four chief cities of the country began, in September of that year, the regular inspection of children in Standard II of the schools, that is, schoolchildren averaging 10 to 11 years of age.²⁶ This inspection followed the classic pattern wherein physical defects were noted and notices sent to the parents of children in cases where medical or dental treatment seemed to be indicated.

The first report of this service, appearing in 1913,²⁷ covers the examination of 7,661 school children, and says : "The medical inspectors do not treat cases but, where necessary, recommend the parents to obtain medical attention for their children. Generally this advice is followed ; but there is a proportion of cases in which the expense of treatment is an obstacle. This is especially the case with dental disease ; and, unfortunately, no less than 72% of the children examined in Standard II were found to be suffering from defective teeth."

At the annual meeting of the New Zealand Association in 1913, Dr. K. Cox,¹ in his presidential address, discussed the decay of teeth, the dental experts' relation to the public, and the findings of the medical inspectors. His recommendation stated, "the only solution of the problem is to establish a system of State Dentistry for the use of the pupils of the primary schools of all denominations . . . This scheme would consist of the appointment of State dentists for the purpose of establishing and carrying on of school clinics, so that every child from the age of, say, 6 to 14 years, would be compelled to have his or her mouth in a perfectly hygienic condition . . . Only by some universal scheme organized by a central authority, that is, the government, would any complete and satisfactory results ensue." Although Dr. Cox said later that, "when he first mentioned the idea at

the 1913 Conference he did so in fear and trembling,"¹⁸ the idea was well received by the more than 100 dentists present. In fact, on 10 July 1913, a deputation from the New Zealand Dental Association¹¹ waited on the Ministers for Public Health and Education with a proposal that the State establish four dental centres in New Zealand with one State dentist in each centre. The government agreed to consider the matter.

Each subsequent report of the medical inspectors indicated that "decayed and neglected teeth" were the most common defects found among school-children. New Zealand entered the first World War in 1914 and the dental needs of the draftees (all available dental manpower was directed to getting these men into shape for service) heightened the concern. The 1915 report of the Department of Education²⁸ says: "Recent events have emphasized the fact that the nation's efficiency depends to a large extent on the physical soundness of its men and women; and have made the duty of laying the foundation of that physical fitness in the children a very clear one."

In 1916, the report of the medical inspection of schoolchildren²⁹ carried the first comprehensive discussion of the dental caries problem. It mentions the techniques employed in tackling this problem, such as inspections, notification of parents, instruction of teachers and children, toothbrush drills, leaflets, and the problem of referral, and then goes on to say: "With regard to curative treatment, we feel that . . . the schoolchildren require special dental clinics, to which they can have direct access through the recommendation of the school medical staff. There should be no delay, and no question as to private means. Many parents would gladly take their children to a school clinic who would hesitate to attend a dental hospital, although unable to pay private fees. Further—and this is important—the treatment times can be arranged specially to suit schoolchildren, and to avoid unnecessary interference with their school work."

Apparently this plan was offered as a solution for urban schools only, since the same report suggests that rural districts might arrange for treatment at special contract rates with local dentists. The 1917 report suggests a provision for school dentists to visit outlying localities so as to treat children at their own schools for a very moderate charge. In 1918, the report³⁰ takes up the proposition of school dentists travelling through the country districts, "by means of motor ambulances, in which simple treatment can be provided in a general and systematic manner".

8.1.1 *Appointment of chief school dental officer*

Both the 1917 and 1918 reports of the Education Department mention the impossibility of obtaining suitable dentists owing to the stress of war conditions. Late in the latter year, however, the announcement was made that arrangements were pending for the appointment of a chief school dental officer, who, "will shortly have the direction of a large staff of school dentists."³⁰ The report for 1919 states that,³¹ "A chief school dental

officer has now been appointed, who is at present inaugurating a scheme for providing dental treatment for children otherwise unable to obtain it, and when this system is in operation a great advance will have been made in the work of maintaining the physical fitness of our boys and girls”.

An interesting circumstance developed over this appointment. One of the dental leaders during this period in New Zealand was T. A. Hunter, one of the founders and a past president of the New Zealand Dental Association, a pioneer in the establishment of a Dental School in New Zealand, and a consistent champion of high standards of dental care.^u It was he who, back in 1913, suggested a committee to present Dr. Cox's idea to the Government.¹

When New Zealand entered the first World War, Hunter accepted the task of organizing and administering a dental corps for the armed forces. Upon his return to New Zealand in 1919, he was asked to accept the newly created position of chief school dental officer in the Department of Education, since he was one of the few men who possessed the varied qualifications needed, had great experience of dental conditions, both in private practice and public service, and a whole-hearted enthusiasm for the cause of child health.

Hunter accepted the appointment in 1919, only to learn that no consultation by the New Zealand Dental Association had been sought by the Education Department in creating or staffing the position. He promptly resigned in protest. The minutes of a special meeting of the Executive Council of the Dental Association, held 6 March 1920,¹⁷ record an interview with Hunter in which the Council assured him that, “the Executive were deeply interested in the State Dental Service, and would at all times be pleased to assist him in every way possible, and would use every effort to make the scheme a success . . .” With matters thus ironed out, Hunter took on the job anew, beginning 1 June 1920.

