1949

NEW ZEALAND

DEPARTMENT OF HEALTH

ANNUAL REPORT OF THE DIRECTOR-GENERAL OF HEALTH

Presented in Pursuance of Section 100 of the Hospitals Act, 1926

HON. M. B. HOWARD, MINISTER OF HEALTH

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REPORT

The DIRECTOR-GENERAL OF HEALTH to the HON. the MINISTER OF HEALTH, Wellington.

I HAVE the honour to lay before you the annual report of the Department for the year 1948–49.

GENERAL SURVEY

From the evidence of the vital statistics for the year 1948, the health of the people, both European and Maori, is being maintained, with definite improvement in many respects during the past few years.

The outstanding epidemiological features of 1948 were the continuance unabated throughout the year of the epidemic of poliomyelitis which commenced in November, 1947, and the remarkably low incidence of diphtheria. The birth-rate, whilst slightly below that of 1947, remained high, and the infant-mortality rate, the still-birth rate, and the tuberculosis death-rate all reached new low levels.

In the past, Maori statistics have been given in the annual reports of the Department only to a minor extent. This has been due to the incompleteness of these statistics and to doubts as to the accuracy of such as were available. The following extract from the Department's annual report of 1935 indicates the position at that time :—

> The vital statistics of the Maori race are necessarily incomplete and inexact because many Maori births and deaths go unrecorded. One of the greatest difficulties in obtaining accurate records of Maori deaths is that a large number of the Maoris are not attended during sickness by a medical practitioner. The regulations that were formerly in force allowed two months as the time in which any death could be registered, and also did not insist on a medical certification of the cause of death prior to burial. This difficulty was partly met in 1934 by advising all Registrars of Maori Births and Deaths that if a death was registered without any cause of death or with only an indefinite cause they should report the facts and supply all particulars available to the nearest District Nurse, who in turn would make inquiries. The cause of death supplied by the District Nurse would, failing one supplied by a medical practitioner, be acceptable for registration and statistical purposes.
>
> Following on recommendations made by the Health Department, the regulations governing the registration of births and deaths of Maoris were revised, and the new provisions came into force on the 1st May, 1935. The amended regulations provide for the registration of Maori deaths within seven days if in the South Island and fourteen days if in the North Island, and also do not permit burial unless there has been furnished (1) a medical certificate of cause of death ; or (2) a Coroner's order to bury or (3) a Registrar's certificate that the death has been registered. It is yet too early to state whether there is a greater accuracy in the vital statistics of the Maori, but it is felt that the new regulations are a definite step in the right direction.

With the introduction of the new regulations mentioned, and, from 1939 onwards, the introduction of various benefits (maternity, medical, hospital) under the Social Security Act, the position has continued to improve. As an example of this improvement, the percentage of deaths for which a medical certificate of the cause of death has been obtained has risen from 62·2 per cent. in 1939 to 81·3 per cent. in 1947. Coroners' inquest verdicts have remained at approximately 11 per cent.

Maori statistics will be dealt with more fully in future, but it must be borne in mind that there is still considerable improvement to be made before they can be accepted as accurate.

A table is given later in this report showing for the past ten years some comparisons between Europeans and Maoris.

VITAL STATISTICS

Population.—The mean population of the Dominion for 1948 was 1,841,531 (Europeans, 1,731,583; Maoris, 109,948), an increase of 38,894 (Europeans, 35,395; Maoris, 3,499) over the figures for 1947.

Births.—Live births registered during the year numbered 49,149 (Europeans, 44,193; Maori, 4,956) and the rates per 1,000 of mean populations were: European, 25·52; Maori, 45·08; combined, 26·69, as compared with the respective rates for 1947 of 26·42, 46·86, and 27·63.

Deaths.—Deaths registered during the year numbered 17,285 (European, 15,812; Maori, 1,473). The respective crude death-rates per 1,000 of mean population were: European, 9·13; Maori, 13·40; and combined, 9·39. These compare favourably with the rates of 9·38, 14·45, and 9·68 respectively for 1947.

Infant Mortality.—Infant deaths totalled 1,349 (European, 969; Maori, 380). The rates per 1,000 live births were: for Europeans, 21·93; for Maoris, 76·67; and for the two races combined, 27·45. The European rate is the lowest ever achieved and the Maori rate is the third lowest recorded, the rates for 1946 and 1947 being 74·62 and 73 18 respectively.

The improvement in the European infant-mortality rate over the past fifty years is shown in the table given below, in which average rates for five-yearly periods are given, with annual rates for the past five years. It may be mentioned here that the Royal Society for the Protection of the Health of Women and Children—popularly known as the Plunket Society—whose activities have been an important factor in the reduction of the infant-mortality rate, particularly in the one-month to twelve-months period, commenced its work in Dunedin in 1907.

It will be noticed that in the first half of the period reviewed there was a very rapid fall in the death-rate of infants between one month and twelve months of age, with very slight reduction in the neo-natal death-rate. Thereafter the neo-natal rate began to improve, and in 1948 reached the low level of 15·78 per 1,000 live births.

Table 1—Infant Mortality in New Zealand, 1899–1948 (per 1,000 Live Births)

(Europeans only)

Year.	Under One Month.	One Month and Under Twelve Months.	Total Under Twelve Months.
1899–03 ..	31·50	49·60	81·10
1904–08 ..	30·17	41·38	71·55
1909–13 ..	29·69	29·43	59·12
1914–18 ..	27·96	21·81	49·77
1919–23 ..	29·27	16·66	45·93
1924–28 ..	25·42	13·57	38·99
1929–33 ..	22·84	9·92	32·76
1934–38 ..	22·74	9·75	32·49
1939–43 ..	20·73	9·46	30·19
1944–48 ..	18·48	7·49	25·97
1944	20·60	9·52	30·12
1945	19·59	8·40	27·99
1946	19·08	7·02	26·10
1947	18·08	6·96	25·04
1948	15·78	6·15	21·93

An analysis of the death of infants under one month for the year 1947 is given below :—

Table 2—Analysis of Deaths of Infants Under One Month, 1947

(Europeans only)

Cause of Death.	Under One Day.	One Day and Under One Week.	One Week and Under Two Weeks.	Two Weeks and Under Three Weeks.	Three Weeks and Under One Month.	Total.
Diphtheria	..	..	..	..	..	..
Whooping-cough ..	..	..	..	..	..	..
Influenza	..	..	..	..	..	..
Syphilis	..	..	..	..	..	..
Convulsions ..	..	..	1	..	..	1
Broncho-pneumonia ..	..	7	3	4	3	17
Pneumonia	..	1	..	2	2	5
Diarrhœa and enteritis	..	..	3	..	2	5
Congenital malformations	28	60	8	13	7	116
Congenital debility ..	2	3	1	..	..	6
Injury at birth ..	59	72	11	4	..	146
Premature birth ..	224	137	21	3	2	387
Other diseases of early infancy	45	52	6	4	3	110
Other causes ..	2	3	6	2	4	17
Totals—						
1947	360	335	60	32	23	810
1946	344	331	76	30	18	799
1945	312	293	70	28	22	725
1944	289	270	76	43	14	692
1943	254	284	61	25	21	645

The following tables show details of infant mortality for the years 1939–48 :—

Table 3—Infant Mortality in New Zealand, 1939–48 (Per 1,000 Live Births)

(Europeans)

Year.	Under One Day.	One Day and Under One Week.	One Week and Under Two Weeks.	Two Weeks and Under One Month.	Total Under One Month.	One Month and Under Twelve Months.	Total Under Twelve Months.
1939 ..	9·43	8·64	2·22	1·56	21·85	9·29	31·14
1940 ..	8·79	9·70	2·20	1·34	22·03	8·18	30·21
1941 ..	7·98	8·35	1·99	1·68	20·00	9·77	29·77
1942 ..	7·74	7·86	1·61	1·52	18·73	9·98	28·71
1943 ..	8·38	9·37	2·01	1·52	21·28	10·09	31·37
1944 ..	8·60	8·04	2·26	1·70	20·60	9·52	30·12
1945 ..	8·43	7·92	1·89	1·35	19·59	8·40	27·99
1946 ..	8·22	7·90	1·81	1·15	19·08	7·02	26·10
1947 ..	8·03	7·48	1·34	1·23	18·08	6·96	25·04
1948 ..	6·65	7·04	1·09	1·00	15·78	6·15	21·93

Table 4—Infant Mortality in New Zealand, 1939–48 (Per 1,000 Live Births)

(Maoris)

Year.	Under One Day.	One Day and Under One Week.	One Week and Under Two Weeks.	Two Weeks and Under One Month.	Total Under One Month.	One Month and Under Twelve Months.	Total Under Twelve Months.
1939	11·18	10·44	3·16	7·29	32·07	82·85	114·92
1940	7·50	11·02	2·82	2·57	23·91	63·31	87·22
1941	7·99	9·91	3·14	5·81	26·85	98·21	125·06
1942	5·54	6·70	3·00	4·16	19·40	78·52	97·92
1943	5·63	7·43	2·48	3·38	18·92	70·94	89·86
1944	5·32	5·99	3·33	4·66	19·30	82·96	102·26
1945	8·40	9·90	4·31	3·44	26·05	62·88	88·93
1946	5·54	6·75	3·64	2·42	18·35	56·27	74·62
1947	10·22	7·82	3·81	3·61	25·46	47·72	73·18
1948	10·69	11·30	3·83	3·03	28·85	47·82	76·67

The marked increase in the number of births during the past several years brought serious problems of accommodation and staffing. That the still-birth rate, the neo-natal death-rate, and the maternal-mortality rate have all reached new low levels in the past few years reflects great credit on the medical and nursing professions and on the controlling authorities of institutions, both public and private.

Still-births.—A still-born child is defined as one "which has issued from its mother after the twenty-eighth week of pregnancy, and which was not alive at the time of such issue."

Compulsory registration of still-births was, for the European section of the community, introduced in 1913. Maori still-births do not require to be registered.

The still-births registered in 1948 numbered 831, giving a rate of 18·46 per 1,000 total births; in 1947 the number was 911 and the rate 19·92. These are the only occasions on which the rate has fallen below 20 per 1,000 total births. The following table shows, for the years 1942–48, the rates per 1,000 total births for still-births and neo-natal deaths:—

Table 5—Rates for Still-births and Deaths of Infants Under One Month, 1942–48: Rates Per 1,000 Total Births

(Europeans only)

Year.	Still-births.	Under One Day.	One Day and Under Two Days.	Two Days and Under One Week.	One Week and Under Two Weeks.	Two Weeks and Under One Month.
1942	25·85	7·54	2·50	5·16	1·57	1·48
1943	26·25	8·16	3·53	5·59	1·96	1·48
1944	23·23	8·40	2·50	5·35	2·21	1·66
1945	22·84	8·24	2·43	5·30	1·85	1·32
1946	21·75	8·04	2·90	4·84	1·77	1·12
1947	19·92	7·87	2·89	4·44	1·31	1·20
1948	18·46	6·53	2·86	4·04	1·07	0·98

Maternal Mortality.—For Europeans the maternal-mortality rate, including deaths from septic abortion, was 1·26 per 1,000 live births (1·07 in 1947). Excluding septic abortion, the rate was 1·06 (0·85 in 1947).

The Maori rate was 1·82 per 1,000 live births (2·21 in 1947). This is the lowest rate so far recorded. The combined rate was 1·30 per 1,000 live births.

The Maori rate has varied considerably from year to year during the past ten years, but with a definite downward trend. In 1939 it was 4·62.

Maternal-mortality rates (European, Maori, and combined) for the years 1939–48 are shown in a table elsewhere in this report, and further particulars regarding morbidity and mortality are given in the divisional report.

INFECTIOUS AND OTHER DISEASES

Notes on the notifiable infectious diseases will be found in the report of the Director of the Division of Public Hygiene, which also deals with the activities of the Department under the Food and Drugs Act, the Social Hygiene Act, the Poisons Act, and the Dangerous Drugs Act.

The main items of interest with regard to infectious diseases were the low incidence of diphtheria during the year, and the continuance unabated of the epidemic of poliomyelitis.

New Zealand was given publicity in the first post-war report of the Permanent Opium Control Board because of the high consumption of heroin in this country. This increasing consumption was noted in the annual reports of 1947 and 1948, and action had already been taken to exercise more control. That the action taken has resulted in an improvement of the position will be seen by perusal of the report of the Director of Public Hygiene but the full effects of such action are not yet apparent.

Tuberculosis.—The report of the Director of the Division of Tuberculosis indicates the progress that has been made over the past few years.

With the coming into force of the Tuberculosis Act, 1948, still further advances in combating this disease will be possible, but under present conditions the provision of more sanatorium beds is difficult and some delay is inevitable. Sites for new sanatoria, one at Hamilton and one at Levin, have been selected, and the provision of buildings will be proceeded with as quickly as circumstances permit.

There has been a marked improvement in the tuberculosis death-rate during the past fifty years. The accompanying table shows the improvement which has taken place in the number of deaths, the crude death-rate, and the standardized death-rate for the sexes separately and combined for all forms of tuberculosis and for tuberculosis of the respiratory system. The figures and rates given refer to the European section of the community.

Tuberculosis takes a much greater toll of the Maori race, but the figures for the past ten years, given later in this report, and the report of the Divisional Director indicate that definite progress is being made.

Table 6—Tuberculosis, All Forms and Respiratory: Table Showing Deaths, Crude Death-rates, and Standardized Death-rates for Males (M), Females (F), and Persons (P), 1899–1948

(Rates are Per 10,000 of Mean Population)

(Europeans)

—	All Forms of Tuberculosis.									Tuberculosis of Respiratory System.								
	Deaths			Crude Death-rate Per 10,000 of Mean Population.			Standardized Death-rate Per 10,000 of Mean Population.			Deaths.			Crude Death-rate Per 10,000 of Mean Population.			Standardized Death-rate Per 10,000 of Mean Population.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
1899	439	356	795	11·11	10·04	10·60	11·04	10·00	10·46	334	259	593	8·45	7·30	7·91	8·38	7·36	7·82
1900	403	349	752	10·05	9·67	9·87	10·08	9·65	9·84	312	265	577	7·78	7·34	7·57	7·79	7·38	7·56
1901	401	374	775	9·80	10·13	9·96	9·79	10·19	9·99	304	292	596	7·43	7·91	7·66	7·40	8·08	7·74
1902	428	374	802	10·19	9·90	10·05	10·21	9·77	9·95	339	278	617	8·07	7·36	7·73	8·09	7·33	7·66
1903	415	354	769	9·59	9·14	9·38	9·67	9·22	9·43	321	249	570	7·42	6·43	6·95	7·46	6·58	6·99
1904	434	365	799	9·71	9·17	9·46	9·41	8·93	9·14	328	270	598	7·34	6·78	7·08	7·01	6·64	6·80
1905	358	320	678	7·77	7·82	7·79	7·59	7·65	7·63	254	242	496	5·51	5·91	5·70	5·28	5·82	5·56
1906	380	340	720	8·01	8·07	8·04	7·88	7·91	7·88	297	259	556	6·26	6·15	6·21	6·11	6·03	6·06
1907	464	392	856	9·53	9·08	9·31	9·28	8·81	9·03	337	275	612	6·92	6·37	6·66	6·64	6·22	6·40
1908	446	394	840	8·89	8·89	8·89	8·70	8·64	8·67	350	321	671	6·98	7·24	7·10	6·77	7·04	6·90
1909	436	367	803	8·46	8·04	8·26	8·15	7·84	7·98	345	289	634	6·69	6·33	6·52	6·36	6·15	6·24
1910	397	334	731	7·56	7·15	7·36	7·23	6·86	7·03	324	250	574	6·17	5·35	5·78	5·85	5·16	5·48
1911	405	333	738	7·58	6·95	7·27	7·30	6·75	7·01	310	253	563	5·80	5·28	5·55	5·53	5·12	5·31
1912	381	335	716	6·97	6·80	6·89	6·74	6·60	6·65	295	258	553	5·40	5·24	5·32	5·15	5·08	5·10
1913	421	391	812	7·50	7·71	7·60	7·20	7·60	7·40	330	310	640	5·88	6·11	5·99	5·58	6·02	5·80
1914	391	337	728	6·87	6·46	6·67	6·64	6·32	6·47	309	255	564	5·43	4·89	5·17	5·20	4·79	4·98
1915	359	334	693	6·34	6·27	6·30	6·16	6·07	6·10	294	252	546	5·19	4·73	4·97	5·02	4·58	4·78
1916	388	354	742	7·03	6·46	6·74	7·10	6·34	6·69	303	262	565	5·49	4·78	5·14	5·48	4·68	5·05
1917	415	340	755	7·63	6·12	6·87	8·08	6·04	7·01	324	260	584	5·96	4·68	5·31	6·38	4·64	5·47
1918	446	386	832	8·26	6·86	7·54	8·91	6·82	7·81	337	301	638	6·24	5·34	5·78	6·75	5·31	5·99
1919	399	363	762	6·97	6·36	6·67	6·90	6·26	6·56	312	273	585	5·45	4·78	5·12	5·39	4·68	5·01
1920	440	411	851	7·22	7·05	7·14	6·94	6·95	6·95	348	323	671	5·71	5·54	5·63	5·42	5·41	5·42
1921	420	373	793	6·72	6·24	6·48	6·51	6·23	6·36	322	287	609	5·15	4·80	4·98	4·95	4·77	4·85
1922	430	373	803	6·73	6·09	6·41	6·59	6·06	6·29	325	269	594	5·09	4·39	4·74	4·90	4·33	4·59
1923	419	373	792	6·45	5·97	6·21	6·31	5·97	6·12	335	284	619	5·16	4·55	4·86	4·97	4·50	4·71

1924	..	..	397	339	736	6·00	5·33	5·67	5·82	5·35	5·57	305	268	573	4·61	4·21	4·41	4·40	4·17	4·28
1925	..	..	370	314	684	5·45	4·82	5·14	5·27	4·76	5·00	300	260	560	4·42	3·99	4·21	4·18	3·91	4·03
1926	..	..	402	325	727	5·82	4·91	5·37	5·59	4·93	5·24	331	261	592	4·79	3·94	4·38	4·54	3·92	4·21
1927	..	..	372	296	668	5·30	4·40	4·86	5·06	4·45	4·74	304	229	533	4·33	3·40	3·88	4·08	3·38	3·71
1928	..	..	339	360	699	4·78	5·28	5·03	4·52	5·18	4·87	278	291	569	3·92	4·27	4·09	3·62	4·15	3·90
1929	..	..	360	282	642	5·02	4·09	4·57	4·72	3·94	4·32	296	228	524	4·13	3·31	3·73	3·81	3·13	3·46
1930	..	..	344	305	649	4·75	4·37	4·56	4·43	4·40	4·40	289	240	529	3·99	3·44	3·72	3·64	3·40	3·51
1931	..	..	331	286	617	4·51	4·04	4·27	4·19	3·97	4·07	266	235	501	3·62	3·32	3·47	3·28	3·23	3·24
1932	..	..	324	291	615	4·38	4·08	4·23	4·06	4·07	4·07	261	227	488	3·53	3·18	3·36	3·15	3·12	3·14
1933	..	..	323	288	611	4·34	4·00	4·17	3·87	3·93	3·89	258	218	476	3·47	3·03	3·25	2·98	2·91	2·94
1934	..	..	339	282	621	4·54	3·89	4·21	4·11	3·81	3·95	266	225	491	3·56	3·10	3·33	3·08	2·97	3·02
1935	..	..	324	252	576	4·31	3·45	3·89	3·84	3·33	3·57	258	213	471	3·43	2·92	3·18	2·98	2·77	2·87
1936	..	..	367	313	680	4·85	4·25	4·56	4·26	4·10	4·18	295	245	540	3·90	3·33	3·62	3·26	3·10	3·18
1937	..	..	327	263	590	4·29	3·54	3·91	3·75	3·43	3·58	282	213	495	3·70	2·87	3·29	3·14	2·69	2·90
1938	..	..	342	255	597	4·44	3·41	3·93	3·97	3·16	3·54	277	205	482	3·60	2·74	3·17	3·06	2·46	2·74
1939	..	..	343	270	613	4·39	3·56	3·98	3·77	3·40	3·57	292	230	522	3·74	3·03	3·39	3·08	2·82	2·93
1940	..	..	349	251	600	4·50	3·26	3·88	3·81	3·06	3·41	307	194	501	3·96	2·52	3·24	3·26	2·26	2·73
1941	..	..	371	226	597	4·90	2·89	3·88	4·03	2·76	3·40	312	179	491	4·12	2·29	3·19	3·38	2·14	2·72
1942	..	..	339	268	607	4·50	3·39	3·94	3·92	3·23	3·54	288	204	492	3·82	2·58	3·19	3·22	2·38	2·76
1943	..	..	325	247	572	4·39	3·09	3·72	3·74	2·95	3·31	280	195	475	3·78	2·44	3·09	3·14	2·26	2·66
1944	..	..	362	231	593	4·84	2·86	3·81	4·16	2·77	3·42	309	176	485	4·13	2·18	3·12	3·42	2·07	2·70
1945	..	..	365	238	603	4·71	2·91	3·79	3·91	2·78	3·31	314	183	497	4·05	2·24	3·12	3·25	2·07	2·63
1946	..	..	313	247	560	3·79	2·97	3·37	3·12	2·79	2·93	257	203	460	3·11	2·44	2·77	2·50	2·26	2·36
1947	..	..	300	223	523	3·54	2·63	3·08	2·88	2·51	2·67	260	181	441	3·07	2·13	2·60	2·45	2·01	2·21
1948	..	..	286	183	469	3·30	2·11	2·71	2·62	1·99	2·27	253	155	408	2·92	1·79	2·36	2·26	1·69	1·95

NOTES.—(1) As regards pulmonary tuberculosis, the figures prior to 1908 are not altogether comparable with those for the years 1908 onwards as they did not apparently include deaths certified as being due to " tuberculosis " (not further defined), which have since been treated as due to " pulmonary tuberculosis."

(2) Standard used for standardized rates—England and Wales, 1901 : Male and female rates calculated on " persons " distribution ; " persons " rates calculated on male and female distribution.

COMPARISON OF MAORI AND EUROPEAN RATES FOR VARIOUS CONDITIONS

The following table gives, for the past ten years and for the races separately and combined, the rates for births, deaths, infant mortality, maternal mortality, and the main causes of death.

Whilst the crude rates for the two races are not strictly comparable owing to different age constitutions and to the lesser accuracy of the Maori figures, the table shows that the general trend of both sets of figures is towards improvement.