In 1920, a new health act was passed by the New Zealand Parliament. This act removed the medical inspection programme from the Education Department and gave full control to the Department of Health. The medical functions of the school programme were settled in a Division of School Hygiene. All dental personnel and activities were placed in a Division of Dental Hygiene as one of seven major sections of the Health Department under the immediate supervision of the director-general of health.³⁴

8.1.2 *Appointment of director of Dental Division*

Hunter became the director of this newly created Dental Division on 1 January 1921. His first published report on the work of the Division covers the period 31 March 1921 to 31 March 1922.

^u An excellent account of Hunter's services to dentistry in New Zealand can be found in the *New Zealand Dental Journal*, 1947, 43, 163.

The following four points might be mentioned in connexion with Hunter's problem of creating a State Dental Service.

(1) A committee report dated 5 February 1919,¹⁶ to survey the practice of dentistry in Great Britain, mentions, "Three factors hithertho hindered the provision of a complete scheme of dental treatment for schoolchildren. They are in order of importance :

"(a) The considerable expenditure entailed.

"(b) The shortage of dentists.

"(c) The absence of a public demand.

". . . With reference to (b) the evidence, undoubtedly, is to the effect that there is a very acute shortage of dentists available for school dental work, especially at the salary and fees which local education authorities are prepared to pay . . . The committee are of opinion that suitably trained and competent dental dressers or nurses, acting under the effective supervision of a dentist, may be usefully and safely employed in school dental work."

(2) The reports of the medical inspections of schools which indicated the great dental needs of the children and the difficulties in providing dental care.

(3) His army experience with the dental neglect of the draftees.

(4) The encouragement and support of the Dental Association, particularly that of Dr. N. Cox. Mr. R. Dunn is quoted, in one place,¹⁸ as paying "high tribute to the enthusiasm, in the cause of a State Dental Services, of Dr. Cox of Timaru, whom he regarded as the father of the scheme".

After much study and deliberation, Hunter decided to inaugurate a full-time service in the schools which would stress the preventive and early corrective aspects of dental care. Such care would be provided to young children and maintained on a routine basis through the elementary school ages.

8.1.3 *Dental nurses project*

The staffing of such a service posed a difficult problem. There were 2,400 schools in New Zealand in 1919, with an average weekly roll of 193,655 children. Obviously, a great number of dentists would be needed to cover the schools adequately but it was doubtful whether this could be done. The one dental college in New Zealand had an average of about 20 graduates yearly. The Government began granting bursaries for the study of dentistry in 1918 but it was doubtful whether such bursars would remain any longer in government service than their obligation demanded. The prospects of private practice were very bright since dental care for the general public was urgently needed also. Furthermore, a large increase in the number of dentists would necessitate enlargement of the Dental School, a prospect that could not be fulfilled for years.

Even if these difficulties could be overcome, Hunter was convinced that instruction and practice in every branch of dentistry was unnecessary for the school programme ; that a career of elementary techniques would cause a dentist to lose his facility in the higher branches of dentistry ; that dentists would therefore find the service unattractive ; and that only the extremely altruistic or those incompetent to the point of failing in practice would apply. Finally, Hunter⁸ believed that women were " temperamentally and psychologically more suited than men to deal with and treat the ailments of very young children". Considering all of these factors, Hunter announced a plan for the intensive training of young women (which he called dental nurses) so as to fit them to undertake simple fillings and extractions, in addition to such prophylactic work as would ordinarily be deemed to come within their province.

These young women, carefully selected as to educational standard, personality and age, general suitability, and general health, were to serve a two-months' probationary period, after which only those showing special aptitude for the work would be retained. The trainees would " undergo an intensive training in a science course, embracing chemistry, physics, biology, anatomy, and physiology, specially arranged by the Health Department's officers as suitably fundamental for the work the nurses will have to do.

" They will at the same time be given work to do on the natural teeth set up in dummies, whereby they will acquire the necessary dexterity in the use of the dental engine and the mouth mirror.

" Following this they will receive instruction in the branch of dentistry for which they are being trained, and only when their manual dexterity is assured will they be allowed to assist in simple operations.

" Their training will proceed finally to a knowledge of the filling of simple cavities and simple extractions of temporary teeth, where a general anaesthetic is not necessary." ⁸

Since these dental nurses when trained were to be full-time employees of the Department of Health, it was thought desirable to train them under the supervision of that department's officers. Wellington was centrally located ; a building and equipment were available and the work could begin at once. The dental school was ruled out as a training centre because " A good deal of the fundamental training, which would be given to the nurses in common with dental students, would be quite superfluous owing to their limited field of work, and would be for them a waste of time. It is also undesirable from a departmental point of view that the nurses should have the stamp of the dental school and acquire there any great knowledge of general dentistry." ⁸

It seems important to point out here that all the reports, suggestions, discussions, and proposals for a State Dental Service in New Zealand, advanced since 1912, had not presupposed the use of fully qualified dentists.

Cox's 1913 address¹ mentioned the possible use of "oral hygienists" and Dunn² (who later became the first supervisor of training of the dental nurses) wrote a paper in 1917 which introduced the term "dental nurse" and suggested her duties might include, "to examine the teeth of very young children, and to treat the teeth and perform certain simple operations on them when necessary".

Hunter's plan, therefore, did not introduce an entirely different note into the matter. Nevertheless, the New Zealand dentists received it with mixed feelings. The report of their Executive Council meeting, 26 July 1920,¹⁹ says, "State Dental Service—Replies were received from 14 Branches concerning Mr. T. A. Hunter's proposals to train women for this service; and as the majority were opposed to the scheme the Secretary was instructed to again write all the Branches asking them to submit proposals that would adequately deal with the matter . . .".

As much dissatisfaction and misunderstanding still seemed to exist, it was eventually arranged, at the invitation of the government, to have a special general meeting of the Executive Council of the New Zealand Dental Association in Wellington. Such a meeting was held 5 September 1920, and, in addition to the Council, was attended by an elected delegate from practically every branch in the Dominion, and the dean of the dental school, Otago University. Hunter, in again outlining his plan, apparently made it clear that though he very naturally sought the co-operation of the New Zealand Dental Association he was under no obligation to come before its members and would indeed be prepared to act independently if required. After an all-day discussion, described as "exhaustive", the conference passed the following resolution²⁰ by a vote of 16 to 7: "That this meeting approves of Mr. T. A. Hunter's scheme in principle".

8.1.5 *Reactions to project*

This decision did not silence the opposition, however, and concerted efforts to hinder and, if possible, overthrow the scheme were evident for some time. The arguments are best summed up in an editorial which appeared in the *New Zealand Dental Journal*.²¹

"Now the objections brought forward, against the employment of dental nurses or hygienists, on the lines indicated, on analysis range themselves under three main headings:

"1. Menace to public health

"2. Menace to the profession

"3. Injustice to those seeking to enter the ranks of the profession by recognized avenues, more especially in reference to those students seeking the B.D.S. Diploma or the C.O.P. Certificate.

"As regards the first point raised, we cannot take it seriously. The scheme as arranged is to operate on children as they enter the first primer, with a view of checking caries in the first permanent molar in its inception. To contend that the insertion of thousands of simple fillings in such teeth, and the cleaning up of a dirty mouth by the removal of hopelessly diseased deciduous teeth, is going to prejudice the health of these children

more than the utter neglect of the past, is to our minds an absurdity, and this even if we grant that a pulp might occasionally become septic under the hands of the dental nurse, which would not have done so if treated by the duly qualified and registered practitioner.

“ The argument that some of the dental nurses will ultimately either seek admission to the dental register or pursue unqualified general practice is, we think, largely nullified by the safeguards imposed. Such of these nurses as, in later years, break away from public service and are yet desirous of remaining in the profession, are more likely to take up the position of operating assistant to a registered practitioner than to try the doubtful expedient of unregistered practice. Employed as indicated, the dental nurse is infinitely less of a menace than is the unregistered man, often with the plea of a wife and family behind him, so much in evidence in our surgeries today.

“ As regards injustice being inflicted on legitimate students entering the profession, there is possible force in the contention that the salary to be paid these women is too high when compared with that offered to our bursary students subsequent to registration. This is a matter that may be well looked into. We do not regard the question of competition as a factor in the case at all. The argument, for such it amounts to, that the teeth of our children must remain in a carious condition, in order to supply work for the practitioner of the future, is a fallacious one. Public necessity must take precedence over either the interests of the individual, or the demands of any dental school, wherever conducted. We yield to none in our admiration of the prescribed course for dental students as conducted at the Otago University, but when the Director of Public Dental Service demands, in the near future, some 200 assistants to cope with work urgently required, and the dean of the dental school can promise but a possible 20 or 30, a discrepancy is shown to the disadvantage of the public which cannot be bridged by present methods.

“ It has been suggested that an extraordinary general meeting of the Association be called to once again re-open the whole question. Such a step would be futile, as very few dentists would face the loss of time and the expense incident to such a gathering.

“ The Executive gathering held in Wellington was composed of men selected by their fellows as representatives, presumably on account of their fitness for this position. Many of these men approached the discussion with a strong feeling, we might almost say, bias, against the proposed training of dental operative nurses; yet, after the most exhaustive enquiry, they came to the conclusion that no alternative suggestion was advanced to meet the case and that no course was open to them but to support the scheme brought forward by the Chief Dental Officer. This scheme is yet in its infancy, and Mr. Hunter himself will be the first to admit that it may have imperfections which time alone will reveal, and experience remedy. We have the greatest respect for those who cannot view this matter as we ourselves do, yet, without sacrificing their own principles, remain loyal to their chosen leaders, but we frankly confess we have no sympathy at all with those who, by unconstitutional methods, seek to overthrow the expressed voice of their chosen representatives, and who, in so doing, imperil not so much the security of a proposed school dental scheme, as the welfare and cohesion of the body to which they belong.”

The last two paragraphs of this editorial accurately reflected the feelings of the majority of the New Zealand Dental Association as evidenced by their subsequent actions. No extraordinary session of that body was called and at the next annual meeting, 17 May 1921,²² the unconstitutional action of certain branches and members in trying to subvert a decision of the New Zealand Executive Council was strongly deprecated. There is no record that the issue was ever debated again. At the May 1922 meeting of the Association at Nelson, Hunter gave a full account of the progress

of the School Dental Service during its first year. He also brought in a number of children from the Nelson school clinic who were examined by members of the conference. The discussion ended by the Association passing unanimously the following resolution : ²³

“ That the Conference, having had an opportunity of inspecting some of the good results obtained by the State Dental Hygiene Service, wish to convey to the Honourable the Minister for Public Health, its hearty appreciation of the work being done by the Department, and only hope that further financial support will be forthcoming to extend the good work.”