Table 7—European (E), Maori (M), and Combined (C) Rates for Births, Deaths, and Deaths from Various Causes, 1939–48

		1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Rates per 1,000 of mean population—											
Births	E	18·73	21·19	22·81	21·73	19·70	21·59	23·22	25·24	26·42	25·52
	M	46·20	46·87	44·77	45·84	45·78	45·32	46·09	56·49	46·86	45·08
	C	20·23	22·62	24·06	23·11	21·25	23·01	24·58	27·05	27·63	26·69
Deaths	E	9·20	9·24	9·84	10·60	10·04	9·87	10·07	9·70	9·38	9·13
	M	19·92	17·51	20·59	18·34	17·27	16·95	16·23	15·91	14·45	13·40
	C	9·78	9·70	10·45	11·05	10·47	10·30	10·44	10·06	9·68	9·39
Rates per 1,000 live births—											
Infant mortality	E	31·14	30·21	29·77	28·71	31·37	30·12	27·99	26·10	25·04	21·93
	M	114·92	87·22	125·06	97·92	89·86	102·26	88·93	74·62	73·18	76·67
	C	41·61	36·78	39·81	36·62	38·85	38·65	34·77	31·99	29·86	27·45
Maternal mortality	E	3·64	2·93	3·36	2·53	2·21	2·71	2·24	2·05	1·07	1·26
	M	4·62	4·69	3·87	4·64	2·26	3·32	1·94	3·98	2·21	1·82
	C	3·76	3·13	3·42	2·77	2·22	2·78	2·21	2·29	1·18	1·30
Rates per 10,000 of mean population—											
Deaths from—											
Tuberculosis—											
Respiratory	E	3·39	3·24	3·19	3·19	3·09	3·12	3·12	2·77	2·59	2·36
	M	33·67	31·87	32·60	33·56	27·53	29·15	28·99	28·65	25·93	18·92
	C	5·05	4·83	4·86	4·93	4·54	4·68	4·66	4·28	3·97	3·35
Non-respiratory	E	0·59	0·64	0·69	0·75	0·63	0·69	0·67	0·60	0·50	0·35
	M	10·33	9·45	11·37	10·48	9·38	9·15	8·44	9·98	6·95	6·28
	C	1·12	1·13	1·29	1·31	1·15	1·20	1·13	1·15	0·87	0·71
Other infections and parasitic diseases	E	2·88	2·46	2·67	4·13	2·65	2·47	2·03	2·51	1·86	1·67
	M	17·51	9·89	21·88	16·94	11·03	13·07	9·93	11·25	8·36	8·91
	C	3·68	2·88	3·75	4·84	3·14	3·10	2·50	3·02	2·24	2·10
Cancer	E	11·79	12·02	13·18	13·13	13·85	14·02	13·88	13·67	13·65	14·17
	M	4·83	5·27	5·85	5·93	8·04	4·93	5·46	5·67	6·86	6·28
	C	11·41	11·64	12·77	12·72	13·51	13·47	13·39	13·21	13·29	13·70
Diseases of the heart	E	27·80	29·52	31·55	36·41	33·68	33·49	35·48	34·86	33·91	32·79
	M	15·49	20·55	22·31	24·88	24·02	23·02	26·70	22·69	23·96	24·65
	C	27·15	29·02	31·02	35·74	33·11	32·87	34·97	34·15	33·32	32·30
Pneumonia and bronchitis	E	5·38	4·51	4·40	4·99	4·48	4·27	4·31	4·30	4·22	4·24
	M	43·33	30·44	40·73	35·87	33·72	31·26	24·02	29·63	22·17	21·74
	C	7·49	5·95	6·46	6·77	6·21	5·89	5·48	5·77	5·28	5·29
Diarrhœa and enteritis	E	0·45	0·50	0·54	0·50	0·58	0·64	0·78	0·44	0·34	0·32
	M	7·63	6·37	7·37	5·72	6·70	7·74	11·32	8·41	6·67	4·91
	C	0·84	0·82	0·93	0·81	0·94	1·06	1·41	0·90	0·71	0·60
Accidental causes	E	4·52	4·55	4·58	4·61	5·06	4·28	3·67	4·16	4·15	4·56
	M	9·88	9·23	9·31	8·79	8·04	6·63	6·45	8·12	8·74	8·09
	C	4·81	4·81	4·84	4·85	5·24	4·42	3·83	4·39	4·42	4·77
Senility	E	2·16	2·63	3·13	3·02	3·17	2·94	2·90	1·95	1·79	1·21
	M	6·85	8·79	10·94	7·20	6·29	6·33	4·96	4·50	3·76	2·91
	C	2·42	2·97	3·57	3·26	3·36	3·15	3·03	2·09	1·90	1·31
Ill-defined causes	E	0·11	0·05	0·08	0·08	0·06	0·03	0·04	0·03	0·00	0·02
	M	4·15	3·85	5·52	1·80	6·29	1·26	1·09	0·39	1·50	1·09
	C	0·33	0·26	0·39	0·18	0·43	0·10	0·11	0·05	0·09	0·08
Other causes	E	32·84	32·25	34·43	35·26	33·15	32·76	33·84	31·70	30·77	29·63
	M	45·57	39·34	38·02	32·17	31·66	36·99	34·94	29·83	29·59	30·20
	C	33·54	32·64	34·64	35·08	33·06	33·02	34·02	31·59	30·71	29·67

OMISSION IN THE ANNUAL REPORT OF 1948

In the report of the Department for 1948 an account of an outbreak of typhoid fever in Kaikoura was given. By an oversight on my part, that portion of the report in which Dr. Blakelock made acknowledgment of the help received from others was omitted. The omitted portion is given below:—

ACKNOWLEDGMENTS

Thanks are due to the Housing Construction Department for producing the map of Kaikoura depicting much of the information collected in the house-to-house survey.

Dr. D. P. Kennedy, Assistant Medical Officer of Health, rendered very valuable service throughout the epidemic. With his assistance it was possible to maintain one medical officer in the field practically continuously, and at the same time give attention to routine matters at District Office. Discussion with him was most helpful, both in assessing the value of data as it accumulated and in planning the campaign.

Considerable additional work fell on Inspector Cruickshank, involving long hours of overtime both on week-days and holidays. Throughout his work was well and conscientiously done.

Inspector Fogarty for a period assisted Inspector Cruickshank with the investigation of notified cases and the supervision of food premises and sanitary services.

The three officers above named, together with Miss Webb, District Health Nurse, assisted in carrying out the house-to-house survey. The group worked together smoothly and efficiently. Without their co-operation it could not have been done as completely and expeditiously as, in fact, it was.

One Nurse Inspector (Miss Grant), two District Health Nurses (Misses Pavelka and Walker), and one clerical assistant (Miss Holmes) from this office worked in a temporary capacity on the staff of the Kaikoura Hospital. Nursing staff from other District Offices were released for similar duty.

To last annual report, Dr. A. W. S. Thompson, Medical Officer of Health, Auckland, contributed an article on the epidemiology of poliomyelitis, based on an investigation undertaken in the Auckland area during the summer months of 1947–48. In this report a further article by Dr. Thompson is given, based on a much longer period of time, during which the poliomyelitis epidemic continued practically unabated.

DIVISIONAL REPORTS

The reports of the Divisional Directors which follow deal with many matters not referred to in this general survey, and indicate the wide activities of the Department.

DIVISION OF PUBLIC HYGIENE

Vital Statistics are given in the report of the Director-General.

Infectious and Notifiable Diseases

Streptococcal Sore Throat (Including Scarlet Fever).—Notified cases numbered 1,110 (Europeans, 1,106; Maoris, 4), as compared with 871 and 1,465 for 1947 and 1946 respectively. In accordance with its usual eight-year cycle, the disease can be expected to be increasingly prevalent during the next two or three years. Fortunately the disease is usually of a mild type.

Diphtheria.—Notified cases were 166 (Europeans, 154; Maoris, 12). This is a remarkably low figure, and the number of cases is the lowest recorded. The Department has continued the policy of encouraging immunization against diphtheria, preferably during the first year of life. The numbers of children being immunized are too few, however, to ensure with certainty that the disease will not increase in future years. With such a certain preventive measure available, the more complete co-operation of parents could reduce the disease to vanishing-point and eliminate what in the past has been an important cause of death in young children.

Enteric Fever.—There were 42 cases of typhoid fever (Europeans, 15; Maoris, 27) and 25 cases of paratyphoid fever, all among Europeans. The corresponding figures for 1947 were: typhoid, 138, and paratyphoid, 8. The cases of typhoid were fairly evenly distributed throughout the year and no outbreaks of any importance occurred. The cases of paratyphoid occurred mainly in the first quarter of the year in two health districts.

Puerperal Fever.—Notified cases following child-birth numbered 66 (Europeans, 65; Maoris, 1), while the figures for septic abortion were 73 (all Europeans). The continued fall in the incidence of puerperal fever, combined with a rising birth-rate, is very gratifying. The Maori statistics are particularly remarkable, as the following table will show:—

Table 8—Maori Puerperal Morbidity

Number of Births.	Birth-rate Per 1,000 Population.	Cases of Puerperal Sepsis.	Rate Per 1,000 Live Births.	Number of Septic Abortions.
4,956	46·86	3	0·6	0

Maori women are making increasing use of maternity hospitals, and this has probably helped towards the satisfactory results.

In 1937 the Maori death-rate from sepsis was 1·01 per 1,000 live births, compared with 0·54 for Europeans, and in the Department's annual report for 1938 the late Dr. T. L. Paget, Director of Maternal Welfare, wrote: "No material drop can be expected until more of the Maoris are admitted to hospital for their confinements, the housing conditions being quite unsuitable for domiciliary attendances."

In 1948 the corresponding maternal mortality figures were:—

Table 9

	Live Births.	Deaths from Puerperal Sepsis (Excluding Septic Abortion).	Puerperal Sepsis Rate Per 1,000 Live Births.
Europeans ..	44,193	4	0·09
Maoris ..	4,956	2	0·40

Bacillary Dysentery.—Ninety-three cases were notified, as compared with 53 in 1947. The increase was largely explained by an outbreak of 53 cases in March and April in a large mental hospital. The disease was of a mild type and responded well to treatment with sulphaguanadine. Outbreaks of this disease are known to occur in mental hospitals with great frequency, and their control is difficult.

Amoebic Dysentery.—Sixty-one cases were reported, as compared with 21 and 31 in 1947 and 1946 respectively. The cases were well distributed throughout the year but the greatest numbers were reported in the Central Wellington and Christchurch districts. In nearly all cases the disease was contracted outside New Zealand and a very large proportion of those affected are ex-servicemen. During the year the War Pensions Branch of the Social Security Department reported a large number of applications for pensions on account of amœbiasis, and it would seem probable that there are still unsuspected cases among ex-servicemen.

Two cases are known where the disease was contracted in New Zealand. One was that of a woman of forty-four who had never left the country but had staying with her visitors who had suffered from the disease in India. The other case was that of a child of fourteen whose father had contracted dysentery in the Middle East and had returned to New Zealand in 1942.

More recently still, civilians arriving by ship from Great Britain have apparently received infection during the voyage, and it is understood that amœbic dysentery is fairly prevalent in Great Britain.

It is quite clear that amœbic dysentery is a disease to be reckoned with, and is likely to become endemic unless energetic measures are taken to follow up notified cases until a cure is established. One disturbing factor to be remembered is that the chlorination of water does not destroy the cysts of *Entamoeba histolytica*.

Food Poisoning.—One hundred and fifty-nine cases were reported, as compared with 22 for 1947, and other cases are known to have occurred.

In January an outbreak occurred at the Hermitage, Mount Cook, and affected a number of the guests and staff who had eaten scones cooked on the premises. The symptoms were those of acute arsenic poisoning, and arsenic was found to be present in the scones to the extent of 3·8 grains of arsenious oxide per scone. The inquiry showed quite convincingly that arsenic had been deliberately added to the flour, but the police were not able to obtain sufficient clear evidence to warrant a charge against any individual. It is interesting to know that this quantity of arsenic can be swallowed without any fatality occurring. The fact that the poison was presented in solid food and not in solution may have hindered absorption sufficiently to allow the irritant effect of the poison to produce its own remedy.

In June an outbreak of nausea and vomiting affecting at least 40 boys in a boarding-school was possibly caused by toxin in minced meat served as cottage pie. The outbreak was not reported at the time, and a thorough investigation was impossible.

In September, 120 persons out of 150 who attended a supper were attacked with typical symptoms of food poisoning which came on in five to eight hours. The infected food was pressed ox tongue which had been cooked forty-eight hours earlier. On the day following its cooking the jelly on the tongues was quite firm, but on the second day it had liquefied. Some of the persons who sliced the tongue twelve hours before the supper ate small portions of it and were taken ill about eight hours later. The fact that the tongue was unfit for consumption was not realized, and it was served at the supper. Bacteriological investigation showed the presence of a hæmolytic *Staphylococcus aureus*.

In December about 100 patients and members of the staff of a public hospital were affected with poisoning, thought to be due to a quantity of green peas. The peas were a " quick-freeze " product and about 60 lb. to 80 lb. were steamed and then placed in a refrigerator. The following day some were reheated and some were eaten cold in a salad. Persons who consumed the peas, either hot or cold, were affected. Bacteriological examination showed considerable fermentation in the peas and the presence of large numbers of anærobic sporing bacilli and lactose fermenting *B. coli*. No organisms of the types usually associated with food poisoning were detected.

A small outbreak involving 4 persons was traced to cooked ham infected with *Staphylococcus aureus*.

The reported cases of food poisoning—viz, 159—do not include all persons known to have been affected. In a disease such as this the number of outbreaks is of more importance, epidemiologically, than the number of persons affected.

Acute Poliomyelitis.—Nine hundred and sixty-three positive cases were notified (Europeans, 915 ; Maoris, 48). Contrary to expectations, the epidemic, which began in November, 1947, continued with undiminished intensity throughout the whole of 1948,

and cases are still occurring at the time of writing (May, 1949). In all previous epidemics of poliomyelitis in New Zealand the outbreak has commenced in early summer and come to an end in the following winter, and the highest incidence of cases has affected a portion only of the country.

In the case of the present outbreak, cases first occurred in Auckland in November, 1947, and for the first six months the epidemic was mainly confined to the Auckland Province and Taranaki. Later in the year cases occurred in considerable numbers in the southern part of the North Island, particularly in Wellington. Towards the end of the year and during 1949 the districts of the South Island reported considerable numbers of cases.

Epidemics of poliomyelitis extending over a period of eighteen months or longer are not unknown in other countries, but have not previously been experienced in New Zealand. It is too early yet to attempt a comprehensive report of the whole outbreak, and this must be deferred until a later date. A few details will, however, be of interest, covering the period November, 1947, to December, 1948, inclusive.

Table 10 shows the age and sex distribution of all cases (including Maoris) notified between 1st November, 1947, and 31st December, 1948, excluding suspected cases in which the diagnosis was afterwards changed :—

Table 10—Poliomyelitis, 1st November, 1947, to 31st December, 1948

District.	0 up to 5 Years.		5 up to 10 Years.		10 up to 15 Years.		15 up to 20 Years.		Over 20 Years.		Totals.		Grand Totals.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
North Auckland ..	4	7	7	6	7	9	6	3	7	4	31	29	60
Central Auckland ..	38	20	58	32	26	26	6	10	33	16	161	104	265
Thames-Tauranga	3	1	5	5	3	2	1	2	2	1	14	11	25
South Auckland ..	16	14	28	18	12	7	9	7	22	19	87	65	152
Taranaki ..	18	14	30	12	18	9	6	3	11	9	83	47	130
East Cape ..	5	2	6	1	1	1	1	0	6	5	19	9	28
Wellington-Hawkes Bay	15	7	11	7	10	8	6	12	8	10	50	44	94
Central Wellington	32	34	40	39	15	24	8	6	34	22	129	125	254
Nelson-Marlborough	5	2	6	4	1	1	1	1	2	3	15	11	26
Christchurch ..	2	1	5	0	3	0	1	1	2	4	13	6	19
West Coast ..	3	2	7	2	1	1	2	0	3	4	16	9	25
Timaru	0	1	1	0	0	0	0	0	1	1	2	2	4
Dunedin	2	0	1	1	1	0	1	0	1	0	6	1	7
Southland ..	0	0	0	0	0	0	0	0	0	0	0	0	0
	143	105	205	127	98	88	48	45	132	98	626	463	1,089

Some particulars as to paralysis are available for 1026 of these patients and are as follows :—

	Cases.	Percentage.
Patients with paralysis (including fatal cases) ..	327	31·9
Patients with paresis only	271	26·4
Patients without paresis	428	41·7
	1,026	100·0

Venereal Diseases.—Tables 11 and 12 show the numbers of persons attending the venereal-diseases clinics for the years 1944–48:—

Table 11—Number of Persons Seen for First Time and Found to be Suffering from Syphilis

Year.	Auckland.		Wellington.		Christchurch.		Dunedin.		Total.		Grand Totals.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1944	21	48	14	26	14	10	27	4	76	88	164
1945	61	34	11	20	15	8	27	6	114	68	182
1946	77	26	20	25	25	13	30	4	152	68	220
1947	58	52	7	28	16	5	26	4	107	89	196
1948	84	61	23	42	29	4	25	4	161	111	272

Table 12.—Number of Persons Seen for First Time and Found to be Suffering From Gonorrhœa

Year.	Auckland.		Wellington.		Christchurch.		Dunedin.		Total.		Grand Totals.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1944	215	470	140	59	139	86	50	22	544	637	1,181
1945	389	413	178	54	149	66	46	9	762	542	1,304
1946	639	329	235	42	168	31	115	13	1,157	415	1,572
1947	623	303	262	41	168	27	53	19	1,106	390	1,496
1948	555	261	247	43	138	33	53	23	993	360	1,353

Infectious Disease in Maoris.—The figures do not call for any special comments, and, except in poliomyelitis, are mostly lower than the figures for preceding years.

The attached tables give details of the notifiable diseases reported in 1948.

Table 13A—Notifiable Diseases in New Zealand for Year Ended 31st December, 1948, Showing Distribution by Months

(Europeans)

	Scarlet Fever.	Diphtheria.	Enteric. Typhoid.	Enteric. Paratyphoid.	Tuberculosis. Pulmonary.	Tuberculosis. Other Forms.	Cerebro-spinal Meningitis.	Poliomyelitis.	Influenza.	Erysipelas.	Puerperal Fever. Ordinary.	Puerperal Fever. Following Abortion.	Eclampsia.	Tetanus.	Hydatids.	Trachoma.	Ophthalmia Neonatorum.	Food Poisoning.	Bacillary Dysentery.	Amœbic Dysentery.	Undulant Fever.	Chronic Lead Poisoning.	Malaria.	Actinomycosis.	Lethargic Encephalitis.	Other.	Totals.
January	41	22	3	9	145	20	1	51	..	16	11	7	8	3	4	..	2	7	3	1	4	..	1	..	1	..	360
February	71	13	3	2	97	13	1	39	..	17	3	16	5	1	3	1	..	11	6	3	4	1	2	..	..	..	309
March	82	17	2	5	133	26	1	68	1	12	3	6	5	2	2	1	..	11	50	3	..	1	1	..	..	..	432
April	99	20	2	1	88	22	6	87	..	14	7	4	5	3	5	1	1	3	16	9	4	2	3	..	1	..	403
May	86	16	1	..	108	15	3	108	..	14	3	6	6	2	1	1	..	3	1	7	1	..	..	..	..	..	382
June	117	16	..	1	115	18	4	62	..	21	4	2	8	1	5	..	1	3	1	1	4	..	..	..	..	..	384
July	146	15	..	..	115	25	2	80	2	15	5	11	8	2	4	..	..	1	7	10	2	..	1	..	..	..	451
August	113	15	1	2	120	46	4	84	5	17	5	9	7	1	5	..	..	..	3	8	1	..	1	..	2	..	449
September	85	3	1	2	119	22	4	114	1	12	3	5	6	2	3	..	..	1	4	9	5	..	1	..	1	..	403
October	82	11	..	1	97	19	4	77	..	12	6	4	8	3	10	..	1	4	1	3	7	..	2	..	2	..	349
November	106	2	1	..	121	16	7	77	..	8	13	..	3	1	3	..	..	3	3	5	12	..	1	..	1	..	382
December	78	4	1	2	98	21	2	67	..	9	2	3	3	2	2	..	1	112	1	2	3	..	1	..	1	..	415
Totals—																											
1948	1,106	154	15	25	1,356	263	39	914	9	167	65	73	73	23	47	4	6	159	96	61	37	4	14	0	9	..	4,719
1947	866	506	98	8	1,396	296	42	130	3	185	69	90	96	18	52	5	3	22	53	21	32	2	12	1	2	..	4,008
1946	1,454	1,577	36	13	1,530	290	87	112	3	193	76	66	55	23	52	9	7	245	78	31	26	2	50	2	3	..	6,020
1945	5,033	996	23	8	1,722	329	98	14	6	248	75	100	46	12	41	10	5	111	151	21	25	3	187	3	5	53*	9,325
1944	7,612	693	24	11	1,501	211	135	45	8	310	73	157	44	18	28	6	6	31	147	3	37	3	397	6	1	12	11,519

* Fifty-three cases of beriberi.

Table 13B—Notifications of Cases of Notifiable Diseases, by Health Districts, for Year Ended 31st December, 1948

(Europeans)

Name of Diseases.	North Auckland.	Central Auckland.	South Auckland.	Thames-Tauranga.	Taranaki.	East Cape.	Wellington-Hawke's Bay.	Central Wellington.	Nelson-Marlborough.	Christchurch.	West Coast.	Timaru.	Dunedin.	Southland.	Totals.
Scarlet fever	11	147	86	15	48	18	157	237	14	140	80	67	49	37	1,106
Diphtheria	3	36	24	3	7	9	17	24	7	15	..	6	..	3	154
Enteric—															
Typhoid	..	1	3	..	1	3	4	1	..	1	..	1	..	..	15
Paratyphoid	..	10	1	..	..	3	1	..	..	8	2	..	..	..	25
Tuberculosis—															
Pulmonary	46	318	46	21	33	35	204	211	42	177	17	52	101	53	1,356
Other forms	1	20	9	2	5	..	24	57	9	63	4	21	43	5	263
Cerebro-spinal meningitis	..	6	4	1	1	4	7	7	2	1	2	2	2	..	39
Poliomyelitis	45	180	121	19	115	21	88	245	25	19	25	4	7	..	914
Influenza	1	4	..	..	..	..	1	..	..	2	..	..	1	..	9
Erysipelas	..	32	10	8	3	3	24	35	3	17	1	9	10	12	167
Puerperal fever—															
Ordinary	1	12	1	1	1	..	3	7	1	18	2	7	6	5	65
Following abortion	..	49	..	..	1	..	1	19	2	..	1	..	..	..	73
Eclampsia	1	18	2	..	2	3	5	9	2	11	2	7	8	3	73
Tetanus	..	4	2	3	3	..	3	2	1	2	1	1	1	..	23
Hydatids	..	2	2	..	5	1	11	9	..	15	..	..	2	..	47
Trachoma	..	1	..	1	..	..	2	..	..	..	..	..	..	..	4
Ophthalmia neonatorum	1	3	..	..	1	..	..	1	..	..	..	..	..	..	6
Food poisoning	2	19	3	..	6	5	2	104	..	1	..	9	3	5	159
Bacillary dysentery	2	4	8	..	..	15	9	4	..	1	..	..	53	..	96
Amœbic dysentery	1	3	1	..	2	..	8	36	1	9	..	..	..	..	61
Undulant fever	..	3	5	..	..	3	1	5	2	7	1	1	3	6	37
Chronic lead poisoning	..	..	..	..	..	..	..	3	..	1	..	..	..	..	4
Malaria	..	4	..	..	..	..	..	3	1	3	2	1	..	..	14
Lethargic encephalitis	1	1	1	..	..	..	5	..	1	..	..	..	..	..	9
Totals	116	877	329	74	234	123	577	1,019	113	511	140	188	289	129	4,719

Table 13c—Notifiable Diseases in New Zealand for Year Ended 31st December, 1948, Showing Distribution by Age and Sex

(Europeans)

Name of Disease.	Under 1 Year.		1 up to 5 Years.		5 up to 10 Years.		10 up to 15 Years.		15 up to 20 Years.		20 up to 25 Years.		25 up to 30 Years.		30 up to 35 Years.		35 up to 40 Years.		40 up to 45 Years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Scarlet fever	16	9	123	132	198	224	48	87	27	49	25	38	8	28	13	20	11	14	8	5
Diphtheria	1	1	19	15	19	19	12	4	3	10	13	8	7	7	3	4	..	..	1	1
Enteric—																				
Typhoid	..	..	..	..	..	2	2	..	3	..	1	1	2	..	..	..	1	..	..	..
Paratyphoid	..	..	1	2	..	1	3	1	..	..	1	2	1	..	1	1	2	1	..	1
Tuberculosis—																				
Pulmonary	1	1	4	7	18	16	16	22	43	92	105	162	84	102	78	85	58	43	38	40
Other forms	3	1	13	13	14	14	12	9	15	9	11	16	17	18	11	7	10	9	10	6
Cerebro-spinal meningitis	5	4	7	4	4	2	2	..	..	2	1	1	1	..	2	..	1	..	..	..
Poliomyelitis	14	7	106	80	161	108	86	74	43	36	42	37	31	19	14	18	13	6	10	1
Influenza	..	..	1	..	..	..	..	1	..	1	..	..	..	..	..	1	..	1	..	..
Erysipelas	..	..	4	2	..	1	1	1	2	..	1	3	2	7	4	10	4	14	3	8
Puerperal fever—																				
Ordinary	..	..	..	..	..	..	..	..	..	7	..	21	..	21	..	8	..	5	..	2
Following abortion	..	..	..	..	..	..	..	..	..	4	..	18	..	20	..	15	..	15	..	1
Eclampsia	..	..	..	..	..	..	..	..	..	7	..	20	..	23	..	12	..	6	..	5
Tetanus	..	..	2	..	6	..	5	2	1	..	..	..	1	..	..	1	..	..	1	..
Hydatids	..	..	1	3	4	..	..	2	2	..	1	..	1	2	4	1	1	..	6	1
Trachoma	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	1	..
Ophthalmia neonatorum	4	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Food poisoning	..	..	1	..	2	2	4	3	1	5	9	12	12	8	7	10	6	10	9	8
Bacillary dysentery	1	1	4	6	3	3	3	2	2	5	7	1	8	5	6	1	4	..	2	1
Amœbic dysentery	..	..	..	..	..	1	2	..	..	..	3	1	8	..	22	2	7	2	4	..
Undulant fever	..	..	1	..	..	..	..	1	..	..	1	2	4	1	1	2	5	2	2	..
Chronic lead poisoning	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..
Malaria	..	..	..	..	..	..	..	..	..	..	4	..	2	..	..	1	3	1	..	..
Lethargic encephalitis	1	..	..	2	2	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Totals	46	26	287	266	431	393	196	209	145	227	226	343	189	261	166	199	127	129	95	80

Table 13c—Notifiable Diseases in New Zealand for Year Ended 31st December, 1948, Showing Distribution by Age and Sex—continued

(Europeans)

Name of Disease.	45 up to 50 Years.		50 up to 55 Years.		55 up to 60 Years.		60 up to 65 Years.		65 up to 70 Years.		70 up to 75 Years.		75 up to 80 Years.		80 and Over.		Totals.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Scarlet fever	..	3	3	7	1	4	..	3	1	..	..	1	..	..	..	..	482	624
Diphtheria	1	..	..	3	..	2	..	1	..	..	..	..	..	..	..	..	79	75
Enteric—																		
Typhoid	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	10	5
Paratyphoid	..	..	..	1	..	..	1	..	1	2	1	..	1	..	..	..	13	12
Tuberculosis—																		
Pulmonary	49	24	35	16	40	6	45	14	47	11	28	7	10	2	3	4	702	654
Other forms	7	3	5	4	4	4	6	5	1	..	4	1	1	..	..	..	144	119
Cerebro-spinal meningitis	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	26	13
Poliomyelitis	3	1	2	..	..	..	..	1	1	..	..	..	..	..	..	..	526	388
Influenza	..	..	1	..	..	..	..	..	..	..	..	..	3	..	..	..	5	4
Erysipelas	8	10	8	9	9	6	10	6	4	8	5	7	1	3	3	3	69	98
Puerperal fever—																		
Ordinary	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	65
Following abortion	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	73
Eclampsia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	73
Tetanus	..	..	1	..	..	1	..	..	1	..	1	..	..	..	..	..	19	4
Hydatids	2	2	1	..	1	..	1	2	4	1	1	..	2	1	..	..	32	15
Trachoma	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	4	..
Ophthalmia neonatorum	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	2
Food poisoning	8	11	7	8	4	3	3	5	..	..	..	1	..	..	..	..	73	86
Bacillary dysentery	6	..	3	..	1	1	3	..	7	1	5	..	4	..	..	..	69	27
Amœbic dysentery	2	..	5	..	2	..	..	..	..	..	..	..	..	..	..	..	55	6
Undulant fever	3	1	4	3	..	1	..	..	1	2	..	..	..	..	..	..	22	15
Chronic lead poisoning	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
Malaria	2	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	12	2
Lethargic encephalitis	..	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	5	4
Total	92	58	77	52	64	29	70	37	70	25	46	17	22	6	6	7	2,355	2,364

Table 13D—Notifications of Cases of Notifiable Diseases for Year Ended 31st December, 1948

(Maoris)

—	Scarlet Fever.	Diphtheria.	Enteric.		Tuberculosis.		Cerebro-spinal Meningitis.	Poliomyelitis.	Influenza.	Erysipelas.	Puerperal Fever.	Septic Abortion.	Eclampsia.	Tetanus.	Hydatids.	Trachoma.	Ophthalmia Neonatorum.	Lethargic Encephalitis.	Food Poisoning.	Bacillary Dysentery.	Undulant Fever.	Malaria.	Amœbic Dysentery.	Actinomycosis.	Other.	Totals.
			Typhoid.	Paratyphoid.	Pulmonary.	Other Forms.																				
January	..	1	3	..	36	3	..	4	..	1	..	..	..	..	1	3	..	..	..	3	..	..	..	..	..	55
February	..	2	3	..	26	2	..	4	..	1	..	..	..	..	..	1	..	..	..	7	..	..	..	..	..	46
March	..	1	2	..	34	3	..	8	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..	..	..	53
April	..	1	..	..	33	6	..	9	..	..	..	..	..	..	..	2	..	1	1	5	2	..	..	..	..	60
May	..	1	3	..	55	1	..	9	..	..	..	..	1	..	..	1	..	1	..	9	..	..	..	..	..	81
June	..	..	1	..	27	3	..	1	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	34
July	1	3	..	..	31	7	2	5	..	..	..	..	..	..	1	2	..	..	..	4	..	..	..	..	..	56
August	1	..	3	..	32	9	1	1	..	..	..	..	..	..	1	..	..	..	..	7	..	..	..	..	..	55
September	2	..	1	..	32	12	..	3	..	..	..	..	..	..	..	2	..	..	..	9	..	..	..	..	..	61
October	..	1	4	..	34	8	3	..	..	..	..	..	..	..	1	1	..	..	..	4	1	..	..	..	..	57
November	..	1	3	..	32	3	..	3	..	1	..	..	..	..	..	2	..	..	..	3	..	..	..	..	..	48
December	..	1	4	..	32	5	..	2	1	3	1	..	..	..	1	..	..	..	..	2	..	..	..	..	..	52
Totals—																										
1948 ..	4	12	27	..	404	62	6	49	1	6	1	..	1	..	6	14	..	2	1	59	3	..	..	..	..	658
1947 ..	5	40	40	..	412	69	6	5	..	4	5	1	1	..	8	11	3	1	2	78	2	..	1	..	..	694
1946 ..	11	106	47	2	449	51	13	1	..	10	6	1	1	2	12	16	6	..	3	25	1	1	2	1	..	767
1945 ..	48	79	42	1	450	71	20	2	..	8	3	..	1	1	6	19	2	..	7	45	..	2	..	..	..	807
1944 ..	10	20	50	..	476	66	20	..	1	9	7	1	..	4	11	39	1	..	2	14	2	..	1	1	..	735
1943 ..	1	15	27	..	521	62	65	1	..	9	2	..	..	1	6	42	1	1	12	37	2	..	..	3	1	809

Food and Drugs

Milk.—Under present arrangements the Department of Health is responsible only for the sampling of milk at the point where the vendor delivers the milk to the consumer. The control of the production on the farms and the operation or control of treatment houses is exercised by other Government Departments.

In the past, when the retailing of milk was mainly in the hands of producer-vendors or of vendors who obtained milk from one or at most two or three producers, it was generally possible to sheet home responsibility for watered or dirty milk to the actual offender. Under the present arrangements the milk from a number of producers is either bulked at a depot and redistributed to vendors, or is delivered by producers to a treatment house. Any shortcomings in the milk of individual producers is thereby masked, and if dirty milk or watered milk is detected the vendor from whom the sample is obtained is able to prove that he obtained the milk from a depot or from a milk association. Thus, the Health Department is powerless to effect any improvement in the country's milk-supplies, but it nevertheless receives most of the blame, because the public believes that the Health Department is responsible for the quality of all food sold. Furthermore, the quality of the milk-supplies has such a close and obvious bearing on the public health that the Department cannot be indifferent.

The remedy is a simple one, and one course of action only is likely to be effective. At every collecting depot and at every treatment house arrangements should be made for the taking of a sample from each producers' milk every day. For purposes of determining butterfat, &c., and detecting added water, each supplier's daily samples could be bulked in a composite sample and tested weekly or fortnightly; reductase tests could be made daily. Payment of the producer should be raised in accordance with the quality of the milk as tested. Such an arrangement would greatly reduce the necessity for sampling at the retailer's end, which now serves no purpose other than the collection of information.

An arrangement such as this has been in force in Dunedin for a year and has resulted in a very great improvement in the quality of the milk. The greatest deterrent against adulteration is the certainty that daily samples are being taken.

The superiority of pasteurized milk over raw milk is now generally acknowledged, but the prejudice against pasteurization still flourishes. A raw milk is unsatisfactory even when obtained from one supplier, but bulked raw milk is exceedingly dangerous, as one diseased cow may infect a large quantity of bulked milk. The principle of free choice, generally speaking, is a sound one, but children, who are the chief consumers of milk, have no free choice in the matter when their parents give them raw milk to their detriment. In New York City it is unlawful to sell raw milk except on a doctor's prescription, and if we allow raw milk to be sold it should not be bulked raw milk. To allow treatment houses that are not producing pasteurized milk up to their full capacity to sell bulked raw milk is clearly quite contrary to the interests of public health and is an unnecessary concession to ignorant prejudice.

The following tables show the results of sampling of milk and other foods:—

Table 14—Results of Milk Sampling

Year.	Samples Taken.	Samples Not Complying.	Percentage of Samples Not Complying.
1945	17,811	1,563	8·7
1946	17,368	1,392	8·0
1947	16,106	1,342	8·0
1948	18,244	1,502	8·2

Table 15—Samples of Food and Drugs Taken and Dealt With During 1948

District.	Milk.				
	Number of Samples.	Samples Not Complying.		Warnings Issued.	Prosecutions Recommended.
		Number.	Percentage.		
North Auckland	212	7	3·3	1	..
Central Auckland	3,018	128	4·2	111	8
Thames-Tauranga	215	14	6·5	10	..
South Auckland	2,038	106	5·2	66	14
Taranaki	638	48	7·5	7	5
East Cape	201	14	6·9	5	2
Wellington - Hawkes Bay	1,648	172	10·4	43	9
Central Wellington	2,699	329	12·1	24	1
Nelson-Marlborough	310	13	4·1	7	..
Christchurch	2,991	183	6·1	101	22
West Coast	489	28	5·7	17	1
Timaru	1,300	215	16·5	71	..
Dunedin	2,105	208	9·8	105	..
Southland	380	37	9·7	27	..
Totals	18,244	1,502	8·2	595	62

District.	Other Food and Drugs.					
	Number of Samples.	Samples Not Complying.		Warnings Issued.	Prosecutions Recommended.	Foods Seized and Destroyed.
		Number.	Percentage.			
North Auckland	89	4	4·4	1	..	..
Central Auckland	435	96	22·0	37	..	177
Thames-Tauranga	8	1	12·5	..	..	..
South Auckland	162	47	29·0	30	2	31
Taranaki	53	4	7·5	1	3	7
East Cape	279	23	8·2	9	2	..
Wellington - Hawkes Bay	255	73	28·6	..	..	25
Central Wellington	380	79	20·7	2	2	18
Nelson-Marlborough	128	11	8·5	7	..	13
Christchurch	562	116	20·0	32	9	72
West Coast	25	10	40·0	5	..	21
Timaru	922	112	1·2	111	..	170
Dunedin	1,172	106	9·0	2	..	32
Southland	177	34	19·2	20	7	6
Totals	4,647	716	15·4	257	25	572

The principal "other foods" sampled included—

	Samples.
Ice-cream	735
Milk-shakes	745
Other milk products	238
Bacon and ham	270
Sausages	156
Other meat products	139
Eggs and egg-pulp	184
Cordials and beverages	180
Fruit, vegetables, and jams	74

The drugs, disinfectants, and soaps examined totalled 331 samples.

Seizure of Unsound Food.—The foods seized and destroyed included a large quantity of bacon that had been canned in rashers without any heat processing. Bacteriological examination showed that in all the bacon tested *staphylococcus* was present. This micro-organism is a common cause of food poisoning and any toxin produced is resistant to heat. Other condemned foods included rabbits, canned fish, dried fish, fruit, dried fruit, desiccated coconut, pickles, sandwich spreads, and wine.

Prosecutions.—Prosecutions under the Food and Drugs Act totalled 87.

Inspection of Pharmacies.—At the request of the New Zealand Pharmacy Board, the Department's Dangerous Drug Inspectors now carry out general inspections of pharmacies and report to the Board. This work has necessitated the appointment of additional Inspectors.

Dangerous Drugs and Poisons

Heroin.—During the year New Zealand's relatively high consumption of heroin was given full publicity by the world-wide publication of the first post-war report of the Permanent Central Opium Board. The facts as reported gave a somewhat exaggerated impression of the increased consumption in 1946 by comparing it with that for 1936. The consumption normally fluctuates from year to year, and the figure for 1936 was unusually low. Nevertheless, as had already been pointed out in the Department's report of last year, New Zealand's *per capita* consumption of heroin was higher than that of any other country except Finland.

This state of affairs was well known to the Department and active steps were begun in 1946 to exercise more stringent control. The matter was referred to in the Department's annual reports for 1947 and 1948. The action taken has been effective and the consumption of heroin has fallen from 7·8 kilograms in 1946 to 6·4 kilograms in 1947 and 5·8 kilograms in 1948. This last figure still shows an unduly high consumption, and as an additional measure of control the Drug Tariff has been amended to restrict the amount of any liquid preparation of heroin obtainable at the cost of the Social Security Fund to not more than sixteen doses. This, it is hoped, will prevent the prescribing and dispensing of larger quantities of heroin, but will still enable any doctor to prescribe the drug in unlimited quantities if there is clearly a necessity to do so.

Morphine.—An increase in the consumption of morphine has also become apparent recently, and this drug requires closer control. The introduction of new drugs such as pethidine was expected to result in the consumption of less morphine, but this has proved not to be the case.

Supplies of morphine are permitted to be carried on ships for first-aid purposes, even in the absence of a medical officer. An amendment of the Dangerous Drugs Regulations is being promoted to permit of the same concession in the case of aircraft.

Drug Addiction.—The Department's reports show a slight increase in the number of drug addicts, but this is certainly due rather to a more intensive search for addicts than to any actual increase. Already one case of pethidine addiction has been brought to light, which is remarkable considering the short time this drug has been in use. The activities of certain addicts are made easier by the carelessness with which certain pharmacists fill prescriptions for dangerous drugs allegedly signed by doctors whose prescriptions they do not normally dispense and whose signatures are not known to them. Two addicts recently in the same city were found to have presented a number of forged prescriptions.

Prosecutions.—A pharmacist who was suspected of having misused dangerous drugs was prosecuted for obstructing the Inspector and was convicted and fined.

Training of Inspectors

During recent years progress in preventive medicine has moved away from environmental sanitation and is concerning itself more and more with personal health. Environmental sanitation, however, remains the only sure foundation on which preventive medicine can be built, and includes such important matters as the supervision of public water-supplies, the satisfactory disposal of excreta and general refuse, the hygiene of dwellings, and the supervision of the cleanliness and freedom from infection of food. So much of this is taken for granted that its importance tends to be overlooked.

In all these activities the Health Inspector and Sanitary Inspector play a leading part, and any reduction in their number or efficiency is certain in time to result in lower standards of public hygiene. For some years both the Department and local authorities have had difficulty in recruiting Inspectors, and recently the shortage of staff in this connection has begun to have serious results. A gradual but continuous lowering in the hygienic condition of food factories, food shops, and eatinghouses may escape the public notice, but if unchecked will have serious results. The efficient control of outbreaks of infectious disease is seriously handicapped without an adequate number of competent Inspectors.

In an attempt to remedy this serious state of affairs the Department, in co-operation with the Wellington Technical College, has organized a full-time course of training for Inspectors, and local authorities were invited to select candidates who would also attend. The course is a full-time one and will cover a full academic year of theoretical training, followed by six months' practical training in the work of an Inspector. Hitherto an Inspector could only undertake part-time training while engaged in earning his living, so that the new arrangement sets the training of the Inspector on a far higher level. The course is a detailed and comprehensive one and utilizes the services of the staff of the technical college, officers of the Wellington City Engineer's staff, departmental medical officers, and senior Inspectors, with the assistance of certain specialists from other Government Departments and Victoria University College. It is hoped that the class will become a permanent arrangement and that local authorities will make full use of it. Six Factory Inspectors of the Department of Labour and Employment are also attending the course.

If he is to exercise the greatest influence on the public health, the Inspector must adopt the role of adviser and teacher rather than that of policeman. In the past the Inspector has been expected to serve a population of about 16,000 people, while some are responsible for as many as 25,000. This is too much for efficient work, and if desirable sanitary standards are to be achieved and maintained it is necessary to reduce the area that each Inspector is required to serve. A population of about 10,000 will supply full-time work for a competent Inspector if a high standard of environmental hygiene is to be achieved. To give effect to this, the Department's staff of Inspectors will require to be considerably increased, as also will the staffs maintained by local authorities. There is still a tendency among certain local authorities to use their Inspector for sundry odd jobs in no way connected with public health, and his proper duties are sometimes neglected.

Regulations Under the Health Act

Many of the existing sets of regulations under the Health Act have been in force for over twenty years and are in need of revision. During the past year this necessary work has been commenced, and the following new or amended regulations came into force during 1948:—

Health (Eatinghouse) Regulations 1948 (enacted, 24th November, 1948; came into force, 1st January, 1949).—Generally speaking, a higher standard is required not only in the building and its equipment, but also in the conduct of the establishment.

Existing licensed eatinghouses are allowed a period of three years in which to bring the building into conformity with the new standard. The importance of a high standard in the washing and sterilization of eating utensils is recognized and provided for. Special provisions apply to cafeterias where food is spread out for the customers' selection and is thereby exposed to chance contamination unless suitable precautions are taken. The establishment of adequate hand-washing facilities for the staff and the wearing of clean, washable overclothing is required.

The regulations are enforceable in all eatinghouses controlled by Departments of State and in all cafeterias in factories and offices. Registration by the local authority is, however, only required in the case of privately-owned eatinghouses that are open to the general public.

Quarantine (Air) Regulations 1948 (enacted, 10th March, 1948; came into force, 1st April, 1948).—These regulations are new, and give legal effect to the provisions of the International Sanitary Convention for Aerial Navigation, 1933, as amended by UNRRA in 1944, and to which New Zealand is a party.

Provision is made for the necessary declaration of health to be given by the commander of each aircraft arriving from overseas, and for a personal declaration of health by each passenger. This is of importance, because a passenger can arrive in New Zealand from almost any part of the world within the incubation period of the most serious pestilential diseases, and the personal declaration records his movements during the previous fourteen days. Details are set out of the action to be taken when aircraft arrive having on board persons suffering from smallpox, plague, cholera, typhus, or yellow fever, or when aircraft arrive from a locality infected with any of these diseases. In compliance with the convention, the precautions to be taken are designed to afford the greatest measure of protection against the importation of disease, with the least possible interference with the movements of passengers and aircraft.

The powers and duties of the medical officer at a sanitary aerodrome, and the duties of the commander, crew, and passengers of aircraft, are set out in some detail.

Provision is made for the spraying on arrival of all aircraft from overseas so as to guard against the introduction of undesirable mosquitoes and other insects. This is intended to prevent particularly the anopheline mosquito, that carries malaria, from gaining an entrance into New Zealand.

Health (Drainlayers Registration) Regulations 1948 (enacted, 13th October, 1948; came into force, 1st April, 1949).—These regulations provide for registration of drainlayers by the Department, and registration enables a drainlayer to work anywhere in New Zealand. Previously each local authority registered drainlayers, and this enabled them to work only in the district of that authority. Any Borough Engineer, or Drainage Board Engineer, or approved Inspector may examine a drainlayer and give him a certificate of competency, but the certificate of registration is issued by the Medical Officer of Health of the district.

Health (Infectious and Notifiable Diseases) Regulations 1948 (enacted, 14th April, 1948; came into force, 25th April, 1948).—The pre-existing regulations were much out of date as judged by modern conceptions of epidemiology. With the advance in bacteriological science and increased knowledge of disease processes, it became evident that the existing periods of isolation for certain infectious diseases were unnecessarily stringent. Certain new methods of treatment also, made available with penicillin and the sulphonamide drugs, have greatly shortened some disease processes and correspondingly reduced the need for long isolation.

The following reductions in isolation periods have therefore been made :—

For cerebro-spinal fever	From four weeks to two weeks.
For chickenpox ..	From three weeks to one week.
For measles ..	From two weeks to 1 week (if uncomplicated).
For diphtheria ..	From three weeks to two weeks (unless infection persists).
For enteric fever ..	From six weeks to four weeks, with more stringent bacteriological tests.
For poliomyelitis ..	From four weeks to three weeks.
For scarlet fever ..	From four weeks to two weeks (unless infection persists).

The periods of exclusion from school of contacts of infectious disease have been correspondingly reduced.

All these alterations follow the modern accepted practices in Great Britain and America.

The Medical Officer of Health now has power to prevent a "carrier" from acting as a food-handler. Previously he could only rely on persuasion.

Provision is made for the issuing of international vaccination certificates and the appointment of public vaccinators for the purpose.

Staff

The Division is now more fully staffed on the clerical side than has previously been the case. I wish to express appreciation of the efforts of the clerical staff, who have got through a large volume of work in an extremely competent manner. This has enabled me to undertake activities outside the normal routine work of the Division that otherwise would have been impossible.

Appendix

The Bacteriological Control of Ice-cream

By Dr. G. O. L. Dempster, Medical Officer of Health, Dunedin

Ice-cream has become an important article of diet, and the possibility of the spread of infectious disease by this medium has been amply demonstrated by the recent outbreak of typhoid fever at Aberystwyth(1). The necessity for constant bacteriological and sanitary control of this product has thus been emphasized.

The standard laid down for ice-cream by regulations under the Sale of Food and Drugs Act, 1908, required the mix to be sterilized by boiling or pasteurized by heating to 156°F. for twenty minutes or 165°F. for ten minutes. The permitted bacterial content was not more than 50,000 organisms per cubic centimetre. The Food and Drug Regulations of 1946, while leaving the requirements for sterilization or pasteurization the same, substituted a *B. coli* standard for the total count. The present bacteriological standard is that ice-cream shall not contain any living coliform organisms in 0·1 millilitre.