8.1.6 *Development of service*

The School Dental Service, as conceived by Hunter, began operating in 1921 with the training of dental nurses. One hundred and twenty young women applied as nurse probationers, thirty being finally selected. Twenty-nine of these nurses completed their training in 1923 and were immediately sent out to provide dental care for schoolchildren. In addition, the Health Department employed six dentists to work in other school clinics. Hunter administered the programme and, with the help of one other dentist, operated the training school. The service has operated continuously since 1921 along the same basic lines. The records of the Division of Dental Hygiene over a 29-year span reveal a constant expansion both as to the staff and the number of schoolchildren brought under care.

Even in the depression years of the early 1930's, the programme moved forward. The 1936 report gives statistics for the preceding six years, showing that the number of schools under systematic treatment increased from 930 to 1,590 during that period. This report says : ³⁶ “ These figures include the years of acute financial stringency, during which the annual extension of the service to new districts became impossible. It is satisfactory to note that no ground has been lost, and that on the contrary, the figures disclose a small, but steady, increase each year.”

In 1937 a second building was acquired as an annex to the training school and the programme was expanded to accept two drafts of student nurses ; one draft entering in March and the other in September. Up to 1937, the entering group of dental nurse trainees numbered 30 to 35 annually. The two-draft system enabled approximately 75 to enter each year and correspondingly increased the number of graduates. In 1945, the intake for each draft of trainees was expanded to 50 and in March 1950, for the first time, the draft was authorized for 75 probationers. The government erected a special building for the training programme in 1938. It is a modern, well appointed structure, designed specifically as a dental nurse teaching institution.

Dental health education for children, parents, and the lay public (called propaganda in the early reports) was an integral part of the School Dental Service from the beginning. Hunter always stressed that, “ the most impor-

tant part of the nurse's duty was to take and make every opportunity to discuss prevention with the mothers, either at the chairside or by arranging meetings" (personal communication). Its materials and methods were always included in the basic instruction of the dental nurses and the development of leaflets, posters, exhibits, and talks are discussed in the various annual reports. In 1944 a senior dental officer of the division was assigned to work in close collaboration with the Departmental Committee for Health Education. The following year, he was given a full-time appointment as executive officer in directing health education work within the Dental Division, thus giving added emphasis to this phase of the programme.

The Division of Dental Hygiene has had only two directors. J. L. Saunders, who entered the service in August 1924, succeeded Hunter as director in March 1930, and still holds the position. Saunders was secretary of the Christchurch Branch of the Dental Association in 1920 and represented North Canterbury on the executive council that approved the dental nurse scheme. At that time, he expressed grave doubts about the plan. He entered the service as the supervisor of training and in 1925 reported: ³⁵ "These nurses are now in their second year of their training, and after observing their work for the past 8 months I must say that I am very much impressed with their enthusiasm and ability".

8.2 Adolescent Service

Discussion for an extension of the school dental service into the adolescent ages began with New Zealand's entry into the second World War. The fact that 45% of the young men called up for service were artificial denture cases (21% were completely edentulous) (Fuller)⁴ suggested the need of a reorientation of dental practice in the Dominion.

The dental journals of the period devote many pages to discussions of a more comprehensive and better distributed dental service. Every article agreed that the work of the school dental nurses was of a high standard. However, a gap existed in dental treatment from the time a child was no longer eligible to be treated in a school dental clinic until he commenced earning his own living. Many reasons were advanced for this: shortage of dentists, particularly in rural areas, economic barriers, indifference and ignorance of the public, attitudes of the dentists toward conservative dentistry, and the like.

Two dental journal articles in 1942 provoked wide, and somewhat heated, discussion. One advocated "a demand by the dental profession for the immediate introduction of state dentistry, free for all, and compulsory for all" (Hewat⁶), and the other raised serious questions about the training of dental students (Saunders⁴⁵).

Early in 1943, another paper appeared in the dental journal advancing the proposal that, "the State assume responsibility for a complete dental

service for all children and adolescents up to the age of 18 years...” (Hewat ⁷). In July of that year, a letter from the Health Department asked for the views of the Dental Association on a tentative government plan to build up a staff of salaried dental surgeons to deal with the adolescent group (Saunders ⁴⁶).

The Central Executive of the Dental Association submitted the tentative government plan to the various branches for comment and later set up a special committee to study the matter. In June of 1944, the government notified the association that it had definitely decided to launch a programme for adolescents, using a corps of full-time dentists and selected dental nurses. It further proposed,²⁴ “to invite the members of the profession themselves to undertake voluntarily and at an agreed rate of remuneration—either on a fee for service, or a capitation basis—the dental care of suitable groups of adolescents . . .”.

Officers of the Dental Association meeting with their special committee discussed this government plan. They felt that a complete salaried State service, manned by graduate dentists, would be more satisfactory. But since it seemed impossible to staff such a State service adequately, they agreed that association members might assist in the provision of adolescent service provided (among other things) that :

1. the scope of the dental nurse’s work was not altered ;
2. the service for adolescents was limited to certain types of conservative treatments ;
3. there was free choice between dentists and patients ;
4. the fee-for-service system was adopted.

This statement, along with a suggested fee schedule, was presented to the government in September 1944 (Wilkinson). ⁴⁸

Through 1945 and 1946, negotiations continued between the association and the government on details of the programme. Finally, on 1 February 1947, the adolescent dental service was inaugurated substantially in the form recommended by the Dental Association.