Over the last few years much time has been spent in plant inspection and in test checking the manufacturing process at various stages, with satisfactory results. Manufacturers have welcomed the service and have shown themselves ready to adopt suggestions to improve bacteriological quality. One fact which has emerged during test checking of plants is the deterioration in quality liable to occur at the stage of the ageing-vat, as indicated by the following typical analyses :—

	Total Count.	*B. Coli.*
Pasteurizer mix	600	A in 1
	5,600	A in 1
Homogenizer	48,000	A in 1
	8,500	A in 1
Cooler	9,100	A in 1
	7,000	A in 1
Ageing-vat	7,800,000	P in 0·0001
	870,000	P in 0·0001
Churn	7,440,000	P in 0·0001
	240,000	P in 0·001
Bulk can	7,080,000	P in 0·001
	280,000	P in 0·0001

In one or two instances it was found that the capacity of the cooler was insufficient, with the result that the mix in the ageing-vat took a long time to reach a temperature at which bacterial multiplication would be arrested. In fact, the ageing-vat was acting as an incubator. For example, in one instance it was found that the mix came off the cooler at a temperature of 105°F. and took five hours for the temperature to be reduced to 51°F.; while in another case the mix came off the cooler at 74°F. and had dropped only 2F. in three hours. It took seven hours twenty minutes for the vat temperature to reach 53°F.

Attention to these and similar points has resulted in a great improvement in bacteriological quality. In 1946 it was not unusual to find that samples of ice-cream at the factory gave analyses as under:—

Total Count Per Cubic Centimetre.	*B. Coli.*
13,300,000	P. in 0·1 c.c.
2,180,000	P. in 0·0001 c.c.

These might be compared with recent analyses:—

	Total Count.	*B. Coli.*
Pasteurizer mix—		
A	2,600	A in 1 c.c.
	..	A in 1 c.c.
B	1,400	A in 1 c.c.
	..	A in 1 c.c.
C	0	A in 1 c.c.
D	..	A in 1 c.c.
Homogenizer—		
A	2,400	A in 1 c.c.
	..	A in 1 c.c.
B	15,000	A in 1 c.c.
	..	A in 1 c.c.
C	0	A in 1 c.c.
D	..	A in 1 c.c.
Cooler—		
A	5,000	A in 1 c.c.
	..	A in 1 c.c.
B	4,200	A in 1 c.c.
	..	A in 1 c.c.
C	100	A in 1 c.c.
D	..	A in 1 c.c.
Ageing-vat—		
B	16,500	A in 1 c.c.
	..	A in 1 c.c.
C	0	A in 1 c.c.
D	..	A in 0·001 c.c.
Churn—		
A	1,600	A in 1 c.c.
	..	A in 1 c.c.
B	9,200	A in 0·1 c.c.
	..	A in 1 c.c.
C	300	A in 1 c.c.
D	..	A in 0·01 c.c.
Container—		
A	1,800	A in 1 c.c.
	200	A in 1 c.c.
B	5,200	A in 0·01 c.c.
	..	A in 1 c.c.
C	2,100	A in 0·001 c.c.
D	..	A in 0·01 c.c.

Although the quality of ice-cream as it now leaves the factory may be considered as satisfactory the position with regard to retail sale in shops is very different, a marked deterioration in quality being evident. The same degeneration in the quality of ice-cream during retail sale was commented on by Turbott in a survey carried out in Gisborne in 1933(2). This is indicated by the following table. The tests were made on the ordinary 3d. ice-cream served from a bulk container in a retail shop. Sampling was done with a sterile spoon and not with the shop server, which is well known as a fertile source of contamination. In one instance the water in which the ice-cream dipper was stored showed a plate count of 8,400,000 organisms per cubic centimetre.

Manufacturer.	Plate Count.	*B. coli.*
A	9,000	A in 0·001 c.c.
B	190,000	A in 0·001 c.c.
	110,000	A in 0·001 c.c.
	1,530,000	A in 0·0001 c.c.
	65,000	A in 0·001 c.c.
	156,000	A in 0·001 c.c.
	69,000	A in 0·001 c.c.
	29,000	P in 0·0001 c.c.
	120,000	A in 0·001 c.c.
C	51,000	P in 0·0001 c.c.
	950,000	P in 0·0001 c.c.
D	910,000	P in 0·0001 c.c.

These results should be compared with the results obtained from packaged ice-cream made by the same manufacturers and purchased from retail shops :—

Manufacturer.	Plate Count.	*B. coli.*
A	1,600	A in 1 c.c.
	6,800	A in 1 c.c.
B	35,000	A in 1 c.c.
C	800	A in 1 c.c.
	8,100	A in 1 c.c.
D	500	A in 0·01 c.c.

These results are overwhelmingly in favour of packaged ice-cream ; and it is as important that ice-cream should be retailed in packages as it is that pasteurized milk be retailed in bottles.

Some attempt has been made to grade ice-cream samples according to the modified reductase test, as was recently described in Great Britain(3).

The following table gives the bacteriological results and the reductase tests on samples :—

Sample No.	Total Count Per Cubic Centimetre	*B. coli.*	Reductase.	Provisional Grade.
			Hours.	
1	2,600	A in 1 c.c.	1¾	3
2	2,400	A in 1 c.c.	1¼	3
3	5,000	A in 1 c.c.	¼	3
4	1,600	A in 1 c.c.	2¼	2
5	1,800	A in 1 c.c.	2¼	2
6	1,300	A in 1 c.c.	1¾	3
7	1,800	A in 1 c.c.	4	2
8	1,800	A in 1 c.c.	4	2
9	1,400	A in 1 c.c.	4½	1
10	15,000	A in 1 c.c.	4½	1
11	4,200	A in 1 c.c.	4½	1
12	16,500	A in 1 c.c.	1½	3
13	9,200	A in 0·01 c.c.	0	4
14	5,200	A in 0·01 c.c.	1½	3
15	7,200	A in 0·01 c.c.	1½	3
16	..	A in 1 c.c.	9¼	1
17	..	A in 1 c.c.	9¼	1
18	..	A in 1 c.c.	9¼	1
19	..	A in 0·001 c.c.	8	1
20	..	A in 0·01 c.c.	8	1
21	..	A in 0·01 c.c.	8	1
22	..	A in 0·1 c.c.	8	1

It is difficult or impossible to reconcile the bacteriological findings with the reductase results, and for the purpose of control of manufacture it is considered that, allowing for the weaknesses of the bacteriological test, bacteriology gives a better guide to hygienic quality than does the reductase test.

References

(1) *Lancet*, Sept. 21, 1946, p. 434.

(2) Report of Director-General of Health, New Zealand, 1933, Appendix.

(3) *Monthly Bulletin of the Ministry of Health and the Emergency Public Health Laboratory Service*, 1947, Vol. 6 (March).

DIVISION OF HOSPITALS

(1) Receipts and Payments of Hospital Boards

At the time of writing, complete returns for the year under review are not yet to hand, but the following estimate made from the data available gives a general picture of the source of finance and the main headings of expenditure.

Receipts for both maintenance and capital purposes were, in round figures, as follows :—

	£
From the Social Security Fund in respect of hospital and other benefits	2,600,000
Levies on local authorities	1,413,000
Subsidies from the Consolidated Fund	4,900,000
From other sources (recoveries on account of relief, including age-benefits, bequests, and miscellaneous receipts)	262,000
	£9,175,000

Expenditure under its main headings was as follows :—

	£	£
Debit balances, net, as at 1st April, 1948		134,000
(*a*) Maintenance expenditure—		
(i) Hospital maintenance	6,900,000	
(ii) Indoor and outdoor relief	225,000	
(iii) Interest on loans	190,000	
(iv) Administration	211,000	
(v) Other items (District Nursing, grants to ambulance associations, subsidies to private hospitals, rents and rates, contributions to National Provident Fund, &c.)	429,000	
		7,955,000
(*b*) Capital expenditure (excluding loan works)—		
(i) Buildings and equipment	686,000	
(ii) Loan repayments and Sinking Fund instalments	340,000	
		1,026,000
Credit balances, net, as at 31st March, 1949		60,000
		£9,175,000

When provision was made in the Finance Act (No. 2), 1946, limiting, at 0·5d. per pound of the rateable capital value, the rate of levy by Hospital Boards upon their contributory local authorities, it was anticipated that although revaluations would later result in some increased contributions by the local authorities a much greater share of the cost would be borne by the Consolidated Fund.

The following table indicates the extent to which local authorities as a whole have been relieved during the two years the rate of levy has been "stabilized" :—

	Total Levies on Local Authorities.	Subsidy Payable From Consolidated Fund.
	£	£
1946–47	1,889,045	1,937,571
1947–48	1,347,441	3,321,378
1948–49	1,413,249	4,941,832

The old subsidy scheme provided for an average rate of subsidy on levies of £1 for £1 and involved adjustments from year to year to achieve that average. The limitation of the rate of levy has resulted in an average rate of subsidy of £3 9s. 11d. for 1948–49.

Hospital expenditure still shows an upward trend, mainly attributable to increases in salaries and wages. For the year 1949–50 the levies on local authorities will amount to £1,503,310, while the subsidy from the Consolidated Fund is estimated at £5,500,000.

An important aspect is the range and magnitude of the capital expenditure programmes of Boards. The five years' programme compiled in 1947, and involving an estimated expenditure of over £12,000,000, has since had many substantial additions, and the aggregate is over £21,000,000. On the building side it is evident that a large part of the programmes could not be carried out with the available supply of labour and materials. Nevertheless, the early rebuilding of several old hospitals is essential, and it is recognized that in the campaign against tuberculosis further institutional accommodation must be provided for these cases.

The increasing availability of technical equipment and labour-saving devices following a period of comparative shortage is responsible for a considerable increase in expenditure on that account.

The heavy demands on the Department's limited technical staff (medical officers, architects, engineers, and others), in the examination of proposals and of plans continues to give rise to a considerable measure of dissatisfaction on the part of Boards, though most of them appreciate and are themselves experiencing the general effects of post-war staffing difficulties. Renewed efforts are being made to overcome these difficulties, despite the strong competition of other agencies and the special training and experience required of new appointees.

(2) Hospital Beds

As at 31st March, 1948, there were available 14,123 public-hospital beds, or 7·8 per 1,000 of population. Of these, 1,542 were maternity beds and 2,416 were for infectious diseases, including tuberculosis. There were also 2,641 beds in licensed private hospitals, or 1·4 per 1,000 of the population. Of these, 761 were maternity beds.

The total of public and private-hospital beds is 16,764, or 9·2 per 1,000 of the population. This does not include mental hospitals or charitable institutions.

Shortages of nursing staff still necessitate the temporary closing down of some of the accommodation in the aggregate, approximately 1,000 beds.

(3) Legislation

The Hospitals Amendment Act, 1948, made several amendments of note, including the adoption of the title "Hospitals Act" in place of the old title "Hospitals and Charitable Institutions Act."

Special provisions were made in sections 3 to 5 for the appointment of committees of management in new hospital districts that may be created by the amalgamation of existing districts. These provisions now make it possible to proceed with the amalgamation of the six northern hospital districts in accordance with the recommendations of the Local Government Commission.

By section 6 of the same Act, amending section 38 of the principal Act, it is now made obligatory for a Hospital Board to obtain the Minister's prior approval of the appointment of any medical officer, or of the matron, master, manager, or engineer of an institution, or of the secretary to a Board.

The types of institutions which a Board may establish have by section 8 of the amending Act been extended to include a residential nursery or a day nursery for the reception and temporary care of young children.

The purposes for which a Board may grant leave on pay and expenses have been extended to include the carrying-out of inspections or investigations outside New Zealand (as well as study leave as formerly), but all such leave now requires to be approved by the Minister.

(4) Inspections

Regular inspections on the medical, engineering, and architectural aspects and on the administrative side have not been possible to the extent that is desirable. There has been some strengthening on the administrative side, but a further increase in staff is necessary, and from the professional and technical aspects is regarded as a matter of urgency if delays are to be overcome.

(5) Hospital Employment Regulations

Following consideration of the recommendations of Hospital Board Salaries Advisory Committees, salary scales and conditions of employment have been prescribed by regulations affecting several classes of Hospital Board employees whose conditions of employment are not governed by awards or industrial agreements:—

Class of Employee.	Regulations.
Physio-therapists and students	Hospital Employees Regulations 1948, Amendment No. 1 (1948/108); Amendment No. 5 (1948/218).
Hospital bacteriologists and other laboratory workers	Hospital Employees Regulations 1948, Amendment No. 2 (1948/192).
Radiographers and other x-ray workers	Hospital Employees Regulations 1948, Amendment No. 3 (1948/216).
Dietitians and students	Hospital Employees Regulations 1948, Amendment No. 4 (1948/217).
Medical officers, Group No. 1 (house surgeons and registrars)	Hospital Employees Regulations 1948, Amendment No. 6 (1948/219).
Medical officers, Group No. 2 (medical superintendents, specialists, and other whole-time medical officers)	Hospital Employees Regulations 1948, Amendment No. 7 (1949/19).

Nurses had been dealt with in the previous year.

There are some 500 to 600 employees whose remuneration and conditions of employment are not yet governed by regulations under the Hospitals Act. They comprise part-time medical officers numbering about 150, clerical officers (180), engineers (50), and a variety of smaller classes, including orthopædic technicians, male nurses, occupational therapists, dentists, architects, works superintendents, &c. The setting-up of special Salaries Advisory Committees to deal with these smaller classes appears impracticable, and consideration is being given to the question of a general Committee undertaking the task of reporting on claims and submissions.

Arrangements are also being made for the early review of scales and conditions previously issued affecting the larger classes of employees.

DIVISION OF CHILD HYGIENE

Medical officers and District Nurses continued throughout the year the departmental policy of health supervision of pre-school, primary, and secondary school children. In general, the health of these children was good. The policy of thorough individual examinations of the pre-school child by the medical officer in the presence of the parent is bearing fruit. Medical officers are finding that advice and encouragement given in the toddler years is remembered by parents, and that this form of health education, through individual interviews and instruction, markedly lessens the health defects found in the school years. Health supervision in primary schools is most active, and medical officers find the most co-operation where the school has a "live" parent-teacher committee or association. Medical officers who have worked in the Department for some years report that the standard of health and nutrition has improved of recent years, and certainly this year's statistics bear this out.

Nutrition would seem to be back to its pre-war average level of about 5 per cent. of subnormal nutrition in our children (pre-school, 6·7 per cent.; school-children, 5·08 per cent.; Maori children, 4·75 per cent.). Posture has improved to this extent, that, while the slight impairments remains high, about one child in three being affected in the school years, the gross defects are almost halved from the previous year. The amount of goitre in the child population continues to decline in pre-school, school, and Maori children. In European school-children there was a new low level of 3·49 per cent.; in these children ten years ago 15·12 per cent. of goitre was reported. This fall is gratifying, and undoubtedly the result of health education effecting the increasing and continuous use of iodized salt in the community.

Table 16—The Medical State of Primary-school Children

	European.		Maori.	
	Number.	Percentage.	Number.	Percentage.
Number of children examined	100,861	..	9,247	..
Number of children found to have defects	30,942	30·67	3,969	42·92
Number with defects other than dental	24,522	24·31	2,761	29·85
Children showing evidence of—				
Subnormal nutrition	5,125	5·08	440	4·75
Skin-diseases	1,929	1·91	843	9·11
Heart and lungs (European, 48,340; Maori, 843)—				
Heart—				
Organic disease	262	0·54	17	0·20
Functional disease	626	1·30	53	0·63
Respiratory disease	600	1·20	34	4·03
Posture—				
Slight impairment	36,757	36·44	2,519	27·24
Gross defect	274	2·72	123	1·33
Deformities of trunk and chest	1,325	1·31	98	0·10
Mouth—				
Defect of jaw or palate	4,315	4·27	127	1·37
Dental caries	7,146	6·08	1,760	19·03
Extractions of permanent teeth	433	0·42	109	1·17
Fillings	75,101	74·45	5,824	63·00
Perfect sets of teeth	4,321	4·28	654	7·07
Gums: Gingivitis or pyorrhœa	321	0·31	202	2·18
Nose and throat—				
Nasal obstruction	2,790	2·76	115	1·23
Enlarged tonsils	9,934	9·84	1,080	11·67
Goitre—				
Incipient	3,104	3·07	102	1·10
Small	411	0·41	27	0·29
Medium or large	15	0·01	3	0·003
Total amount of goitre	3,530	3·49	132	1·42
Eye—				
External eye-disease	529	0·52	66	0·71
Squints	331	0·33	11	0·11
Defective vision—				
Uncorrected	2,408	2·38	288	3·11
Corrected	1,609	1·59	37	0·40
Ear—				
Otorrhœa	120	0·11	77	0·83
Defective hearing	273	0·27	84	0·90
Defective speech	444	0·44	21	0·22
Mental—				
Retardate	205	0·20	22	0·23
Feeblemindedness	139	0·13	1	0·01
Epilepsy	17	0·16	1	0·01
Nervous defects	403	0·39	6	0·06
Digestive system defects	113	0·11	..	..
Phimosis	77	0·07	1	0·01
Undescended testicles	349	0·34	38	0·41
Number of parents present at medical examination	31,602	31·33	885	9·57

The findings of the pre-school medical examinations show a slight but fairly general improvement on those of the previous year. There is less malnutrition, reduced dental caries, and healthier noses and throats. Mothers still need a lot of help on the training and mothercraft side—for example, one pre-school child in every ten has a bad food habit, and a further one in each twenty has some other bad habit. These result from faulty training and lack of knowledge in the home. One of the valuable functions of the pre-school clinic is the opportunity it affords of discussing feeding and training difficulties with mothers, and of giving advice and reassurance on these matters. Another value of the clinic is its very real worth as a means of obtaining early treatment of defects, and of having the child as fit as possible as it enters school life.

Table 17—The Medical State of Pre-school Children

	Number.	Per Cent.
Number of children seen	11,250	..
Defects—		
Uncleanliness	91	0·80
Subnormal Nutrition	758	6·7
Protuberant Abdomen	281	2·4
Posture defective	238	2·1
Deformities—		
Chest	256	2·2
Legs	793	7·0
Feet	1,060	9·4
Skin disease	562	4·9
Heart	177	3·1
Lungs	89	0·79
Dental—		
Gums and soft tissue	84	0·74
Dental caries	838	7·4
Nose and throat—		
Adenoids	299	2·6
Tonsils	886	7·8
Goitre	56	0·49
Eyes—		
External disease	140	1·2
Defective vision	80	0·71
Ears—		
Otorrhœa	24	0·21
Deafness	17	0·15
Phimosis	54	0·48
Undescended testicles	152	1·3
Hernia	52	0·46
Habit abnormalities—		
Bad food habits	1,129	10·03
Other bad habits	672	5·9
Bowel action abnormality	171	1·5
Enuresis	449	3·91
Insufficient daytime rest	440	3·91
Insufficient sleep	418	3·71

The Medical State of Secondary-school Children

During the year the medical inspection of 2,005 secondary-school children was effected at the School Certificate age-level only, when officers could find the time, restriction to this age group being due to our shortages of medical staff. Wherever this work was undertaken, the Principals and staff were enthusiastic and co-operative, and the Department hopes to expand this work as staff increases. The girls particularly appeared to welcome the opportunity of getting advice on many minor problems which parents consider too trivial for their own medical practitioner. The general standard of

health was good. Mantoux testing was done, all positive reactors being x-rayed, and a minority referred to the chest clinic for serial x-rays and specialist supervision. In this age group, 15–17 years, the positive reactors to the Mantoux test average 20 per cent. in the areas studied, and by the age of 19 years 32 per cent. have become positive.

Conference of Medical Officers

During the year a refresher course for medical officers engaged in child-hygiene work was held in Wellington, lasting one week. The physical, psychological, and specialized medical needs of the pre-school child were reviewed. The course was found valuable and much appreciated by the medical personnel. The lectures given at this course will soon be issued in pamphlet form for the use of those interested.

Immunization Against Disease

Whooping-cough.—Departmental medical officers immunize on request only babies and toddlers between the ages of 3 months and 2 years. During the year, 5,148 complete courses of whooping-cough vaccine were given.

Typhoid Fever.—Maori children attending primary schools were vaccinated with triple vaccine in the autumn term against typhoid and paratyphoid fevers. During the year 19,521 of these vaccinations were done by District Nurses.

Diphtheria.—Departmental nurses and medical officers carried out anti-diphtheria immunizations to a total of 29,181 complete courses of prophylactic.

Table 18—Diphtheria Immunization

Health District.	Babies, 3 Months. to 1 Year.	Pre-school, 1 up to 5 Years.	School, 5 up to 10 Years.	School, 10 up to 15 Years.	Total.
North Auckland	1,725	465	88	3	2,281
Central Auckland and Thames-Tauranga	2,407	1,593	130	4	4,134
South Auckland	829	661	823	99	2,412
East Cape	367	1,312	292	10	1,981
Taranaki	592	641	153	9	1,395
Wellington - Hawkes Bay ..	937	1,277	139	8	2,261
Central Wellington	1,674	1,134	2,643	42	5,493
Nelson-Marlborough	295	215	93	3	606
Christchurch - West Coast ..	1,352	1,847	1,429	5	4,633
Timaru	471	763	149	21	1,404
Dunedin	242	522	174	26	964
Southland	1,087	394	20	16	1,517
Totals	11,978	10,824	6,133	246	29,181

This does not give a complete picture of the state of artificial immunity in New Zealand, as private practitioners are doing an increasing amount of this work and are failing as a body to keep the Department informed of numbers done, although they accept free prophylactic from the Department on the understanding that such returns are made in due course.

Health Camps

As in previous years, officers of the Department concerned with child hygiene continued to recommend for treatment in approved health camps some 3,000 children found to have defects which could possibly be corrected by the treatment offered in the camps. The Department maintains a general oversight of camps through the Medical Officers of Health and appoints matrons and sub-matrons from the registered nursing staff of the Department.

The general administration and financing of these health camps is the joint responsibility of the King George V Memorial Fund Board and the New Zealand Federation of Health Camps (Inc.). The latter organization, working in close co-operation with the Post and Telegraph Department, conducted the 1948–49 Health Stamp Sales Campaign, which will result in approximately £35,000 being paid to the funds of the Federation. This amount will defray the cost of maintenance of children in camps for the forthcoming year.

Milk-in-Schools Scheme

The Milk-in-schools Scheme continued during the year. Despite one complete distribution scheme from a pasteurizing plant not operating because of contract difficulties, the number of children to whom the supply was available increased compared with last year's figure. The percentage of children accepting pasteurized milk offered to them, however, decreased from 70 to 68. Of the 244,000 children attending the various schools where the milk was supplied, 166,000 accepted the ½-pint ration. Malted-milk powder to be made into a hot drink was supplied as an alternative to schools in isolated parts of the country where it was not practicable for pasteurized milk to be delivered. With this scheme, 7,200 of the 8,500 children on the rolls of the schools where it was available accepted the drink. At a few schools the Department supplied raw milk from approved sources for making into cocoa, in lieu of malted-milk powder. This was taken by approximately 800 children.

Health Education

Posters.—Six were printed during the year, to a total number of 45,000 copies. Two of these featured dental care, one hydatids, one nutrition, one spitting, and one physical recreation. This brings the total of original posters produced over the last six years to 37. These posters circulate to schools, to interested groups of many kinds, and are displayed on railway-stations throughout the land.

Glass show-case exhibits are maintained at Auckland and Wellington Railway-stations, with monthly changes of material.

Show-cards with health messages changed bi-monthly are displayed in tram-cars and motor-buses throughout New Zealand. In a fixed proportion of railway carriages a show-card, changed once a year, carries a health message for railway travellers.

Mobile Exhibit.—Owing to the continuation of the poliomyelitis epidemic, only one short tour of the mobile exhibit was arranged. This comprised a four-day exhibit in Auckland. During the period it was visited by 1,560 children and 560 adults. Smaller exhibits were made available to locally arranged health education efforts at Lawrence, Gisborne, New Plymouth, and Christchurch.

Films and Visual Aids.—The health film library now comprises 276 titles, multiple copies of some of these bringing the talkie film total to 678 films. The services offered by this library are being increasingly accepted and used not only by departmental officers, but by an increasing number of Hospital Boards, who use the films for nurse-training purposes. During the year 3,527 film showings were made to a total attendance of 167,542 persons.

Pamphlets.—During the year the following pamphlets were printed:—

"Beware of Hydatids"	12,000
"Technique of Isolation"	5,000
"The Family's Food"	100,000
"Give Us Good Teeth"	100,000
"Artificial Respiration"	20,000
"Feeding the Flatter or the Roomer"	20,000
"Tuberculosis" (4)	80,000

Newspapers and Magazine Publicity.—Advertisements have been continued throughout the year putting health messages before the public through fortnightly changes in all newspapers and monthly changes in most of the circulating magazines of the country. Pulls of these advertisements, 20,000 copies, are obtained and circulated to schools and others interested, and used on our mobile and other exhibits.

Radio Talks.—The daily ZB network talks were not resumed during the year owing to staff shortages, but the thrice-weekly YA network talks on health subjects were maintained throughout the year.

DIVISION OF NURSING

Nurses and Midwives Board

During the year two very important reports or studies have been published concerning the training and the future development of the nursing profession.

The American study, entitled "Nursing for the Future," by Dr. L. Brown, of the Russell Saye Foundation, predicts the development of professional nursing on three lines, and uses the analogy of the engineering profession, in which there are three grades :—

(1) The highly skilled University qualified professional engineer.
(2) The well-qualified technical engineer who has been trained in the technical schools or colleges.
(3) The general labourer, who may be a skilled workman, but usually has had little or no professional training in his work.

The British reports were the work of a small committee of experts, and covered the training, examination, and registration of nurses and midwives in Great Britain, emphasis being placed on the necessity for student status for future training so that pupils could be allocated for duty according to the required clinical experience rather than where staff, as such, are needed for patients.

A recommendation was also made that the special registers should be eliminated, and that the first eighteen months of a nurse's training should be devoted to a comprehensive review of all sections of hospital service ; specialization in one service to follow during the remainder of the period of training.

The Nurses and Midwives Board of New Zealand set up a special committee of the Board, together with certain co-opted matrons, to review the New Zealand syllabus and to make recommendations in regard to the future of the profession. It was recognized that in New Zealand with our small population, it would not be possible to introduce true student status, where the students are not depended upon to ensure ward staff. Therefore, in making recommendations to the Government, the Board has laid down certain clinical and theoretical requirements to ensure that nurses will receive a well-rounded training and be given student status as far as possible.

In addition, the Board has reviewed the regulations governing the practice of obstetric nurses, and hopes in the near future to review the syllabus governing the training of male nurses and of nursing aids.

The Board met five times during the year and reviewed reports on the various training-schools, following which action in regard to regrading was taken in some cases. A few disciplinary cases were dealt with in regard to registered nurses, and a considerable number of applications from nurses with broken periods of training received consideration.

An attempt has been made to have a more accurate issue of Practising Certificates, and with this object in view all practising nurses, as well as all public and private hospitals and Medical Officers of Health, were circularized. Notifications were also inserted in *Kai Tiaki*, the New Zealand nursing journal. The result was gratifying, although there are still many nurses who will not recognize their responsibility in this matter. For the current year ending 28th February, 1950, the number of Practising Certificates issued or renewed was 5,841, as against 3,612 last year. Approximately eighty per cent. of the nurses in practice hold both general and obstetric qualifications.

Hospital Staffing

The past year has been one of continued difficulties in regard to the number of registered nurses available for the many and constantly expanding services. This aspect of staffing has been more acute than that of applicants for training, largely for two reasons: firstly, the very high marriage rate, and, secondly, the large number of nurses proceeding abroad for further experience.

In regard to the first point, while young girls are trained to enter the nursing profession it is natural that there should be a high wastage by virtue of marriage. Very few continue to practise after marriage, and when they do, it is generally only on an hourly basis, without week-end duties.

In regard to the second point, there is throughout the world a general spirit of restlessness, and the fact that nurses may readily find work wherever they go makes travel attractive.

During the past two years almost the same number of overseas nurses have registered for work in New Zealand as New Zealand nurses have gone overseas. The majority of those coming to New Zealand have been Australians, but there are also a large number of British immigrants, in addition to Anglo-Indians, Anglo-Burmese, Dutch, Danish, Polish, and American nurses. In fact, never has there been so many overseas nurses practising in New Zealand as at present; however, the majority wish to see the country and do not stay long in any position. This, from the point of view of the stability of staff, is not satisfactory.

The placement and follow-up of the immigrant and overseas nurses has entailed a great deal of work for the Nursing Division. However, the result has been that many hospitals have been helped with staff.

A review of the hospital staffing situation shows that the training-schools have been able to maintain their position satisfactorily, and, in fact, slightly improve upon the position obtaining during the previous year. The small country hospitals were not so fortunate, but by the end of the year their position had improved also.

The following table, giving the occupied-bed rate of the training-schools during the past five years, shows a decrease in occupied beds for the last three years; this may be due to a decrease in Service patients:—

	1945.	1946.	1947.	1948.	1949.
General hospitals—					
Number of daily occupied beds ..	8,493	8,550	7,812·1	7,352·5	7,667·6
Number of registered nurses ..	1,500	1,347	1,199	1,221	1,428
Number of pupil-nurses	3,390	3,280	3,203	3,138	3,317

(For the year 1949 the number of nurses is taken as the average number employed during the year.)

These figures show an improvement on the previous year both in regard to the proportion of nurses to patients and registered nurses to pupils:—

	1946.	1947	1948.	1949.
Total number of nurses to patients ..	1 to 1·9	1 to 1·77	·1 to 1·68	1 to 1·4
Total number of registered nurses to pupils	1 to 2·4	1 to 1·3	1 to 2·5	1 to 2·4

For several years the Department has been basing the requirements for staffing in the proportion of 1 nurse to 1·5 occupied beds and 1 registered nurse to 2 pupil-nurses. These requirements were based on a forty-four to forty-eight-hour week.

It has become evident that in the large base hospitals where there are several theatres, special clinics and departments, and a large number of supervising staff this basis is inadequate and that an average of 1 to 1·25 will be required, or a fresh basis of assessment considered.

If a staff of 1 to 1·25 is required for a forty-four to forty-eight-hour week, in those hospitals where a forty-hour week is to be worked a staff of at least an additional one-sixth will be required—*i.e.*, approximately 1 nurse to 1 occupied bed. No hospital has a staff of anything like this proportion, although a few of the base hospitals are now finding it necessary, in order to provide a proper service, to have 1 nurse to 1·3 patients.

This basis of staffing is quoted in the British Working Party's report as being already in existence in some English hospitals where a forty-eight-hour week is worked but where they are many special services.

An alternative method is to calculate staff requirements on a ward basis and add to this for special wards or for special departments—*i.e.*, in several international studies the number of nurses required for a 30-bed medical and surgical ward on a forty-eight-hour week was shown as 12—3 registered, 6 for day duty, 2 night duty, and 1 reliever—but this number was increased by 1 registered nurse and 2 pupil-nurses in a children's ward of the same size.

Obstetrical Hospitals Which Are Training-schools

A few of the country hospitals have had a difficult period, but on the whole, in spite of the increased number of births, the staffing position has not only been maintained, but slightly improved.

The increased beds are due to the public hospital system having to be responsible for more beds, due to the closing of private hospitals.

	1947.	1948.	1949.
Total number of beds	759	863	940
Daily average occupied beds	613·9	702·3	780·5
Total number of confinements	15,217	16,628	18,813
Total number of registered nurses—			
Midwives	138	138	187
Maternity nurses	91	73	137
Total number of midwifery trainees ..	49	48	39
Total number of maternity trainees—			
Registered nurses	218	193	215
Eighteen months' trainees	170	214	235

These results, both in general and obstetrical hospitals, would not have been possible had it not been for several factors :—

(1) The increased salaries recommended by the Salaries Advisory Committee and agreed to by the Government.

(2) The immigration scheme, which has brought both registered nurses and girls for training as nurses to New Zealand. Although a small proportion have proved unsuitable, by far the greater majority have fitted in well to the nursing life in New Zealand.

(3) The combined recruitment policy which has been conducted by the Joint Committee of the Department and the New Zealand Hospital Boards' Association Executive. This scheme has resulted in thousands of inquiries being received, and although many may be too young for training, the interest in nursing is aroused.

(4) The pre-nursing course was commenced last year at Wellington Hospital in conjunction with a group of five secondary schools. The girls were very interested and proved capable of good work. This year the scheme has spread to eight other centres, and it is hoped, as the schools become adjusted to the new syllabus, the course may extend to all centres of any size.

Health of Nursing Staff

A Research Officer has been employed by the Department, attached to the Division of Tuberculosis, to investigate the question of tuberculosis amongst nurses. A preliminary report has been prepared which is referred to in the report of the Tuberculosis Division. This report draws attention to the accuracy with which returns should be kept and forwarded ; the standardization of forms ; the necessity for reviewing nursing technique carefully in the light of bacteriological knowledge ; the need for reviewing diet and recreational facilities ; but, above all, the importance of the allocation of duties to ensure fair distribution and the arrangements for health supervision of the staff, this depending so much upon the personality of the person directly responsible.

In our anxiety regarding tuberculosis, other aspects of health supervision are often overlooked, and in my annual reports I have on many occasions pointed out that sick-leave for many preventable conditions could be reduced considerably—*i.e.*, septic fingers, dysentery, tonsilitis, to mention only a few. Why should 236 out of 3,300 pupil-nurses have tonsilitis in one year ?

Public Health Nursing

Following on the return to New Zealand of Dr. H. Deem, the medical adviser to the Plunket Society, arrangements were made that in a number of the more isolated areas the Department's District Nurses should undertake the work of the Plunket Society, and that in future when either organization was appointing a nurse to a purely rural scattered area consideration should be given as to whether the work could not be done by one nurse employed by either organization.

This agreement has necessitated a revision of the Department's record forms, so that only one set of records, which will be satisfactory to either organization, is required to be kept by the individual nurse.

A consistent policy of staff education has been carried out during the year by means of staff conferences, extension of district libraries, and of health-education material in the form of films, posters, &c.

Bursaries have been given to 20 nurses to undertake Plunket training and to 11 nurses to undertake the Post-graduate Diploma in Public Health Nursing. In addition, nurses entering the service undertake the introductory course for District Nurses, receiving salary during the period of this course.

The record of the year's work shows a steady increase in the work accomplished. There is a marked increase in the number of infant and pre-school visits, largely due to the extension of the diphtheria immunization service. The school work also shows a marked increase over the previous year, when there was so much school closure during the early part of the poliomyelitis epidemic.

Table 19—Comparative Summary of Work Undertaken by Public Health District Nursing Service

	Year Ended 31st March, 1948.		Year Ended 31st March, 1949.	
	Maori.	European.	Maori.	European.
School work—				
Hours spent in school work	5,179	29,669	5,704	39,072
Number of schools visited with S.M.O.	47	1,360	199	2,128
Number of schools visited alone	3,170	11,625	3,403	15,080
Number of visits to homes of school-children	26,475	21,274	30,452	27,691
Number of visits to homes of pre-school children	27,060	21,585	30,728	24,696
Tuberculosis control—				
Number of visits to homes	17,863	17,413	16,824	17,886
Number of cases seen at home	11,042	9,354	12,163	9,618
Number of contacts seen—				
Adults	14,294	12,351	14,415	12,150
Children	22,857	9,510	26,506	9,453
Maternal and infant welfare—				
Ante-natal cases seen	8,362	2,132	8,717	2,382
Confinements attended	82	12	88	21
Number of visits during puerperium	1,433	45	1,167	120
Infants seen at home or clinic	49,924	19,407	50,112	27,507
Attendances and treatments—				
Number attended at cottage or office	17,214	16,009	17,822	18,965
Number in own home	42,800	21,740	39,051	26,062
Total number of homes visited for any purpose	132,965	90,693	137,188	102,707
Number of inoculations	19,221	16,382	20,813	16,994
Social welfare cases	2,828	665	2,829	1,097
Pas or settlements visited	18,369	4,956	15,558	6,724
Lectures given—				
To school-children	1,219	4,954	1,333	5,152
To other groups	373	254	190	292

District Nursing

The bedside care given by Hospital Board District Nurses also is expanding as more doctors and patients realize the value of this service. From experience it would appear that one nurse can care for up to 6,000 population, provided the area is fairly closely settled (as in a city or town), that she is equipped with a car, and that the hospital has an adequate number of beds. Where the town or borough is smaller in population, a nurse does not have sufficient to do unless she has other duties.

Hospital Boards have been advised to send new nurses to undertake the introductory course for District Nurses, and in consequence a good system of records and procedures is gradually being adopted.

Table 20—Comparative Summary of Work Undertaken by Hospital Board District Nurses

	Year Ended 31st March, 1948.	Year Ended 31st March, 1949.
Number of nurses—		
North Island	71	78
South Island	44	45
Total	115	123
Total number of new cases referred from—		
Hospital	3,323	3,378
Private practitioners	7,403	6,996
Patient's own home	12,965	11,999
Total number of cases, including old and new cases—		
Nurses' centre	10,484	9,366
Patient's own home	44,800	46,660
Total number of visits, including old and new cases—		
Nurse's Centre	25,009	20,292
Patients' own home	247,723	281,633

Industrial Nursing

The Department's Public Health Industrial Nurses are being added to as their duties are increased. Industrial clinics are being formed on the wharves at Auckland, Wellington, and Lyttelton with the object of reducing the amount of sick-leave.

Regular visits have been paid to all the private manufacturing units where registered nurses are employed, and during these visits educational and group meetings have been organized.

South Pacific Islands Nursing Service

There has been no visit to Fiji this year owing to the fact that Dr. Buchanan, Inspector-General of the South Pacific Health Service, went on leave and then retired, but it is expected that a meeting will be held in the near future.

It has not been easy to maintain this Service, with its heavy demands.

In Fiji extra wards have been opened at Lautoka, which has necessitated the staff being increased.

This year the Samoan Administration has sent two Samoans of full blood to New Zealand to train. The Fijian Administration has also sent a Fijian of full blood. In addition, two or three of the part European and Indian girls who have had the necessary educational qualifications have come to New Zealand to train. The time will soon come when these girls will be ready to return to their island homes. Their status and salary will be important things for decision, and New Zealand nurses will require to be interested in, and help, these girls.

Post-graduate School

The year 1948 was an exceedingly busy year at the school. Apart from the usual courses, a special week was arranged for ward sisters which was very much appreciated.

The new obstetrical course is proving popular and is giving those who specialize in obstetrics an opportunity of preparing themselves for administrative and teaching positions.

The time has now come when it is necessary to appoint a full-time librarian, and with this in mind an officer was sent to undertake a short librarian course. The books have been screened to eliminate those which are out of date, and the whole library has been catalogued.

Among the students this year is one sent by the Indian Government, and another student has come from Queensland sponsored by the Health authorities there.

With the arrival of Professor Marsh to open the School of Social Work at Victoria University College, it is hoped to link the work of the Post-graduate School more closely with that of the college in order to give opportunity to those nurses anxious to undertake work to degree level in social work. I hope that in the near future it will be possible not only for those nurses interested in social work, but also those interested in education, to extend their studies at the University so as to have a deeper understanding of the fundamental principles underlying their work.

The school has now completed twenty years of work and there is no doubt that it has had a far-reaching effect upon the nursing profession in New Zealand. The teaching in our training-schools has certainly been standardized, and the principles of our health service have been taught with a common basis.

Occupational Therapy

Two meetings of the Selection Committee have been held in addition to two meetings of the Governing Committee.

Draft legislation and regulations for the creating of a proper register have been prepared and approved.

The clinical instruction has been improved from the remedial aspect by affiliation with the Auckland Hospital Board's institutions, which have excellent equipment.

Examinations are now being held twice a year for both Preliminary and Final pupils.

Conclusion

Again this year several nurses have received decorations from His Majesty the King in recognition of their services to the community, and I would like to record my personal appreciation of their work:—

Miss E. M. Sparkes, O.B.E.
Miss A. Buckley, M.B.E.
Miss M. A. Hall, M.B.E.

Owing to ill health, Miss A. Jewiss, Nurse Inspector at Palmerston North, retired at the end of the year. Miss C. Doneghue, Nurse Inspector, Nelson, also retired earlier in the year, and Miss E. Leslie, Nurse Inspector at Whangarei, has submitted her resignation. These three Nurse Inspectors have worked very closely with me during the whole of my period at Head Office, and I would like to record the deep respect and affection with which they and their work have been held in the Department.

The health service of any country is made up of a team and it can only function well if all its members co-operate fully in working together, and I would like to thank the other senior members of the nursing profession, whether employed by the public hospitals, Plunket Society, voluntary organizations, or our own Department, for their help and co-operation. Further, the other professions within that team—the medical profession, dietitians, physiotherapists, and occupational therapists, as well as the technical and less-skilled members—all play their part, and I am grateful for their assistance. Lastly, no professional organization can function without a well-organized clerical staff, and I would also express my grateful appreciation of their work.

DIVISION OF HEALTH BENEFITS

Appended is a table showing the expenditure on the various classes of benefits. It is to be noted that without exception there has been an increase in all the five classes of benefits and also in the total expenditure, which has now reached £7,843,634 per annum. Again it must be emphasized, as in last year's report, that the people of New Zealand are receiving many advantages through the provisions of the Social Security Act, as there are now no economic barriers involved. This has led naturally to an increased use of all services, but there is evidence that the services are not always used prudently and wisely by the general public and that accordingly some of the expenditure in certain of the benefits is both unnecessary and wasteful.

[NOTE.—Since last year's report was submitted the report of the Medical Services Committee has been laid on the table of the House. It is hoped that the majority of the Committee's recommendations will be implemented during the ensuing year.

One of the important recommendations of the Committee is the setting-up of investigating and disciplinary committees composed of practising members of the medical profession itself as well as departmental medical officers. Thus the medical profession will not only assist the Department in the administration of the Act, but also will accept certain responsibilities. Accordingly, it is anticipated that many improvements in the administration of health benefits will become operative for part at least of the year ending 31st March, 1950.]

Table 21— Social Security Fund Medical Benefits: Statement Showing Expenditure Since Commencement of Benefits

	1939–40. (10½ Months)	1940–41.	1941–42.	1942–43.	1943–44.	1944–45.	1945–46.	1946–47.	1947–48.	1948–49.
Subdivision I—Maternity Benefits (commenced 15th May, 1939)										
	£	£	£	£	£	£	£	£	£	£
Public hospital fees	74,780	106,834	113,276	110,217	114,930	133,946	160,870	223,914	301,293	389,416
Private-hospital fees	139,602	216,086	227,315	207,575	209,841	210,675	222,689	202,928	214,963	221,061
Medical practitioners' fees	45,938	161,638	176,973	158,208	162,227	158,409	201,633	232,088	269,265	291,246
Medical practitioners' mileage fees	1,031	5,663	6,215	5,089	5,044	5,647	4,572	4,825	5,997	7,715
Obstetric nurses' fees	16,022	21,101	18,940	15,089	12,027	11,117	10,465	9,234	8,512	6,682
St. Helens Hospital fees	6,440	7,653	7,151	9,046	9,870	10,940	Contribution now abolished			
	283,813	518,975	549,870	505,224	513,939	530,734	600,209	672,989	800,030	916,120
Subdivision II—Medical Benefits (capitation scheme introduced 1st March, 1941; general medical services scheme introduced 1st November, 1941)										
Capitation fees	..	..	114,608	71,149	55,610	42,400	38,084	31,187	22,945	16,818
Capitation and general medical services mileage	..	..	21,166	64,039	60,392	59,442	68,965	90,289	109,522	123,768
General medical services	..	..	69,898	831,397	1,026,073	1,161,326	1,291,448	1,600,601	1,993,806	2,112,304
Special arrangements under section 82	..	..	..	49,468	37,256	23,855	27,495	35,428	37,714	45,286
Purchase of sites and erection of residences for Medical Officers appointed under section 82	..	..	..	..	..	..	..	2,673	3,839	8,660
Remuneration, allowances, and expenses of medical practitioners in areas other than those covered by section 82	..	..	..	..	..	..	1,317	396	..	45
	..	..	205,672	1,016,053	1,179,331	1,287,023	1,427,309	1,760,574	2,167,826	2,306,881

Subdivision III—Hospital Benefits (commenced 1st July, 1939); *Out-patient Benefits* (commenced 1st March, 1941)

Treatment in approved institutions includes Ashburn Hall, Knox Home, Auckland, and Karitane Hospitals, payments to latter being introduced in 1940, but dated back to 1st November, 1939

Treatment in public hospitals	514,254	893,251	953,794	1,020,319	1,564,315	1,689,233	1,767,874	1,593,367	1,536,417	1,560,483
Out-patient treatment	..	..	47,162	70,720	73,137	83,412	98,972	97,287	117,385	141,530
Treatment in private hospitals	82,980	141,737	146,953	191,647	238,772	259,489	264,865	251,581	252,850	245,000
Treatment in approved institutions	1,459	37,873	28,155	38,819	43,908	56,504	41,749	44,053	42,837	50,362
Contribution to Consolidated Fund for—										
Mental hospitals	166,000	171,000	181,451	181,869	182,830	187,942	Contribution now abolished			
Queen Mary Hospital	6,835	10,060	11,705	22,872	28,691	28,032				
Rotorua Sanatorium	2,707	4,712	4,985	4,563	5,932	6,425				
Rotorua Soldiers' Hospital	..	..	..	10,150	20,561	19,663				
	774,235	1,258,633	1,374,205	1,540,959	2,158,146	2,330,700	2,173,460	1,986,288	1,949,489	1,997,375
Subdivision IV—Pharmaceutical Benefits (commenced 5th May, 1941)										
Drugs supplied by—										
Chemists	..	..	261,845	530,695	716,080	933,490	1,082,342	1,389,638	1,507,521	1,727,556
Medical practitioners	..	..	1,527	5,891	6,092	6,231	6,030	5,879	5,973	8,262
Institutions	..	..	16,326	26,661	40,026	40,516	44,994	44,169	44,856	57,341
	..	..	279,968	563,247	762,198	980,237	1,133,366	1,439,686	1,558,350	1,793,159

Subdivision V—Supplementary Benefits

Radiological services (commenced 11th August, 1941)	..	..	27,962	88,588	109,426	128,842	132,806	175,420	209,059	249,461
Laboratory services (commenced 1st April, 1946)	..	..	..	..	..	..	..	61,453	90,306	117,173
Massage services (commenced 1st September, 1942)	..	..	..	8,836	27,331	32,152	35,569	43,028	47,510	57,088
Specialist services (neuro surgery)	..	..	..	..	1,066	1,324	2,260	1,485	121	4,072
District nursing services (commenced 1st September, 1944)	..	..	..	..	..	7,717	58,880	68,614	82,756	111,289
Dental services	..	..	..	..	..	..	..	..	105,109	223,186
Domestic assistance (commenced 20th December, 1944)	..	..	..	..	..	..	456	2,043	2,865	3,258
Ambulance benefits	..	..	..	..	..	..	..	..	..	324
Artificial-aids benefits (commenced 1st July, 1947), (artificial limbs, hearing-aids, contact lenses)	..	..	..	..	..	..	..	..	8,067	96,062
	..	..	27,962	97,424	137,823	170,035	229,971	352,043	545,793	861,913
Grand totals	1,058,048	1,777,608	2,437,407	3,722,907	4,751,437	5,298,729	5,564,315	6,211,580	7,021,488	7,875,448
Recoveries*	1,350	923	1,819	1,728	24,757	64,015	27,751†	20,384	47,630	31,814
Net totals	1,056,698	1,776,685	2,435,588	3,721,179	4,726,680	5,234,714	5,536,564	6,191,196	6,973,858	7,843,634

* These are mainly in respect of hospital benefits. † Prior to 1st April, 1945, these recoveries were treated as credits in reduction of expenditure. For 1945–46 they are included in Miscellaneous Receipts, Social Security Fund. This should be taken into account when comparing published figures relating to Social Security Fund expenditure.