ACKNOWLEDGEMENTS

Grateful acknowledgement is due to the consultants mentioned at the beginning of the report and to many New Zealand people for their co-operation and assistance, particularly the Director of the Division of Dental Hygiene, J. Ll. Saunders, and his staff. Special thanks are due to Dr. B. Price for his tabulation and presentation of the data, to Mr. G. Ellison for his help on the manuscript, and to the able secretarial work of Mrs. B. Currie.

Annex 1

OFFICIAL INSTRUCTIONS
ON DENTAL HEALTH EDUCATION ACTIVITIES *

To save reference back to the *Gazette* of June 1945, copies of which are not now available for new clinics, the classification of activities is republished herewith. Officers will note that individual instruction in oral hygiene, full details of which appear in the July 1948 issue of the *Gazette*, is classified under section (b). It should be noted also that each individual instruction in oral hygiene constitutes one activity.

The classification is as follows :

(a) Formal talks or lessons to a group in class-room, one unit. (No time limit to talk, but ten to twenty minutes speaking-time regarded as average. Nurse will state preparation time. Informal talks and waiting-room or chair-side instruction not included.)

(b) Individual instruction in oral hygiene and inspection of classes or groups for oral cleanliness. Aggregate time during month to be assessed, and three-quarters of an hour of same to equal one unit. Calculate to the nearest half unit. These inspections must be regular inspections of either one class only or certain specified classes. For example, primers during one month, Standards 1 and 2 the next month, Standards 3 and 4 the next month, and so on. Spasmodic inspections lose their effect.

(c) Talks to adult organisations. Nurses will supply details of talk, time of preparation, etc., to act as guides for principal dental officers, who will allot units up to five for this activity.

(d) Stalls or exhibitions at school functions, shows, or public gatherings. Maximum, ten units. Nurses will supply full details as in (c) above.

(e) Preparation of posters, models, or dental health education material for use in clinic or school, up to five units. Supply details as in (c) above.

(f) Preparation of written articles for the *Gazette*, up to five units.

(g) Composing or producing stage plays, radio plays, etc., up to ten units.

It will be seen that the range of units allows for those efforts entailing a large amount of work. Wherever possible, quality will be taken into account as well as the time factor in preparation. In cases where the subject cannot be fully written up on the return, a separate sheet must be used for this purpose. Nurses will assess their own units under sections (a) and (b) and add these to the return. Units for sections (c) to (g) will be allotted by the principal dental officer, who will advise nurses what units were given.

A minimum of two units per month from each school dental nurse is required.

It should be noted that there is a difference in the use of the terms "activity" and "unit". "Unit" is a means by which health education activities may be assessed. By an "activity" is meant, under sections (a) and (b), each individual time a nurse talks or demonstrates to a class or group. For example, if a nurse takes inspection of tooth-brush drill five times—that is five separate activities. Under sections (c) to (g) each talk, public exhibition (whether it lasts one day or one week), poster, model, written article for *Gazette*, or stage play will constitute one activity. All school dental nurses will adhere rigidly to these instructions.

* Taken from the *New Zealand Dental Service Gazette*, March 1949

Annex 2

DENTAL ATTENDANTS : SUMMARY OF COURSE *

<i>Subject</i>	<i>Lectures</i>	<i>Practical Hours</i>
Organization of the Department, the Training School, and field clinics	1	—
Clinical records	—	15
Stores forms	—	16
Names of instruments	—	2
Use and care of equipment	—	12
Routine care of surgery, etc.	2	—
Hygiene	5	—
Teeth and mouth	4	—
Filling materials	5	2
Management of the child and adolescent	1	—
Extraction-room technique	—	2
X-rays	2	2
The National Dental Service	1	—
Dental health education	2	2
Clinical duties	—	19
Publicity section	—	2

*One-month course given in the Dominion Training School, New Zealand

Annex 3
NATIONAL DENTAL SERVICE
 Department of Health — Division of Dental Hygiene

[H.—D.H. 61

Claim for Dental Treatment under Social Security (Dental Benefits) Regulations 1946

Mr _____, Dental Surgeon. Address : _____

Name of Patient : _____
 (Surname in block letters) (Christian names)

Address : _____

RECORD OF TREATMENT GIVEN (For instructions, see overleaf.)

Operation	BUCCO-LABIAL PATIENT'S RIGHT								PATIENT'S LEFT								BUCCO-LABIAL		Remarks
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	8	7	
Palatal	[Diagrams of teeth 8-1]								[Diagrams of teeth 1-8]								Palatal		
TOOTH, Upper	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8			
TOOTH, Lower	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8			
Operation	Lingual								Lingual										
	Bucco-labial								Bucco-labial										

Other treatment : _____

SUMMARY OF TREATMENT AND CLAIM FOR FEES ACCORDING TO SCALE

Period of Service	Treatment or Service	Fee per Treatment		Number	£	s.	d.
		s.	d.				
From	I. Examination and prophylaxis (twice each year), each time	10	6				
(Date)	II. Synthetic porcelain fillings—						
	(a) Each separate filling	15	0				
	(b) Each of two or more approximal fillings when done together.	12	6				
To	III. Amalgam fillings—						
(Date)	(a) Each simple filling in anterior teeth and back to and including second premolars	7	6				
	(b) Simple filling in molar (including two fillings in occlusal surface of upper molars, and including all buccal, palatal, and lingual fissure extensions)	10	6				
	Two-surface approximo-occlusal { (c) In premolar	12	6				
	fillings { (d) In molar	15	0				
	Mesio-occluso-distal { (e) In premolar	21	0				
	fillings { (f) In molar	25	0				
	Restorations (include the restoration { (g) Premolar	25	0				
	of one or more cusps) { (h) Molar	30	0				
	Maximum fee for treatment of any one { Premolar	25	0				
	tooth (exclusive of root-canal treatment) { Molar	30	0				
IV. Root-canal treatment—							
(a) Pulp removal and root-filling	21	0					
(b) Treatment of septic root canals with subsequent root filling, but without x-ray—Maximum fee	30	0					
V. X-rays—							
(a) Bite wing (for diagnosis—two films ; one each side)	10	6					
(b) For root treatment (two films ; one before and one after)	10	6					
VI. Other treatment specifically approved—							
	Totals						