DIVISION OF TUBERCULOSIS

The general activities of the Division were expanded during the past year and particular attention was given to promoting legislation to deal with tuberculosis.

The Tuberculosis Act passed last session took the control of tuberculosis out of the provisions of the Health Act, 1920, and introduced new measures to assist tuberculous patients and to prevent the spread of the disease.

To assist in obtaining greater accuracy in classification and better control of the disease, a visible record system was instituted in all districts to maintain the tuberculous register.

The use of B.C.G. vaccine in New Zealand as advocated by the World Health Organization has been accepted by the New Zealand Tuberculosis Service and pathologists, and a restricted programme in two provincial hospitals has already commenced by inoculating successive groups of nurses with a reliable vaccine obtained from Australia. B.C.G. vaccination will be extended as vaccinators become skilled in the procedure.

Several recommendations made by the Director of the Division as a result of his visit overseas in 1947 have been accepted and are now being put into effect. The use of B.C.G. in New Zealand has already been mentioned. Mass radiography is being extended and two miniature film units will be available shortly in the Dominion, one for use at Christchurch, and the other at Auckland. A third unit has already arrived, and is being held in Wellington for use in the training unit to be established to train field staff in tuberculin testing, B.C.G. vaccination, and miniature radiography. Unfortunately, difficulty is being experienced in obtaining adequate accommodation and staff to operate these units.

Shortage of adequate hospital and sanatorium accommodation has militated against the hospitalization of as many of the active cases as would be desired, but it is hoped that this position will be relieved as soon as possible.

Mortality

The mortality returns for tuberculosis, as supplied by the Government Statistician, are as follows:—

Table 22—Deaths from Tuberculosis, by Years, Race, Pulmonary Forms, Non-pulmonary Forms, and Crude Death-rates (Worked on Mean Population), for Particular Years 1943–48

(Deaths, 1948, subject to further correction)

Year.	Pulmonary.			Non-pulmonary.			All Forms.			On Mean Population Crude Death-rates, All Forms, per 10,000.		
	European.	Maori.	Both Races.	European.	Maori.	Both Races.	European.	Maori.	Both Races.	European.	Maori.	Both Races.
1943	468	264	732	96	91	187	564	355	919	3·72	36·6	5·62
1944	485	285	770	106	87	193	591	372	963	3·81	37·40	5·96
1945	496	292	788	105	81	186	601	373	974	3·77	37·02	5·76
1946	459	292	751	102	103	205	561	395	956	3·38	39·04	5·42
1947	440	275	715	84	75	159	524	350	874	3·09	32·88	4·85
1948	408	207	615	61	68	129	469	275	744	2·71	25·01	4·04

The picture obtained from the table shows a steady decline in all categories and in death-rates from 1943 onwards. On mortality figures alone it would appear that general over-all control exercised in New Zealand is gradually showing satisfactory effect.

Table 23—Comparison of Deaths from Tuberculosis (1947 and 1948), by Race, Sex, Pulmonary, Non-pulmonary: Crude Death-rates, by Race and Sex, Per 10,000 of Mean Population

Year.	Pulmonary Forms.						Non-pulmonary Forms.						Total Deaths, All Forms.					
	European.		Maori.		Both Races.		European.		Maori.		Both Races.		European.		Maori.		Both Races.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
1947 ..	261	179	125	150	386	329	42	42	36	39	78	81	303	221	161	189	464	410
1948 ..	253	155	85	122	338	277	33	28	42	26	75	68	286	183	127	148	413	331
Death-rates on mean population, 1947 ..							..	..	..	..	..	..	3·56	2·6	29·41	36·54	5·14	4·5
Death-rates on mean population, 1948 ..							..	..	..	..	..	..	3·30	2·1	22·46	27·7	4·47	3·6

MEAN POPULATION

Europeans		*Maoris*		*Both Races*	
Males	866,478	Males	56,525	Males	923,003
Females	865,105	Females ..	53,423	Females	918,528
Total ..	1,731,583	Total ..	109,948	Total ..	1,841,531

A slight drop in European male and female figures is noted, but a much more substantial reduction in Maori male and female is evident, and in combined races the reduction is more noticeable in females. These rates are subject to further checking, but if proved accurate should give some cause for encouragement to workers in New Zealand Tuberculosis Service, although no cause for complacency.

Table 24—Deaths from Tuberculosis, by Years, All Forms, Both Races, North and South Islands, and Crude Death-rates (Worked on Estimated Population) Each Year, 1944–48

Year.	North Island.	Crude Death Rates Per 10,000 Estimated Population.	South Island.	Crude Death Rates Per 10,000 Estimated Population.
1944	725	6·81	238	4·31
1945	734	6·43	240	4·32
1946	733	6·21	223	3·89
1947	651	5·33	223	3·83
1948	565	4·52	179	3·01

The death-rate for combined races in the North Island is still higher than in the South Island, but over the period shown the reduction in each Island is approximately the same.

Table 25—Deaths from Tuberculous Meningitis, 1948

(Comparable 1947 figures in parentheses)

Maoris	26	(28)
Non-Maoris	18	(16)
Total	44	(44)

(Total cases alive and under treatment in hospital at 31st December, 1948, 24.)

This table shows no appreciable change from the previous year in spite of the lowered general tuberculosis death-rate. It is expected that the use of streptomycin and allied substances may produce a fall in these figures in the future. If, however, these numbers are maintained, the situation would call for persistance in control measures augmented by B.C.G. vaccine. Streptomycin and allied substances are keeping these cases alive longer, as shown by an increasing number of such cases being under treatment at any one day.

Table 26—The Ratio of Deaths to Registered Cases at 31st December, 1946–48

	1946.	1947.	1948.
Non-Maori	1/12	1/14	1/15
Maori	1/6·5	1/7	1/9·3
Combined races	1/10	1/11·2	1/13·3

The improved position in this ratio as noticed last year was maintained in 1948. Undoubtedly intense efforts in case-finding have brought to light relatively more cases in an early stage of the disease and these have responded to treatment and not terminated fatally.

The returns for 1944–48, as obtained from the notifications from general practitioners, hospital clinics, and the Department's case-finding scheme, disclose the known position each year as at 31st December as under:

Table 27—Morbidity

Year.	North Island.			South Island.			New Zealand Total.
	Pulmonary.	Non-pulmonary.	Totals.	Pulmonary.	Non-pulmonary.	Totals.	
1944 ..	5,083	507	5,545	1,722	259	1,981	7,526
1945 ..	6,116	546	6,662	2,055	360	2,415	9,077
1946 ..	6,356	531	6,887	2,315	415	2,730	9,617
1947 ..	6,196	673	6,869	2,479	473	2,952	9,821
1948 ..	6,482	505	6,987	2,554	456	3,010	9,997*

*This total includes Maoris, 2,560; non-Maoris, 7,437.

The increase in the morbidity in both Islands over the previous five years in the pulmonary forms is held to be due more to continued efforts in case-finding rather than to any actual increase in the incidence of infection, and to increasing expectation of life of previously notified cases. While the known cases may increase from year to year and the incidence may show a rise, this should not cause undue alarm. It is suspected that there are still many untraced cases which will eventually be found as the result of extended case-finding surveys in the general population.

New Cases (actual or suspected) notified during 1948, with comparable 1947 figures in parentheses, number: Maori, 466 (481); European, 1,618 (1,693): total, 2,084 (2,174). Of this total, pulmonary cases numbered 1,760 (1,809): Europeans, 1,356 (1,397); Maoris, 404 (412); and non-pulmonary 324 (365): Europeans, 262 (296); Maoris, 62 (69).

The total new cases notified as tuberculosis to Medical Officers of Health show a steady decline from 2,254 in 1944 to 2,084 in 1948.

The known incidence rates for all forms of tuberculosis registered (1947 figures in parentheses) are: Europeans, 4·32 (4·36) per 1,000; Maoris, 23·53 (23·31) per 1,000; and combined races, 5·46 (5·47) per 1,000. The European incidence shows a slight decline over the previous year, the Maori incidence a slight rise, and the incidence of combined races a decline of 0·01 per 1,000.

Of the 9,997 cases on the register at 31st December, 1948, 3,326 were returned as being in the "active," "infectious," or "potentially infectious" state. This represents 33 per cent. of the registered cases, a slight reduction on the previous year.

Other detailed trends, as disclosed by the register of live cases, are as follows:

Table 28—Disposition of Registered Cases, All Forms, Both Races, by Years, at 31st December, 1944–48

Year.	Supervised in Institutions.			Supervised Outside Institutions.				Total under Supervision.
	In Hospital.	In Sanatoria.	Total.	In Home.	Huts.	Boarding-house and Nomadic.	Total.	
1944 ..	1,114	661	1,775	5,308	182	466	5,956	7,731
1945 ..	1,116	706	1,822	6,535	181	539	7,255	9,077
1946 ..	1,055	688	1,743	7,067	207	600	7,874	9,617
1947 ..	1,072	648	1,720	7,403	163	535	8,101	9,821
1948 ..	1,023	630	1,653	7,635	196	513	8,344	9,997

It will be noted that since 1944 there has been a progressive decrease in the number being supervised in institutions and a greater increase in the number being supervised outside institutions. There is still insufficient institutional accommodation to cater for more than approximately 50 per cent. of the active cases and insufficient to cater for the extra number of cases found each year requiring institutional care. The reduction in institutional supervision has been forced largely through the necessity to close a number of beds because of shortage of staff.

Patients being supervised in huts, all of whom are Maoris, show an increase, but the increase is no more than the increase which has taken place in the number of Maoris on the register.

The nomadic and boardinghouse group, however, shows a further pleasing decrease. The co-operation of other State Departments in this connection is appreciated.

Table 29—Classification of Registered Cases, All Forms, Both Races, by Years, at 31st December, 1944–48

Year.	Classified.						Classification Unknown.
	Active.			Inactive.			
	Deteriorating and Stationary (*a*).	Improving (*b*).	Totals, (*a*) and (*b*).	Quiescent and Arrested (*c*).	Apparently Cured (*d*).	Totals, (*c*) and (*d*).	
1944 ..	1,445	1,321	2,766	2,374	381	2,755	2,201
1945 ..	1,068	1,253	2,321	3,654	488	4,142	2,614
1946 ..	1,293	2,011	3,304	4,610	645	5,255	1,058
1947 ..	1,296	1,965	3,261	4,762	705	5,467	1,093
1948 ..	1,422	1,904	3,326	5,094	762	5,856	815

The figures over the last five years do not show any reduction in the number of "active" cases, and, in fact, indicate a slight rise, comparable to the accretion to the register. However, there has been a further appreciable rise in the number of cases which are classified as "improving," indicating that, in spite of the loss of institutional beds, the control being exercised outside institutions is assisting materially in controlling the spread of infection from "active" cases. The increased number of cases classified with disease apparently cured should be noted.

The number of cases with category not yet classified for 1948 is still high, although it does show a substantial decrease over the previous years. The proposed improved form of keeping the register, to be laid down in the regulations which it is hoped will be enacted under the powers given in the Tuberculosis Act, 1948, should help to reduce this figure.

Table 30—Bacteriological Status of Registered Cases, All Forms, Both Races, by Years at 31st December, 1944–48

Year.	Tubercle Bacilli in Sputum or Discharge.		No Sputum or Discharge.	Not Investigated.	Total.
	T.B.+	T.B.−			
1944* ..	708	1,323	..	4,729	6,760
1945 ..	1,045	1,504	3,099	3,429	9,077
1946 ..	1,306	2,324	4,405	1,581	9,617
1947 ..	1,227	2,371	4,731	1,492	9,821
1948 ..	1,283	2,305	5,344	1,065	9,997

* The figures for 1944 relate to pulmonary cases only, while the figures for the remaining four years represent all registered cases.

The slight increase in the year 1948 for the number of cases with positive sputum is probably significant of more assiduous investigation, and it will be noted that the number of cases with no sputum or discharge has risen quite appreciably. The number of cases not investigated has fallen again, but a greater effort could probably be made to reduce the number still further.

Work of District Nurses

Altogether 8,344 out-patients and 24,161 contacts were on 31st December, 1948, under constant supervision by 225 District Nurses employed by the Department or by Hospital Boards.

These nurses were responsible for finding 329 new cases of tuberculosis during the year, 15·8 per cent. of the total new cases notified.

Mass Radiography

The Medical Director of the Taranaki mobile x-ray unit reports that his unit, for the year ended 31st December, 1948, examined 17,895 persons, made up of 2,535 Maoris and 15,450 Europeans. These examinations were spread over Taranaki, Hawera, Stratford, Patea, and Wanganui Hospital Districts.

Of this number, 707 were recalled for large films, 545 being Europeans and 162 Maoris. The response, however, was poor, as only 435 Europeans and 49 Maoris reported, making a total of 484. In Stratford, 27 Europeans were recalled for large films, but only 1 reported. It is considered that only by intensifying the educational programme can a better response be expected.

A total of 33, representing 0·18 per cent. of the total examinations, were found to be suffering from pulmonary tuberculosis. These reported to the chest clinic for early treatment. A total of 6·8 per cent. of those who reported, when recalled for large-film examination, were found to have pulmonary tuberculosis.

Tuberculosis Research

The Tuberculosis Committee of the Medical Research Council held several meetings during the year. A member of the Armed Forces Medical Advisory Committee was added to its number, and its work was concerned mainly with research into the incidence of tuberculosis amongst nurses; with the typing of bacilli to deduce the incidence of bovine

infection in humans; with the most suitable forms of laboratory investigation to detect tubercle bacilli in various types of specimens; and with a special survey to detect tuberculosis in the Royal New Zealand Navy personnel.

The typing of bacilli as a means of finding the extent of bovine tuberculosis in humans has been completed at Auckland, and the results are to be published shortly. Similar work is to commence at Christchurch to gain the necessary knowledge into this question in the South Island. When this is completed it should be possible to give a fair estimate of the extent of this type of tuberculosis as it affects patients in New Zealand.

The Committee considers that improvement can be effected in the method to be adopted in laboratory investigation in the provincial and country hospitals in the sure detection of tubercle bacilli, and it is hoped to institute a particular research of this nature.

An interim report on the incidence of tuberculosis amongst nurses has already been submitted to the Committee, and further consideration is being given to this question by an extended detailed examination of the medical history of each case reported from some of the larger hospitals.

This preliminary report suggests that from the evidence which is at present available the following deductions can be made:—

(1) That the increase in incidence of notified cases of tuberculosis in nurses which has occurred during the years 1942–46 has been due to improved standards of case-finding and notification.

(2) That although the standards of case-finding and control of tuberculosis in nurses in New Zealand hospitals as a whole are high, further improvement in measures of case-finding and control in in-patients and out-patients of hospitals is essential in the control of tuberculosis in nurses.

(3) That the incidence of notified cases of tuberculosis in nurses in New Zealand compares favourably with that in other countries.

(4) That the introduction of B.C.G. vaccination in nurses on a voluntary basis should assist in the reduction of the incidence of cases of pleurisy and erythema nodosum of tuberculous origin and of other manifestations of primary infection and possibly in the reduction in incidence of cases arising from exogenous reinfection. This measure should not be allowed to replace other effective means of case-finding and control.

Health Education of the Public and Patients in Tuberculosis Control

The Tuberculosis Division has, with the co-operation of the Health Education Committee, shown considerable activity during the year.

Pamphlets explaining the nature, effects, and methods required to control the disease have been printed and widely distributed.

Radio talks in English and Maori have been broadcast and educational cinematograph films on tuberculosis have been widely screened. A documentary film, "Tuberculosis in the Maori," is in the course of preparation by the National Film Unit. In this connection much assistance has been given the Department by the tuberculosis associations which have now become established in various provinces, and in particular by Dr. R. S. Francis, Tuberculosis Officer, Eastern Area.

These regional associations, guided by the Council of the New Zealand Tuberculosis Federation, have also supplied on their own initiative and expense valuable information to the public concerning tuberculosis.

Over all it is felt that there is now in New Zealand an awareness of what tuberculosis is, of its effects, and how it should be controlled. With this knowledge, the elimination of the disease should be more easily accomplished.

Summary

Although the steady fall in the mortality from tuberculosis over the last five years in both races gives a sense of satisfaction, it should be realized that the death-rate for tuberculosis in the Maori, when compared with that of Native races in other countries, is unduly high.

Although the registered incidence of known cases shows an accretion at the end of 1948 of only 176 cases, compared with 540 cases in 1946 and 204 in 1947, it should be obvious that shortages of hospital and sanatorium accommodation must be overcome if the control of the disease is to be maintained. More assiduous case-finding has and will find a greater number of active cases which, during the next ten years at least, will require accommodation and treatment.

The present apparent favourable position cannot be expected to continue unless this accommodation is provided. The early provision of additional planned hospital and sanatorium accommodation, together with adequate staffing of these institutions, is necessary to help bring about a further reduction in the incidence and mortality of the disease.

The general measures authorized by the Tuberculosis Act, 1948, should materially help many active patients to regain their full health and thus become rehabilitated into full employment.

DIVISION OF MATERNAL WELFARE

Births

The number of births recorded for 1948 showed a decline in both European and Maori races.

A comparison between 1947 and 1948, showing the number of births and the birth-rates, Maori and European, is set out hereunder :—

	1947.		1948.	
	European.	Maori.	European.	Maori.
Total births	44,816	4,988	44,193	4,956
Birth-rate per 1,000 mean population ..	26·42	46·86	25·52	45·08
Combined rate	27·63		26·69	

Accommodation

The total number of available beds for the Dominion has increased over the past year by 124 to 2,327.

The private hospital bed accommodation has decreased by 55 with the loss of twelve hospitals, but this has been offset by an increase of 179 beds in public hospitals or annexes. In ten cases Hospital Boards have taken over private hospitals and are now running them as Hospital Board institutions.

The total number of available beds represents a ratio of 5·84 beds per 1,000 mean population of the female population in the 15–44 age group. This is an increase of 0·29 beds per 1,000 population over 1947.

Statistics

The accompanying tables show the trend over the years in various branches of maternal welfare :—

Table 31—Number of Births, Birth-rates, Neo-natal Death, Still-birth and Maternal Death-rates

(Average rates for each year from 1944 to 1948)

——		1944.	1945.	1946.	1947.	1948.
Number of live births per annum	E.	33,599	37,007	41,871	44,816	44,193
	M.	4,508	4,644	5,776	4,988	4,956
Live-birth rate	E.	21·59	23·22	25·24	26·42	25·52
	M.	45·32	46·09	56·49	46·86	45·09
Total		23·01	24·58	27·05	27·63	26·69
Still-birth rate per 1,000 total births	E.	23·23	22·84	21·75	19·92	18·52
Neo-natal death-rate per 1,000 live births	E.	20·60	19·59	19·08	18·08	15·77
	M.	19·30	26·05	18·35	17·84	28·85
Still-birth rate and neo-natal death-rate combined, per 1,000 total births	E.	43·35	41·98	40·42	37·63	34·00
Maternal-mortality rate (including septic abortion) per 1,000 live births	E.	2·71	2·24	2·05	1·07	1·26
Maternal-mortality rate (excluding septic abortion) per 1,000 live births	E.	2·14	1·94	1·76	0·85	1·06

E. = European : M. = Maori.

Table 32—Puerperal Mortality, 1948 (European), Showing Number of Deaths and Their Proportion to Live Births

——	Number of Deaths.		Death-rate Per 1,000 Live Births.
Puerperal sepsis following childbirth	4		0·09
Accidents of labour—			
Placenta prævia	..		
Post-partum hæmorrhage	5		
Puerperal embolism and thrombosis and pyelitis without puerperal sepsis	3		
		18	0·40
Other—			
Obstetrical shock and heart-failure	6		
Ruptured uterus	4		
Toxæmia of pregnancy—			
Eclampsia	5		
Puerperal toxæmia (pre-eclamptic)	9		
		14	0·32
Acute yellow atrophy of liver	..		
Accidents of pregnancy—			
Abortion (non-septic)	3		
Ectopic gestation	3	7	0·16
Ante-partum hæmorrhage, without delivery	1		
Parturition (unspecified)	4		0·09
Total maternal deaths (excluding septic abortion)	47		1·06

Table 33—Maori Puerperal Deaths and Death-rates for the Ten Years 1939 to 1948 Inclusive

Cause of Death.	1939.		1940.		1941.		1942.		1943.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Puerperal sepsis following childbirth	3	0·73	6	1·41	3	0·73	3	0·70	..	..
Accidents of labour (hæmorrhage, thrombosis, phlegmasia, embolism, and following childbirth, not otherwise defined)	12	2·92	7	1·64	9	2·18	7	1·62	6	1·35
Toxæmia, albuminuria, and eclampsia	2	0·49	1	0·23	1	0·24	4	0·93	3	0·68
Accidents of pregnancy	..	..	3	0·70	1	0·24	1	0·25	..	..
Total maternal causes (excluding septic abortion)	17	4·13	17	3·99	14	3·39	15	3·48	9	2·03
Septic abortion	2	0·49	3	0·70	2	0·48	5	1·16	1	0·23
Total (including septic abortion)	..	4·62	..	4·69	..	3·87	..	4·64	..	2·26

Cause of Death.	1944.		1945.		1946.		1947.		1948.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Puerperal sepsis following childbirth	3	0·67	4	0·86	1	0·17	..	..	2	0·40
Accidents of labour (hæmorrhage, thrombosis, phlegmasia, embolism following childbirth, not otherwise defined)	6	1·33	3	0·65	15	2·60	8	1·61	7	1·41
Toxæmia, albuminuria, and eclampsia	2	0·44	..	..	3	0·52	1	0·20	..	..
Accidents of pregnancy	2	0·44	2	0·43	3	0·52	2	0·40	..	..
Total maternal causes (excluding septic abortion)	13	2·88	9	1·94	22	3·81	11	2·21	9	1·82
Septic abortion	2	0·44	..	..	1	0·17	..	..	..	..
Total (including septic abortion)	..	3·32	..	1·94	..	3·98	..	2·21	..	1·82

Table 34—Maternity Hospital Statistics, 1948

——	Private Hospitals.	Public Hospitals.	St. Helens Hospitals.	Alexandra Home, Wellington.	Totals.
Number of hospitals	112	126	4	1	243
Number of beds	774	1,428	106	19	2,327
Admissions for ante-natal treatment	660	2,461	139	4	3,264
Admissions for delivery	15,982	28,247	2,264	414	46,907
Confined at full term	15,362	26,595	2,125	401	44,483
Confined between seventh month and full term	620	1,266	102	10	1,998
Total confinements	15,982	27,861	2,227	411	46,481
Abortion	23	105	2	..	130
Instrumental delivery	2,201	2,857	126	96	5,280
Induction—					
Medical	988	2,253	147	8	3,396
Surgical	816	1,282	59	42	2,199
Combined	293	608	97	18	1,016
Manual removal of placenta	97	234	27	1	359
Hæmorrhages—					
Accidental	42	170	6	3	221
Unavoidable (placenta prævia)	32	174	8	1	215
Post-partum	145	467	53	6	671
Eclampsia	28	61	6	..	95
Deaths of infants born alive	134	360	24	3	521
Still-births	251	506	29	4	790
Morbidity—					
Not notifiable (mild)	233	1,132	76	3	1,444
Notifiable (puerperal pyrexia)	79	808	88	10	985
Maternal deaths—					
Non-puerperal	2	2	..	..	4
Puerperal	11	21	1	..	33
Total	13	23	1	..	37

Table 35—Deaths From Diseases and Accidents of Pregnancy, Childbirth, and the Puerperal State, 1947 and 1948

(Excluding Maoris)

	Number of Deaths.		Rate Per 1,000 Live Births.	
	1948.	1947.	1948.	1947.
140. Post-abortive infection—				
(*b*) Spontaneous, therapeutic, or of unspecified origin without mention of pyelitis	3	2	0·07	0·04
(*c*) Self-induced abortion	2	4	0·05	0·09
(*d*) Induced by persons unknown	4	4	0·09	0·09
	9	10	0·20	0·22
141. Abortion without mention of septic conditions—				
(*a*) Spontaneous, therapeutic, or of unspecified origin	3	1	0·07	0·02
(*b*) Self-induced abortion	..	1	..	0·02
	3	2	0·07	0·04
142. Ectopic gestation—				
(*b*) Without mention of infection	3	5	0·07	0·12
143. Hæmorrhage of pregnancy (deaths before delivery)—				
(*c*) Ante-partum hæmorrhage	1	..	0·02	..
144. Toxæmias of pregnancy (deaths before delivery)—				
(*a*) Eclampsia of pregnancy	2	5	0·05	0·11
(*b*) Albuminuria and nephritis of pregnancy ..	1	1	0·02	0·02
(*d*) Other toxæmias of pregnancy	8	3	0·18	0·07
	11	9	0·25	0·20
146. Hæmorrhage of childbirth and the puerperium—				
(*a*) Placenta prævia during childbirth	..	2	..	0·04
(*c*) Other and unspecified hæmorrhages of childbirth	5	2	0·11	0·04
	5	4	0·11	0·08
147. Infection during childbirth and the puerperium—				
(*a*) Puerperium pyelitis and pyelonephritis	1	..	0·02	..
(*b*) General or local puerperal infections	4	3	0·09	0·07
(*c*) Puerperal thrombophlebitis	..	1	..	0·02
(*d*) Puerperal embolism and sudden death	2	2	0·05	0·04
	7	6	0·16	0·13
148. Puerperal toxæmias—				
(*a*) Puerperal eclampsia	3	..	0·07	..
(*c*) Acute yellow atrophy of the liver (post-partum) ..	..	1	..	0·02
(*d*) Other puerperal toxæmias	..	2	..	0·04
	3	3	0·07	0·06
149. Other accidents of childbirth—				
(*a*) Laceration, rupture, or other trauma of pelvic organs	4	3	0·09	0·07
(*b*) Other accidents of childbirth	6	5	0·14	0·11
	10	8	0·23	0·18
150. Other or unspecified diseases of childbirth	4	1	0·09	0·02
Totals (including septic abortion)	56	48	1·26	1·07
Totals (excluding septic abortion)	47	38	1·06	0·85

In last year's report it was mentioned that a new low record of European maternal mortality (excluding septic abortion) had been established in New Zealand with a rate of 0·85 per 1,000 live births. The rate for the current year of 1·06 shows a slight increase over that of last year, but is still remarkably low.

It is to be noted that the decrease in maternal mortality has not been confined to the European population and that a very low rate of maternal mortality from all causes, excluding septic abortion, has also been reached with the Maori population, the rate of 1·82 per 1,000 actually being less than for the European population of 1945.

Undoubtedly there are many factors involved in the reduction of maternal mortality from practically all causes in both races during recent years, among which may be mentioned—

(1) The relatively higher standard of living, particularly with the Maori race, as a result of social security legislation, associated with a better appreciation of the cultural factors involved in health promotion and the prevention of disease.
(2) A greater degree of health consciousness among all classes in the community as a result of specialized and general health education.
(3) Improved nursing, medical, and hospital facilities and increased use of same following the improvements in health consciousness, and the free services provided by social security legislation.
(4) Improvements in medical and nursing techniques in the ante-natal, intra-natal, and post-natal spheres and the continued supervision of techniques by the Department.
(5) The use of sulphonamides and antibiotic drugs, both in the prevention and cure of maternal infection.
(6) And, finally, the special efforts of the Department of Health and the Obstetrical Branch of the British Medical Association in a policy aimed at prevention of maternal morbidity and mortality.

DIVISION OF DENTAL HYGIENE

Introduction

The work of the Division has been seriously hampered during the year under review by an acute and increasing shortage of staff at all levels. The Division is seriously understaffed not only in the field clinics, but also in the administrative and teaching departments as well. Although numerically the field staff is a little larger than it was last year, it is not expanding in the same proportion as the child population. Consequently it has become increasingly difficult to maintain the principle of systematic and regular attention which has always been a fundamental feature of the Service and on which its success has been built.

In the administrative sphere it is proving impossible to attract dentists with the necessary qualifications and experience, and the effects of shortage at this level must necessarily be felt throughout the whole Service. A special tribute is due to the field staff, who, faced with excessive numbers of patients, are doing their utmost, often at considerable personal inconvenience, in an endeavour to maintain the same high standard of dental health as has been maintained in the past.

A development of moment during the year has been the appointment of an Orthodontist to the staff of the Division, and the formulation of a policy for the development of orthodontic treatment within the Service.

The school dental nurse system, which has been the basis of the New Zealand School Dental Service since 1921, has always been a source of interest to the dental profession and Health authorities in other countries. Recently, however, with the post-war development of general health services in many countries, interest in the

New Zealand School Dental Service has become intensified, and during the past year numerous requests have been received from abroad for full details of the system. These inquiries culminated in a visit in March, 1949, from a delegation of dental experts sent by the Australian Commonwealth Government, and accompanied by the Commonwealth Director-General of Health, to investigate personally the dental services in New Zealand.

It would be fitting to refer in this report to the Seventh Pacific Science Congress, which was held in New Zealand in February, 1949. Dental Officers of this Division not only attended the Congress, but they also organized and contributed to the dental symposium, under the Public Health and Nutrition Section of the Congress.

Staff

At the 31st March, 1949, the staff of the Dental Division numbered 759.

During the year, the senior staff of the Dental Division was strengthened by the arrival of seven dental surgeons from the United Kingdom. Of the twenty applicants who had been offered appointment, only eight accepted, and the remaining one is expected to arrive shortly. In addition, nine graduates of the Otago University Dental School who had held Health Department bursaries joined the staff of the Division in accordance with the provisions of their bursary agreement. There is still an acute shortage of experienced senior staff suitably qualified for appointment to teaching and higher administrative positions.

Reference was made in the last annual report to the threatened shortage of school dental nurses in relation to the rapid increase in the school population, resulting from the unusually high birth-rate during the previous few years. Although the actual number of dental nurses in the field is about the same (451, as against 440 twelve months before), this number is now quite inadequate to cope with the needs of the rapidly growing school population. At the date of this report the shortage of dental nurses is estimated at 150, and by 1952, when the number of children entering the schools is expected to reach its peak, an increase of at least 300 dental nurses will be required. Plans to alleviate the situation have been formulated, and steps are being taken to put them into operation, but, at the best, no substantial relief can be expected for three or four years. A limited measure of relief is hoped for shortly by (i) an appeal to ex-dental nurses to rejoin the Service, and (ii) arranging with the dental profession to transfer some of the upper primary-school classes temporarily to their care under social security. This will be purely an emergency measure, and all primary- and intermediate-school patients will revert to the care of the School Dental Service as soon as the staff necessary is available.

The senior staff was strengthened during the year by the appointment of a Principal Dental Officer (Orthodontics) to direct this important branch of dental health service.

Reference to staff would be incomplete without recording the retirement on superannuation in January, 1949, of Miss E. M. Haines, who was a member of the original draft of dental nurse trainees appointed in 1921, and who for twenty-five years was Matron, first of the old Training School of Dental Nurses at Government Buildings, Wellington, and later of the Tinakori Road section of the Dominion Training School.

Adolescent Dental Service

The provision of organized dental care for adolescents has now operated for two complete years and is giving general satisfaction. Minor problems arise from time to time, but the experience gained so far has not revealed any fundamental weakness in the organization that was originally devised. Wherever possible, dental care for adolescents is provided by full-time dental officers of the Department working in State clinics. The development of this service is retarded by the difficulty of securing staff, and by delays in building and in obtaining equipment. For the present, most of the full-time dental officers are stationed in school clinics attached to intermediate schools, where facilities for the full development of their work are necessarily restricted.

The great bulk of the dental treatment for adolescents is done by private practitioners under social security. Following are the statistics under this heading for the year under review :—

Number of persons enrolled under the Social Security (Dental Benefit) Regulations as at 31st 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 prior to 31st March, 1949			9,674
Special benefits : Patients whose treatment was completed prior to 31st March, 1949			9,330
Amounts paid for dental benefits for the year ended 31st 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
Number of completed treatments in respect of which the above sums were paid—			
General dental benefits			64,566
Special dental benefits			9,345
Average cost per completed treatment—	£	s.	d.
General dental benefits	3	2	11
Special dental benefits	2	9	10

NOTE.—The aim is to give a complete treatment every six months to every person enrolled for general dental benefits.

Owing to the time lag that occurs in calling up patients and in rendering and meeting claims for treatment, it is found in practice that two payments are not necessarily made in respect of every enrolled person within the financial year. The average cost of general dental benefits per person is therefore shown as the average per completed treatment. The cost per year per person would be approximately twice this figure. In future annual reports it is proposed to show the number of persons in respect of whom two payments and one respectively were made during the financial year, together with the average cost per person *per year*.

Of the 672 private dental practitioners holding annual practising certificates as at the 31st March, 488 had contracted to provide treatment under the dental-benefits system. The latter figure does not include dentists who are employed by contracting dentists as assistants, and therefore the figure 488 does not represent the total number of dentists engaged in providing dental benefits.

SCHOOL DENTAL SERVICE

Thirty-two additional treatment centres have been established during the year, making the total number 508, as against 476 at the end of the previous year. At the 31st March, 1949, the staff numbered 759, including 202 student dental nurses in training.

As was the case last year, the output of school dental nurses from the Training School has again been rather more than sufficient to make good current wastage, but not sufficient to augment the field staff to the extent that is necessary to deal effectively with the increased school population. The urgent need for more staff has already been dealt with in another section of this report.

The number of children under regular treatment is 235,746, an increase of 1,765 during the year. The number of schools receiving treatment is 2,333, as compared with 2,331 at the end of the previous year.

The total number of operations for the year was 1,674,125. This included 1,045,191 reparative fillings in both permanent and deciduous teeth and 94,538 preventive fillings, a total of 1,139,729 fillings. In contrast with this figure, which represents approximately the number of teeth preserved for useful service, the number of teeth removed as unsaveable (or in some cases to relieve overcrowding) was 69,718, a ratio of 6·12 extractions to every 100 fillings.

Dental Research

The Field Dental Research Officer attached to the Dental Division has continued his study of regional variations in the incidence of dental caries in New Zealand, and has also been associated with certain studies undertaken by the Division in connection with the control of dental caries. These include the topical application of sodium fluoride to children's teeth, and also the regulation of carbohydrate intake in the diet. The former showed an encouraging result, which was comparable with those obtained in the United States, where this form of preventive treatment has been shown to result in a 40-per-cent. reduction in the incidence of dental caries. Full reports on the various research activities are being published in the appropriate scientific and professional journals.

Dental Bursaries

At the beginning of 1949, 21 new bursaries were awarded to dental students. Of the bursaries granted in previous years, 57 were renewed, 11 were suspended temporarily, and 1 was terminated. The total number of bursaries held as at the 31st March, 1949 (including those temporarily suspended), was 89. Twenty-one holders of bursaries graduated in 1948, and, of these, 9 are now on the staff of the Dental Division, 3 are on the staff of hospitals, 2 are serving with the Royal New Zealand Army Dental Corps, and 3 were appointed to Demonstratorships at the Otago University Dental School for one year. Four failed to undertake the service prescribed in the bursary agreement, and the penalties provided for in the agreement were imposed in each case.

Health Education

Emphasis is still being placed on the preventive side of the school dental nurses' work, and there has been a marked increase during the past year in the volume of such type of work performed. Health education activities totalled 16,848. New material prepared during the year for health education work comprised a sound film on care of the teeth, a coloured film strip, a complete set of six animal posters, a completely new dental section in the Department's Health Exhibition, and a supply of new teaching aids for use in class-rooms and clinics. A course of instruction in dental health education continues to be given to student dental nurses at the Dominion Training School as a routine part of their training, and post-graduate instruction for nurses in the field has also been conducted. The health education staff continues to be responsible for the publication of the *School Dental Service Gazette.*

Overseas Study

During the year, the Deputy Director visited Australia, where he studied the dental services conducted by the various States, visited the Dental Schools, and attended the Seventh Australian Dental Congress in Perth.

The Preventive Approach to the Dental Problem

The last annual report of the Dental Division concluded by saying that it was the aim of the Department to attempt to reduce the high incidence of dental decay in New Zealand by applying the knowledge and methods that scientific research makes available. In the present state of knowledge, the most fruitful results in this direction can be expected from the painting of children's teeth with sodium fluoride solution. This form of preventive treatment originated in the United States, where it was found to result in a 40-per-cent. reduction in dental decay, and it is now being widely used both in public dental services and by private dentists. Promising results have been obtained by the Dental Division under New Zealand conditions in an experimental study with adequate controls, and, as a result, steps are now being taken to introduce this form of preventive treatment in the School Dental Service.

INDUSTRIAL HYGIENE DIVISION

The year 1948 was the first complete year during which the Division has operated. It is now easier to see how the work may take shape.

Staff

In addition to the Director, it was agreed by Cabinet during 1947 that there should be one District Industrial Medical Officer in each of the four main centres. During 1948 these appointments have been made.

Each of these medical officers will have on his staff two trained industrial nurses, in addition to his clerical assistant. Industrial nurses so far appointed, besides the two appointed in Wellington in 1947, are one in the Christchurch area and one in the Auckland area. Both these nurses completed the post-graduate course in industrial hygiene in 1948. Nurses now being trained will in due course fill the vacancies in the other areas.

In addition to the whole-time staff, one or more general practitioners have been appointed as Certifying Factory Medical Officers in each district to carry out the medical examination of juveniles required by the Factories Act. It is highly desirable in the future that the permanent staff should be able to mobilize other part-time trained staff to assist with the work, both from the ranks of general practitioners and nurses and from such organizations as the St. John Ambulance (New Zealand) and the New Zealand Red Cross Society.

Scope of the Work

The term "industrial hygiene" perhaps fails to convey a broad enough concept of what should be the scope of the work. The Division is concerned with any aspect of health that may be directly related to occupation, and "occupational health," therefore, is perhaps a better term than "industrial hygiene." While work in factories and mines in relation to health has attracted more attention than occupational health problems elsewhere, these do exist in all manner of spheres and should very properly be the concern of the Division. The fact that general practitioners die from coronary thrombosis far more commonly than any other group of workers presents a very nice occupational health problem, for example. Nevertheless, the bulk of the work must be among industrial workers and, to start with at least, in factories. For that reason it is very

necessary to establish a good liaison with the Labour and Employment Department. It has been agreed that, in order to effect a close working contact with the Factory Inspectors, the District Industrial Medical Officers and their staff shall be housed initially in the District Offices of the Labour and Employment Department.

The work of the Division may be further considered under certain subheadings :—

(1) *Education and Propaganda*

Education on healthy working-conditions needs to be directed to the whole community, as well as to those most closely concerned—the employers and the employees. An accident or illness incurred at work becomes a charge on the whole community, just as any other form of disability. Working-conditions everywhere, therefore, are the concern of each one of us, and general health propaganda should not omit to mention working-conditions. In the past year the Health Education Officer at Christchurch has included occupational health material in her general work.

A considerable amount of other work of an educational character has been carried out during the year. Some sixty lectures have been given to various bodies on aspects on the Division's work, and lectures should remain a prominent feature of the educational work in each district. The subject-matter is not only of interest to particular groups of workers, but to any socially minded citizen. The subject is also an extremely interesting one historically. The first organized efforts of medical men were of an occupational health character in relation to soldiers, and there is evidence that flint-stone miners were having their casualties from occupational hazards in prehistoric times. A useful adjunct to the lecture is the film strip, and considerable use has been made during the year of the one produced in 1947.

In October the Director gave six lectures to fifth-year medical students at the Medical School, University of Otago, and the Dean has expressed a desire that similar lectures shall in future form a recognized part of the medical training course, so that the Division has now an opportunity to influence the general practitioners of the future.

A number of lectures have been given here and there to groups of Factory Inspectors in the Labour and Employment Department, but up to the end of 1948 there was no proper training course for these men on the health side of their work. However, in February, 1949, a course was instituted at the Technical College, Wellington, which should meet this need.

The post-graduate nursing course again included a small group of girls anxious to qualify as industrial nurses, for whom a series of lectures were arranged. The Nurse-Inspector of Industrial Health has continued her regular visits to industrial nurses employed by private firms in the country and has done much to raise the standard and scope of the work in these units. During August a refresher course, covering one week, for all industrial nurses throughout New Zealand was given at the Post-graduate School in Wellington. Over 70 per cent. of the nurses were released by managements to take the course, and the employers' co-operation was further emphasized by the fact that all boarding and travelling expenses were met by the respective firms. The course served to encourage the nurses to consider themselves as a group of people working in a common cause, rather than being concerned only with their own individual factory. It also promoted a better understanding by the nurses of the advisory role of the Industrial Hygiene Division.

A very valuable feature of the educational work in the Wellington and Hutt Valley area was a lecture on health aspects of work to apprentices. This gave an opportunity to say something about the proper use of amenities at work and observing common-sense precautions against dangers to workers while they are still young. The Commissioner of Apprenticeship has been most co-operative in this matter, and if similar lectures can become general, so that every apprentice in the country attends at least one lecture on industrial health matters during his course, eventually some influence will have been exerted upon most of the skilled workers in the country.

The Division has published during the year regular articles in a number of trade-union journals, a valuable method of putting our views and objectives before the workers. In all, during the year, some fourteen journals, including one or two run by employers' associations, have published a series of these articles.

Arising from the refresher course for industrial nurses, there was a request for the circulation of regular information to those nurses employed in factories, and the Department agreed to publish an *Industrial Nurses' Bulletin* quarterly. In December the first issue of this bulletin appeared.

(2) *Collection and Dissemination of Information*

This is undoubtedly one of the most important functions that the Division can fulfil. It is remarkable how a group of manufacturers with several health problems of a common character will differ in how they meet them. Factory A will solve the first two perfectly satisfactorily, but miss out on the third; factory B will know all about how to solve number 3, but not number 1, and so on. It is by no means uncommon to find a manager of a firm saying that such and such a problem is impossible to solve, and yet at the other end of the Island, or even the other end of the same town, it is solved completely satisfactorily. By acquiring a thorough knowledge of industries in the Dominion, together with the health problems associated with them, the Division should be capable in time of amassing a volume of information that is readily available to all who need it.

The most important place of all for collecting information is at the work-bench. The ingenuity, skill, and initiative of individual managers and workers in meeting certain problems is remarkable, and considerable national gain can be expected if the knowledge required for these successes is more widely and quickly disseminated. Officers of the Department must therefore carry out as many surveys and inspections as possible of men and women at work not only with the object of teaching, but with the object of collecting information and learning. Certain difficulties are occasionally met with, due to the economics of industrial production. Sometimes a measure calculated to eradicate a health problem is regarded as an asset in the competition with another firm and objection is made to informing others of how the problems have been solved. However, by and large, managers are most willing for any information they have collected on safety and health to be made freely available to others.

The Department has now appointed in its central office a clerk one of whose main duties is to cover publications of an industrial health and safety character from other countries and to index and record matter for future reference. A great deal of material in this field is now published in Great Britain, America, Australia, and Canada. During the past year there has been a considerable addition to the Health Department library of publications dealing with occupational health subjects. There is, in fact, already considerable information readily available that could be of great use to manufacturers, employers, and workers on health hazards at work and how to avoid them, and every year this material will be more comprehensive. Quite a number of inquiries are being referred to the Division, but naturally the fact that this service is available is not yet widely realized.

(3) *Special Supervision of Those at Particular Risk*

The study of occupational health originally developed as a result of the heavy casualties in particular groups of workers. For example, three thousand years ago the occupation of mining was recognized to be so dangerous to health that for centuries no one was put to it unless he was either a slave, a captive, or a criminal, and miners remain the group of workers subjected to more risks than any other. Though few groups have heavy casualties to-day, there are a number who warrant special supervision of their health.

In the past year, workers subject to the danger of lead poisoning have been chosen as a group for special supervision. They are already covered by regulations under the Health Act, 1920. Two meetings were held during the year in Wellington with local manufacturers of batteries and paint at which these regulations were discussed and proposals put forward by the Division for carrying them out more effectively than has been done in the past. The industrial nurses have been specially trained in doing the blood examinations that are required by the regulations, and during the year 924 of these examinations were made in the Wellington and Lower Hutt districts. Certain men employed in battery-manufacture, paint-manufacture, and on lead-recovery furnaces were examined at monthly intervals. A few others have been examined at longer periods in printing-works, on solder-burnishing in motor assembly, lead-burning in leaded-window making, and one or two in other industries. From these examinations, 33 men were found showing stipple cell counts of 2,000 or more per million red blood cells and were temporarily transferred to other positions where the risk of lead absorption was considered to be less. The majority of these counts occurred in men employed on reclaiming-furnaces and in the manufacture of batteries. Actual notifications of lead poisoning in the area covered were 3, and these men were employed in—

(*a*) Manufacture of paint where dry white lead was used.

(*b*) Pasting department in manufacture of batteries.

(*c*) Reclaiming-furnace.

There is little doubt that further cases of lead poisoning have occurred of which the Department has not been notified. Advice and assistance has been given to managements and workers on measures to control the lead hazard and lessen the risk of absorption. During 1949 it is hoped that this supervision of lead-workers will be extended to the rest of the country.

Another group which it is proposed to supervise in the future is that of workers in electroplating establishments, where a number of dangerous substances are handled. The industrial nurses carried out a detailed survey of these establishments in the Wellington and Lower Hutt area during the year and a number of cases of dermatitis and several cases of chrome ulceration were discovered. Standards in 50 per cent. of these establishments were low.

(4) *Examination of Juveniles*

The year 1948 was the first full year in which section 37 of the Factories Act, 1946, was in force. This section requires that any one entering industry under the age of sixteen shall have a medical certificate declaring him to be fit for the work to be undertaken and requires a re-examination at the age of sixteen. The following table shows the numbers examined by the Certifying Factory Medical Officers during the year, compared with the figures for nine months of 1947 :—

—	Number Examined.	Number Passed as Fit.	Number Rejected.	Percentage Rejections.
1947 (April–December) ..	2,129	2,099	30	1·4
1948	2,971	2,934	37	1·2

Of the total rejected in 1948, 4 are shown as being deferred only and 2 of the rejects are reported as having been accepted later. The most common reasons for rejection are defective vision (9), chest conditions (9), and skin conditions (5).

The medical examination of these juveniles reveals a number of remediable defects in those passed as fit for work, as well as in the small number who are rejected. In all cases a letter is sent to the parents or guardians advising them to consult their own doctor regarding treatment. As the number of industrial health nurses in the Division increases, it is planned that they will follow up this advice with personal visits, as is done by District Health Nurses in the case of school-children.