I hereby certify that I received dental treatment from Mr. _____ during the period specified in this column.
 (Signature of Patient.)

I hereby claim this amount in respect of the above dental treatment undertaken at the fees agreed to.

Date : _____ Signed : _____
 Dental Surgeon.

[OVER.

Annex 6

DENTAL CLINIC SURVEY FORM II

FEDERAL SECURITY AGENCY
Social Security Administration
Children's Bureau

Interviewer _____

Date _____

State	County	City or Town	Address
Type of service	Yes	No	Remarks
EXAMINATION : 1. Mirror & explorer 2. Radiograms 3. Saliva sample 4. Charting the mouth 5. Health education			
TREATMENT : 6. Prophylaxis 7. Fluorides 8. Gingivitis 9. Extractions 10. Anaesthesia 11. Partial pulpectomy 12. Pulp capping 13. Root canal therapy 14. Orthodontics			
RESTORATIONS : 15. Silver amalgam 16. Silicates 17. Castings 18. Fractured anteriors 19. Cement bases 20. Prosthetics 21. Other			

Annex 7

DENTAL CLINIC SURVEY FORM III

**FEDERAL SECURITY AGENCY
Social Security Administration
Children's Bureau**

Interviewer _____

Date _____

State	County	City or Town	Address
-------	--------	--------------	---------

Clinicians :

Supervisors :

Assistants :

Equipment :

- Procedure :
1. Registration :
 2. Examination :
 3. Appointments:
 4. Treatment :
 5. Referral :
 6. Recall :
 7. Other :

Annex 8**DENTAL CLINIC SURVEY FORM IV**

FEDERAL SECURITY AGENCY
Social Security Administration
Children's Bureau

Interviewer _____

Date _____

State	County	City or Town	Address
-------	--------	--------------	---------

Clinician's Name : _____ Date of Grad. : _____ Yrs. of Service : _____

Why studied dentistry :

Method of diagnosis :

Method of treatment plan :

Technics :

Referral criteria :

Questions asked of supervisor :

Annex 9

REASONS FOR STUDYING DENTAL NURSING

New Zealand Dental Nurses

<i>Nurse</i>	<i>Clinic</i>	<i>Period of service year mth</i>	<i>Reason for studying dental nursing</i>
B.	Henderson	9 0	Answered advertisement in paper. No particular reason.
W.	Manurewa	4 6	Cousin was dental nurse.
R.	Campells Bay	23 0	Started as general nurse trainee. Transferred.
M.	Leeston	4 0	Vocational guidance in high school. Showed film and gave a talk.
D.	Waimate	2 0	As an alternative to school teaching.
C.	Waimate	1 3	Vocational-guidance teacher.
T.	Waimataitai	1 6	Like children but not school teaching. Had own teeth treated by dental nurses.
D.	Waimataitai	0 1	Impressed.
R.	Kaipoi	20 0	Talked among girls in high school. Got interested.
F.	Howarden	1 0	Stimulated by vocational-guidance officer in secondary school. Knew two dental nurses personally and received glowing accounts of the service.
M.	New Brighton	3 0	Worked in dental office as assistant.
F.	New Brighton	0 6	Influenced by friend who was a dental nurse.
C.	Beckenham	3 0	Got the idea from a dental nurse in home school district. Keen on science, liked children, did not want to be a teacher. Had had teeth treated in school clinic.
S.	Riccarton	1 0	Fond of children ; interested in community service; dental nursing would be more independent. Vocational-guidance teacher contacted in VI form.

Annex 10**EXAMINATION QUESTIONS. DOMINION TRAINING SCHOOL
FOR DENTAL NURSES, NEW ZEALAND****Primary Examination***Tuesday, 15 February 1949**Time allowed: 3 hours***Dental Anatomy, Anatomy and Hygiene**

1. Write a full account of the maxillary division of the Vth nerve.
 2. Draw a diagram of the internal aspect of the mandible showing all associative features.
 3. Describe the lower first deciduous molar in detail.
Draw the tooth from the mesial, buccal and lingual aspects.
Draw a diagram giving the relative position of the permanent successor at the age of 8 or 9 years.
 4. Write detailed notes on—
 - (1) The development of the teeth. Illustrate with diagrams.
 - (2) The ages of calcification.
 5. Describe the correct methods regarding—
 - (a) Hygiene in general care of surgery
 - (b) Hygiene of the hands
 - (c) Hygiene of food preparation
 - (d) Personal hygiene directed to prevention of infection and maintaining good health.
-

Intermediate Examination*Monday, 14 February 1949**Time allowed: 3 hours***1. Operative Dentistry.**

Write all you know of :

- (a) The preparation of small anterior cavities for silicate cement.
- (b) The properties, care and mixing of silicate cement.
- (c) The insertion and finishing of the filling and its after care.

2. General Pathology.

Classify bacteria according to type and describe the essentials for their growth.

3. Anaesthetics and Extractions.

Give a comprehensive outline of the difficulties, complications and sequelae of extraction of the teeth.

How would you deal with each case ? (Include instructions to parent).
Enumerate the possible causes of pain following extraction.

4. *Dental Surgery and Pathology.*

Write short notes on the following :

- (a) the role of carbohydrate food in the initiation of dental caries.
- (b) the *causes only* of trench mouth.
- (c) the probable consequence of causing exposure of the pulp.

5. *Materia Medica.*

Give :

- (a) The formula of the Service local anaesthetic solution.
- (b) The action of each individual drug in the solution.
- (c) The preparation of the solution.

Qualifying Examination

Wednesday, 16 March 1949

Time allowed : 3 hours

1. (a) Discuss the role of carbohydrate in the initiation of dental caries.
(b) What constitutes inflammation of the dental pulp ? Discuss what occurs in the tissues. Give likely causes and possible sequelae.
2. Discuss the pharmacology and therapeutics of :
(a) Alcohol
(b) Hydrogen peroxide
3. Enumerate the distinctive characteristics of a healthy, normal child of 5 years of age. Briefly describe the ideal management and feeding of such a child.
4. You begin work on a deep class II cavity and during the preparation you traumatically expose the pulp.
Describe in detail the technique followed from the beginning to the end of the appointment.
5. You are a second nurse in a double clinic. What are your responsibilities in regard to :
(a) Instruments and equipment
(b) Correspondence
(c) Organisation of treatment
(d) Requisitioning for dental stores and stationery.

Final Examination

February 1950

Time allowed : 3 hours

All questions to be attempted

1. (a) What are the causes, symptoms and treatment of shock during the administration of a local anaesthetic ?
(b) What precautions are necessary to prevent the needle breaking during the administration of a local anaesthetic ?
If the needle should break, what would you do ?

2. (a) What are antiseptics and disinfectants ? Give 3 examples of each.
- (b) Give the pharmacological properties and the therapeutic action of iodine.
3. (a) Discuss the operation of pulp-capping under the following headings :
 - (a) Indications and contra-indications.
 - (b) Difference in technique (if any) when applied to deciduous and permanent teeth.
 - (c) Drugs and materials used and the reasons therefor.
- (b) State briefly, with reasons, under what circumstances you would insert proximal fillings in posterior teeth and the material used for the actual filling in each case. What are the dangers of the proximal filling technique ?
4. (a) Discuss the role of the toothbrush in the prevention of dental caries, stating its advantages and disadvantages. What sequelae can follow its incorrect use and how would you treat them ?
 What simple advice would you give an intelligent child regarding selection of a toothbrush and its subsequent use ?
- (b) An interested parent asks you to explain to her " how fluorine prevents decay ". What would you tell her ?

SUMMARY

This study on the dental care and condition of children in New Zealand was made possible through a fellowship grant from the World Health Organization, and was carried out early in 1950.

Altogether 4,072 schoolchildren, aged 7-14, were given a dental examination. The dental caries history of these children was recorded in terms of DMF (decayed, missing, and filled permanent teeth), and def (decayed and filled deciduous molars). The study disclosed that the prevalence of dental caries is high in New Zealand. The average seven-year-old New Zealand schoolchild had 2 permanent teeth attacked by caries. This attack-rate increased by 1 additional permanent tooth each year so that by age 14 the average child had 10 permanent teeth showing evidence of caries attack. At the age of seven, the average New Zealand schoolchild had 5.6 deciduous molars attacked by caries.

The components of the DMF reveal a high rate of treatment in this group of children. At all ages, a large proportion of

RÉSUMÉ

L'étude qui précède traite de l'état dentaire des enfants en Nouvelle-Zélande et des soins qui leur sont donnés à cet égard. Elle a été effectuée au début de 1950, grâce à une bourse octroyée par l'Organisation Mondiale de la Santé. Au total, 4,072 écoliers, âgés de 7 à 14 ans, ont fait l'objet d'un examen dentaire, dont les résultats ont été enregistrés à l'aide des notations « DMF » (D = dents cariées, M = dents manquantes et F = dents obturées (pour les dents permanentes) et « def » (de = molaires cariées et f = molaires obturées) pour les dents temporaires. L'étude a révélé une fréquence élevée des caries dentaires en Nouvelle-Zélande. L'écolier néo-zélandais de 7 ans a, en moyenne, deux dents permanentes atteintes de carie. Ce chiffre s'accroît d'une unité par an, si bien qu'à 14 ans, chaque enfant a, en moyenne, une dizaine de dents cariées. A l'âge de 7 ans, il y a une moyenne de 5,6 molaires temporaires atteintes de carie, par écolier.

Les éléments qui composent le DMF montrent qu'un grand nombre des enfants reçoivent des soins dentaires. A tous les

the attacked teeth had been filled. Three-quarters of the DMF at the age of seven and 86% at the age of 14 appeared as F. More than 5 of the attacked deciduous molars had also been filled at the age of seven.

Tooth mortality (M or missing) is the end result of lack of treatment. In New Zealand schoolchildren tooth mortality was low, at the age of 14 averaging less than one-half missing tooth per child.

Teeth that are untreated but still savable are identified in the D (decayed) component of DMF. Since the New Zealand findings show that the number of D teeth amounts to about one-half tooth per child per year, it would appear that the dental care of these children has been maintained at a high level.

Thus to the extent that a high proportion of attacked teeth have been treated in the form of fillings, and to the extent that a low tooth mortality-rate has been achieved, these findings indicate that New Zealand's public dental programme has gained a large measure of success in controlling the effects of dental caries in schoolchildren.

This study did not measure the state of health of the supporting tissues of the mouth or the extent of malocclusion, neither was an attempt made to evaluate the programme in terms of what is ideal care for the individual child.

School dental clinics in New Zealand are operated by dental nurses. These women are employed and trained exclusively by the Department of Health. The training period covers two years, a total of 1,608 hours. At the completion of the training period, the dental nurse is assigned to a school dental clinic. Under the general supervision of a dental officer of the health department, she performs examinations, prophylaxis, fillings, extractions, gum treatments, and dental health education for elementary schoolchildren. This service is also available to any pre-school child. In

âges, une forte proportion de dents cariées ont été obturées. Les trois-quarts de la valeur du DMF, pour les enfants de 7 ans, et 86% pour les enfants de 14 ans, sont constitués par le nombre F. Plus de 5 molaires cariées (temporaires) ont été soignées chez les enfants de 7 ans.

L'absence de traitement se traduit finalement par le nombre de dents manquantes (M). Ce nombre est relativement faible chez les écoliers néo-zélandais. Il est apparu qu'à l'âge de 14 ans il ne manque, en moyenne, que 0,5 dent à chaque écolier.

Les dents qui ne sont pas soignées mais qui peuvent encore être sauvées ont été classées dans la catégorie des dents cariées (D). Comme, en Nouvelle-Zélande, la moyenne des dents cariées est de 0,5 par enfant et par an, il est clair que les soins dentaires donnés aux enfants sont très développés.

Le programme national de soins dentaires a donc permis, dans une très large mesure, de combattre avec succès la carie dentaire chez les écoliers, si l'on considère le pourcentage élevé des dents atteintes qui ont été obturées et le faible pourcentage de dents manquantes.

L'auteur de l'étude n'a cherché à déterminer ni l'état clinique des tissus de soutien de la cavité bucale ni la fréquence des anomalies de l'articulé dentaire ; il ne s'est pas préoccupé non plus d'apprécier le programme national par rapport aux soins idéaux que devrait recevoir chaque enfant.

En Nouvelle-Zélande, il existe des cliniques dentaires pour écoliers, qui sont dirigées par des infirmières spécialisées (dental nurses), employées et formées exclusivement par le Department of Health. Les études s'étendent sur deux ans et représentent un total de 1.608 heures. Une fois la période de formation terminée, l'infirmière est affectée à une clinique scolaire. Sous la direction générale d'un dentiste officiel, elle effectue des examens, des traitements préventifs, des obturations, des extractions et des traitements de gencives ; en outre, elle enseigne

the fiscal year 1949, an average of 715 children per nurse were cared for in the school dental clinics. On the average, each child received 2.2 hours of service, comprising 6.5 operations for that year. Such clinic service was available to 97% of all the elementary schools—both public and private—in New Zealand, and 85% of the children in these schools were registered on the clinic rolls.

The school dental service as provided by the dental nurse ends when the child leaves the elementary school. Since 1947, the New Zealand public dental programme has extended dental service for such children up to the age of 16. This care is furnished by practising dentists under contract with the Department of Health. Conservative dental treatment is given to children under this system on an agreed fee-for-service basis. In the fiscal year 1949, 488 dentists (about 73% of the practising dentists in New Zealand) were under contract, taking care of about 77,000 adolescents.

Figures furnished by the New Zealand Department of Health for the fiscal year 1949, showed that the total cost of the school dental service per child per annum was approximately £1. 8s. 11d. The average cost per completed dental treatment of the adolescent child in the same year was £3. 2s. 11d.

l'hygiène dentaire aux enfants des écoles primaires. Les enfants d'âge préscolaire peuvent aussi bénéficier de ces soins et de cet enseignement. Pendant l'année fiscale 1949, dans les cliniques dentaires scolaires de la Nouvelle-Zélande, chaque infirmière a soigné en moyenne 715 enfants. Chacun d'eux a reçu, en moyenne, 2,2 heures de soins comprenant 6,5 interventions. Le service a fonctionné pour 97% des écoles primaires, tant privées que publiques ; 85% des enfants ont été inscrits sur les registres des cliniques.

Ces soins dentaires dispensés aux écoliers par les infirmières spécialisées prennent fin lorsque l'enfant quitte l'école primaire. Depuis 1947, le programme national de soins dentaires a été étendu à tous les enfants jusqu'à l'âge de 16 ans. Les soins sont donnés par des praticiens qui ont accepté un arrangement avec le Department of Health, selon lequel ils assurent un traitement conservateur suivant un tarif convenu. Durant l'année fiscale 1949, 488 dentistes (environ 73% des praticiens de Nouvelle-Zélande) avaient adhéré à ce système et ont traité près de 77.000 adolescents.

Les chiffres donnés par le Department of Health de Nouvelle-Zélande, pour l'année fiscale 1949, révèlent que le service scolaire de soins dentaires a coûté £1. 8s. 11d. par enfant et par an. Le prix moyen d'un traitement complet a été, pendant la même année, de £3. 2s. 11d. pour chaque adolescent.

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