(5) *Organization of First Aid*

It cannot be too often stressed that treatment of industrial casualties is not the *primary* objective of an occupational health service. The primary objective is to alter conditions and to alter practices and habits so that work becomes healthier and safer. In the future the Division must be judged by the degree to which it has succeeded in doing this, rather than by counting the number of chromium-plated surgeries and swift ambulances available in factories. Nevertheless, the industrial casualty must be treated, and a close contact with casualties throws light on necessary preventive measures. It is proper, therefore, both on humane grounds and as a step to prevention, for the Division to concern itself closely with the treatment of accidents and illness arising from work. In countries where there are very large industrial concerns, industrial medicine has tended to develop as unconnected units in individual factories. Thus, a firm like Austin Motors in Great Britain employs several doctors, a number of nurses, has a full x-ray plant, and a large rehabilitation workshop for the injured. Such a development in this country is quite impossible, and perhaps fortunately so, for not only are these individual units isolated from one another, but the mass of workers, who, even in the highly industrialized countries, work in small factories, still have no adequate service. In this country there are no really large factories and it would appear uneconomic use of trained staff to encourage, except in the rarest instances, the employment of whole-time industrial nurses or the provision of elaborate surgery accommodation by individual firms. A far more efficient and complete coverage appears possible by establishing suitably sited industrial health clinics, staffed by industrially trained nurses, under the direction of the District Industrial Medical Officers, which any worker in the surrounding area can attend. A start in this direction has been made during the past year on the Wellington waterfront.

At the end of 1947 a survey was made of the first-aid facilities and amenities on the Wellington waterfront, and a report to the Minister of Health recommended that the Harbour Board be asked to make available a room equipped after the manner of a factory surgery and staffed by one of the industrial health nurses for an experimental period of six months. This was approved, and the Wellington Harbour Board provided and equipped a room at Glasgow Wharf. The surgery was opened on 3rd June, 1948.

At the end of the first six months it was unanimously agreed by the interested parties—namely, the Wellington Harbour Board, the Waterfront Industry Commission, the New Zealand Waterside Employers' Association, and the New Zealand Waterside Workers' Union—that the experiment had been a success, and they recommended that in future the surgery should be open from 8.30 a.m. to 5 p.m. Subsequently Cabinet approved that the Wellington Waterfront Industrial Health Clinic be administered by the Health Department, the expenditure on staff, maintenance, and equipment to be a charge against the Department, and the premises to be provided by the Harbour Board. The centre is now under the direction of Dr. Janet Brown, and one of the industrial nurses is in attendance from 8.30 a.m. to 5 p.m. During the seven months June to December, 1948, the attendances at the centre numbered 2,468.

In April, 1948, a further report was submitted to the Waterfront Industry Commission on conditions at the Lyttelton waterfront, and after the appointment of an Industrial Medical Officer to the Christchurch area similar arrangements to those existing at Wellington were recommended there. The Lyttelton Waterfront Industrial Health Centre is likely to be opened during 1949.

First-aid organization within most factories in this country need only be of a simple character and could be adequately carried out in many places by St. John or Red Cross members. If these organizations come to play a larger part in industrial health and safety work, it is desirable that some addition to the training should be made.

(6) *Industrial Health Research*

There has been no industrial health research done as yet in New Zealand and the facilities available will inevitably be very limited for a long while to come. Nevertheless, it would be profitable probably to do a certain amount. The enormous cost to the industry, for example, of accidents in the meat-freezing works, entailing at least £75,000 a year, might well repay a research grant of a couple of thousand pounds a year for a five-year period, and there are a number of other fields for equally profitable research. At the end of 1948 a letter was sent to the Secretary of the Medical Research Council asking the Council to consider setting up a committee to deal with research into matters affecting health and safety at work. It was suggested that a grant might be provided to enable a recently qualified medical man to undertake research into the cause of accidents in some specific industry and to report on methods that might be adopted (*a*) to prevent them, and (*b*) to lessen the duration of time lost. The decision of the Medical Research Council on this matter is awaited, but in the meantime an approach has also been made to the General Manager of the State Fire and Accident Insurance Office. Under Part I of the Workers' Compensation Amendment Act, 1947, which comes into force on 1st April, 1949, that Office is empowered to conduct research into the causes, incidence, and method of prevention of accidents, injuries, and diseases in respect of which compensation may become payable. If the Medical Research Council agrees to set up a research committee, it is suggested that it should include representatives of the State Fire and Accident Insurance Office and of the employers' association and the union concerned. A country as little industrialized, however, as New Zealand must inevitably rely for industrial health research chiefly on the findings in the more highly industrialized countries, such a Great Britain and the United States.

(7) *Rehabilitation of the Injured and Sick Industrial Worker*

This is a field in which the Division has shown no activity as yet, except to advise those responsible for the rehabilitation of returned soldiers in a few individual cases. If at some future date the organization for rehabilitating war casualties comes to be transferred to the peacetime industrial casualty, there would appear to be useful work to be done by the Division in this field. Rehabilitation in industry of the man who has developed a duodenal ulcer or tuberculosis, or of the injured miner or timber-worker, calls for exactly the same care and consideration as that being given to the returned soldier and, if wisely handled, could cut down considerably the loss of production that results from illness and injury among workers.

This new Division has taken its first toddler's steps and the above outline has tried to show the direction in which they are moving. The work is capable of almost unlimited extension, given the necessary staff and equipment.

DIVISION OF PHYSICAL MEDICINE

The Division was set up with the object of stimulating an interest in, and co-ordinating the treatment of, diseases of the locomotor system, particularly chronic arthritis, poliomyelitis, and cerebral palsy. It was felt that the treatment of these conditions was in many aspects inadequate and their importance was sufficient to demand the whole-time attention of a Division of the Health Department. The chronic course which these diseases pursue makes them unsuitable for active treatment in public

hospitals, and ignorance as to their causation, disappointment with the results of treatment, and the fact that these diseases (not being killing diseases) have no dramatic appeal has led to lack of interest being taken in them by hospitals and medical practitioners.

The economic loss to the country produced by these diseases is enormous. Not only do they cause diminished production as far as labour is concerned, but they also lead to a heavy demand on social security funds, and to considerable diversion of other labour to look after the sufferers. Finally they constitute a formidable incubus on the hospitals.

In 1947 the Sanatorium at Rotorua and the Bathhouse were transferred from the Tourist and Health Resorts Department to the Health Department, and this necessitated a re-orientation of ideas. The old-fashioned spa conception—a conception of treatment which has been responsible for the delayed knowledge of the treatment and causes of the rheumatic diseases—had to be abandoned, and the further exploitation of the mineral waters of Rotorua as miraculous cure-alls could not be condoned by the Health Department. A more rational and scientific outlook required to be developed.

On appointment, the Director of Physical Medicine inspected the resources of Rotorua and submitted a report to the Director-General in which he made the following recommendations:

(1) A centre should be established at Rotorua for the treatment of remedial cases of rheumatic diseases by every known method of treatment.
(2) A residential school should be set up for the treatment, education, and training of cerebral palsy cases.
(3) A hospital school should be incorporated for poliomyelitis cases.
(4) A rehabilitation centre should be established for other physical disabilities.

After due consideration, these proposals were agreed to, and Cabinet gave formal approval to the expenditure upon the alterations, new buildings, and purchase of equipment. They authorized in principle the appointment of extra medical and nursing staff.

From 1st June, 1948, until 31st March, 1949, plans were discussed to give effect to these proposals. At the end of June, 1948, there were 36 servicemen in the hospital, and 18 male and 21 female patients were brought over from the old Sanatorium.

On the 30th December, 1948, the Services Convalescent Hospital received Royal permission to be renamed the "Queen Elizabeth Hospital." The admission of female patients to a building which had been designed for and used hitherto exclusively by males presented problems of organization, and some reconstruction was immediately necessary.

The new policy with regard to the treatment of rheumatic diseases and other disorders of the locomotor system was brought to the notice of medical practitioners and hospitals in the four main centres by addresses given by the Director. The proposals were well received by the hospitals and the B.M.A., and in November the inaugural meeting of the New Zealand Branch of the Empire Rheumatism Council was held at the Queen Elizabeth Hospital, Rotorua.

In co-operation with the various branches of the Crippled Children Society, clinics to examine cerebral palsy cases have been held at Dunedin, Invercargill, Nelson, and Wellington, and talks were given to the parents of these children at Christchurch and Wellington. The Director also examined some of these cases at the Wilson Home, Auckland. These examinations led to the somewhat unexpected discovery that only about 20 per cent. of the total number of cases were suitable for or required treatment at special residential training-schools. Taking the Crippled Children Society's figure of 500 as the number of cerebral palsy cases in New Zealand, this would mean that only about 100 need treatment in a residential training-school. The proposed school at Rotorua would have a maximum of 30 beds, while the Wilson Home will probably accommodate 20. New schools at Wellington, Christchurch, and Dunedin, each of about

20 beds, should therefore provide adequately for the needs of the country as a whole. If Phelp's figures are accepted, there are 7 cerebral palsy cases born every year per 100,000 of the population. Of these 7, only 2 would be suitable for or would require treatment in a residential establishment. In terms of New Zealand's population this would mean that about 35 new cases a year would require to be catered for. It is, of course, of no use setting up such training-schools until trained and efficient staff are available to man them. One of the most important functions of the centre at Rotorua will be to train staff for this purpose.

DEPARTMENTAL INSTITUTIONS

Queen Mary Hospital, Hanmer

Since 1943 the work of this hospital has been gradually reoriented to the treatment of functional nervous diseases, a process which is still under way. A definite advance has, however, been made, evidenced mainly by the appointment of two Psychiatrists. The main difficulties experienced during the year have arisen from an insufficiency of medical staff and a very rapid turnover of non-medical staff. During the year, 172 appointments to the staff were made and 164 resignations were received (all among non-medical staff); as at 31st March, 1949, the total staff employed in the institution was 167.

The hospital is faced with a large waiting-list, both of men and of women. Experience has shown that this burden could be considerably lightened if greater use were made of psychiatric out-patient facilities. At the same time, it is a fact that earlier reference of suitable applicants would make the therapeutic task easier and would help to lessen the economic burden on the State.

Patients come to the hospital from all parts of New Zealand. During the year ended 31st March, 1949, there were 550 admissions (266 men, 284 women), 540 patients were discharged, and 4 died, leaving 100 patients in the institution at the end of that period. In addition, 1,556 out-patients attended the hospital during the same period.

Queen Elizabeth Hospital, Rotorua

In December, 1948, with the gracious permission of His Majesty the King, this institution was renamed the "Queen Elizabeth Hospital." Up to that time it was known as the Services Convalescent Hospital.

The work of the hospital is very closely connected with that of the Division of Physical Medicine, and has been referred to in outline in the report of that Division. It is stressed that this hospital should be reserved for the treatment of such cases of rheumatic disease as have a chance of benefiting from treatment.

The institution has been handicapped during the past year by shortage of staff, and in some sections by a very rapid turnover of staff. In addition, problems of accommodation and building maintenance are very pressing and have not yet been completely solved.

During the year, 325 patients (191 men, 134 women) were admitted and 266 patients (186 men, 80 women) were discharged. The number of patients remaining in the institution as at 31st March, 1949, was 98 (44 men, 54 women).

Included among those treated during the year were 82 servicemen, of whom only 8 remained in hospital at the end of the year.

St. Helens Hospitals

During the year the four St. Helens Hospitals (Auckland, Wellington, Christchurch, and Invercargill) continued their valuable work, an important aspect of which is the training of midwives. Statistics relating to their work are given in the report of the Division of Maternal Welfare.

The main difficulty facing three of these hospitals is that their work is done in buildings which can only be regarded as obsolete. The fourth, Auckland, has a reasonably good hospital building, but needs additional living-accommodation for its staff and a new building for an ante-natal clinic.

At Christchurch the building of a new hospital has been commenced, and it is expected that it will be completely equipped and ready for occupation early in 1951. In addition, plans for a nurses' home in Christchurch are now being prepared.

In Wellington, difficulty is being experienced in finding a suitable site for a new St. Helens Hospital, and as a temporary measure it is proposed to carry out extensive renovations to the present building.

GENERAL

World Health Organization

This organization, the constitution of which was determined at the International Health Conference held in New York in June–July, 1946, came into being early in 1948, when twenty-six members of the United Nations, including New Zealand, had ratified the constitution. By 31st March, 1949, sixty nations had notified their adherence, but three Eastern European members have given notice of their withdrawal.

The first World Health Assembly was held in Geneva in June, 1948, and New Zealand was represented by Dr. F. S. Maclean, Director of the Division of Public Hygiene, as chief delegate, and Mr. T. P. Davin, of the Office of the High Commissioner, London, as alternate.

The Organization has taken over the activities of the Medical Section of the extinct League of Nations, and the Office International d'Hygiene Publique which will shortly cease to exist.

By a resolution of the Assembly, the transport expenses of one delegate from each member State to the annual meetings of the Assembly are paid by the Organization. Thus distance does not impose any extra financial burden on any member State, and New Zealand, as the most distant member, benefits accordingly.

Boards Associated With the Department

Board of Health

The Board of Health held three meetings in the year.

As in previous years, much of the Board's attention was occupied with proposals of local authorities concerning schemes for the installation or improvement of water-supply and drainage services where for various reasons it was not appropriate for a poll of ratepayers to be taken. As a standard procedure in these cases the Board obtains reports on the health, engineering, and financial aspects from the Government Departments concerned.

The following list shows the principal requisitions issued by the Board during the year, under the authority contained in section 22 of the Health Act, 1920:

	£
Lyttelton (Diamond Harbour): Water and drainage	26,000
Hutt County (Days Bay): Water and drainage	26,000
Christchurch City: Water-supply	151,000
Nelson City: Sewerage	20,000
West Harbour Borough: Water-supply	12,300
Geraldine: Chlorination of water-supply	1,500
Auckland: Waterworks	135,900
Wellington: Waterworks	30,000
Te Kuiti: Water-supply	22,250
Lower Hutt: Water-supply	28,875
Henderson: Water-supply	12,000
Greymouth: Water-supply and drainage	42,000

Medical Council

During the year the Medical Council met on four occasions. A total of 148 medical practitioners were admitted to the New Zealand Medical Register 110 holding New Zealand medical qualifications and 38 holding overseas medical qualifications. The total number of medical practitioners on the New Zealand Medical Register as at 31st March, 1949, was 2,272. It was found necessary to discipline one medical practitioner for an offence against the Dangerous Drugs Regulations 1928.

The Council has continued its efforts to extend medical reciprocity between New Zealand and other countries. Existing reciprocal arrangements with South Africa have been extended, and negotiations were commenced to establish reciprocity between New Zealand and the Province of Saskatchewan in Canada and between New Zealand and Pakistan. At the present time New Zealand has medical reciprocity with the United Kingdom, Australia, Manitoba (Canada), and to a limited extent with South Africa and India.

Dental Council of New Zealand

At the 31st March, 1949, there were 667 dental practitioners holding annual practising certificates. In addition, the Health Department, the Armed Services, and the University of Otago Dental School employed a total of 63 dental practitioners. At a meeting of the Dental Council in February, 1949, 39 graduates of the University of New Zealand were granted registration, together with 6 dental practitioners from overseas possessing United Kingdom qualifications previously approved by the Dental Council.

The question of reciprocity of qualifications between New Zealand and countries outside the Commonwealth was considered, and of the 6 applicants for registration who were concerned, 4 were successful in being granted registration and 2 unsuccessful as their qualifications were not approved for registration in New Zealand.

A total of 69 names were removed from the Dentists Register, 17 because of death, 35 non-practising dentists at their own request, and 17 to whom letters in terms of section 19 (1) of the Dentists Act, 1936, were sent and returned unclaimed.

Nurses and Midwives Board

During the year five meetings of the Board were held. Fifteen applications for approval or regrading of training-schools were dealt with, and 1,676 nurses (including 202 overseas personnel) were admitted to the respective registers. Six disciplinary cases were considered and appropriate action taken.

The principal matters dealt with during the year were the consideration of the report on recruitment and training of nurses in Great Britain, shortage of pupil-nurses in New Zealand, and the revision of the general nursing syllabus.

Other matters dealt with included—

(*a*) Anæsthetics in maternity training.
(*b*) Inspection reports on training-schools.
(*c*) Reciprocity with overseas registration authorities.
(*d*) Pre-nursing course for secondary-school girls.

Masseurs Registration Board

Two meetings of the Masseurs Registration Board were held during the year, 49 applications for registration being considered, of which 45 were granted. The establishment of an additional subsidiary training-school at Palmerston North Hospital was also approved. Two cases in connection with unregistered practitioners were dealt with.

The principal matter considered was the formulation of recommendations concerning legislation to consolidate existing enactments and to bring the practise of physiotherapy into line with overseas provisions.

Other matters dealt with included—

(*a*) Reciprocity with overseas registration authorities.
(*b*) Conduct of State examinations.
(*c*) Establishment of a panel of examiners.
(*d*) Bursaries for students.
(*e*) Refresher courses for tutor physiotherapists.
(*f*) Administration of light therapy by registered nurses.
(*g*) Provisional registration of overseas personnel.

Opticians Board

The Opticians Board met on two occasions during the year. A further 11 opticians were registered during the year, 8 holding the New Zealand qualification and 3 holding English qualifications. As at 31st March, 1949, 317 persons were registered as opticians under the Opticians Act, 1928, of whom 263 persons were actually in practice as opticians.

A total of 62 candidates presented themselves for examination in the various sections of the State Examination in Optics held during November, 1948. Of this number, 13 completed the final section of the examination and so became eligible for registration

The Plumbers Board of New Zealand

The function of the Plumbers Board, among other things, is to examine, register, and license plumbers. The Board met three times during the year.

Examinations were held during May and October at twenty-two centres extending from Whangarei to Invercargill. Two hundred and fourteen candidates sat for the written portion of the examination, 140 securing a pass. Two hundred and sixty-nine sat for the practical test in workmanship, 126 securing a pass. One hundred and twenty-six qualified for registration.

As at 31st December, 1948, 3,407 plumbers were registered by the Board.

The King George V Memorial Fund Board

This Board was established in December, 1938, pursuant to the King George V Memorial Fund Act, 1938, to administer the Fund publicly subscribed and subsidized by the Government on a pound-for-pound basis. The purpose of the Fund is the establishment, improvement, and maintenance of a series of children's health camps dedicated as a national memorial to the late King George V.

The Board held three meetings during the year. In addition, the Chairman and members have made inspections of five of the eight camps owned by the Board. A ninth camp is at present being constructed at Pakuranga, and it is expected that it will be opened during 1949. Ultimately this camp will accommodate 100 children, but until all buildings have been completed it will be necessary to restrict admissions to approximately half that number.

The management of each of these camps is in the hands of a Camp Management Committee set up by the New Zealand Federation of Health Camps (Inc.).

Dominion Advisory Board of the New Zealand Federation of Health Camps (Inc.)

The main function of this Board is to maintain health camps for the treatment of children between five and twelve years of age who, for various reasons, are below standard in their general health. In doing so, the Board is a valued auxiliary to the work of the Department's School Medical Service. Children are admitted to the camps for a period of two months, during which time they are given a well-balanced diet and facilities are provided to ensure that they get proper rest and recreation. "Problem" children are not eligible for admission to these camps.

The Federation also works in close co-operation with the Post and Telegraph Department in promoting the sale of Health stamps. It is mainly from this source that the funds for running the King George V memorial health camps are received.

Medical Research Council

The Medical Research Council held two meetings during 1948. At its May meeting it considered reports submitted by its research committees on the work carried out during the previous year and formulated recommendations on expenditure on the medical research work under its control for the year ended 31st March, 1949. At its September meeting the Council inspected medical research in progress at that time for which it was responsible.

During 1948–49, research work in the following spheres of medicine was conducted by the Council:—

Microbiology.	Neuropathology and neurophysiology.
Tuberculosis.	Dentistry.
Clinical medicine.	Obstetrics.
Nutrition.	Thyroid.

A list of the articles published during the year, giving the results of medical research carried out under the auspices of the Medical Research Council, is given below.

In addition, a close liaison was maintained with the work of the Travis Trust Laboratory for Tuberculosis Research, and the New Zealand Branch of the British Empire Cancer Campaign Society.

In November, 1948, a Medical Research Expedition visited Western Samoa to survey the medical research needs of that territory so that a research policy for the future could be formulated. A report setting out the findings of the expedition was submitted to the last meeting of the Medical Research Council and is at present under consideration.

During the year under review the Council, with the approval of the Government, established Medical Research Council Fellowships. The fellowships are intended to discover workers who will devote themselves to medical research work and at the same time to promote medical research. The first fellowship has been awarded to Mr. R. L. Blakley, M.Sc., of Dunedin, who is to undertake a study of ketosis, attacking the problem by investigating the mechanism of the anti-ketogenic effects of sorbitol and glycerol.

PUBLICATIONS

Tuberculosis Research.—Annual report received from Dr. T. W. J. Johnson.

Travis Trust.—Annual report received from Professor N. L. Edson.

Publications:—

(*a*) "A Case of Human Tuberculosis Due to Avian Tubercle Bacilli" (Margaret K. Finlayson). *N.Z. Med. J. 47*, 362 (1948).

(*b*) "The Catalese Activity of Mycobacteria" (Margaret K. Finlayson and N. L. Edson). *Trans. Roy. Soc. N.Z., 77*, 284 (1949).

(*c*) "The Occurrence of Cytochrome and Coproporphyrin in Mycobacteria" (C. M. Todd). To be submitted to *Biochem. J.*

Clinical Medicine Research.—Annual report received from Dr. K. S. Alstad.

Publications :—

(*a*) "Hypertension in New Zealand" (K. S. Alstad and F. H. Smirk). *N.Z. Med. J.*, *260*, 298–308 (1948).

(*b*) "R-Waves and T-Waves" (F. H. Smirk). *Br. Heart Journal XI*, No. 1 (1949).

(*c*) "Circulatory Properties of Amidine Derivatives I: Pressor analysis of methyl *iso*-thiourea" (F. N. Fastier). *Br. J. Pharm.*, *3*, 198–204 (1948).

(*d*) "Circulatory Properties of Amidine Derivatives II: Potentiation of the Vasoconstrictor Action of Adrenaline" (F. N. Fastier and C. S. W. Reid). *Br. J. Pharm.*, *3*, 205–210 (1948).

(*e*) "'Constant Flow' Organ Bath Techniques" (F. N. Fastier and C. S. W. Reid). *Br. J. Pharm.*, *4*, 109–110 (1949).

(*f*) "Some Properties of Amarin, With Special Reference to Its Use in Conjunction with Adrenaline for the Production of Idio-Ventricular Rhythms" (F. N. Fastier and F. H. Smirk). *J. Physiol.*, *107*, 318–331 (1948).

(*g*) "The Variation of Casual, Basal, and Supplemental Blood Pressures in Health and in Essential Hypertensions" (J. A. Kilpatrick). *Br. Heart J.*, *10*, 48–56 (1948).

Accepted for publication :—

(*h*) "Effect of Thiocyanate on Basal and Supplemental Blood Pressures" (K. S. Alstad). *Br. Heart J.*

(*i*) "Physiotherapy in the Treatment of Cardiac Disease" (K. S. Alstad). *N.Z. Jnl. of Physiotherapy.*

(*j*) "Histological Studies and Perfusion Experiments on Hypertensive Rats" (P. A. Restall). *Br. Med. J.*

(*k*) "Symposium on Hypertensive Disease" (*F. H. Smirk*). *Br. Med. J.*

Neuropathology and Neurophysiology Research.—Annual report received from Professor J. C. Eccles.

Publications :—

(*a*) "Plain Radiography in Lumbar Intevertebral Disk Lesions" (A. C. Begg and M. A. Falconer). *Br. J. Surg.*, Jan., 1949.

(*b*) "Actions of Anticholinesterases on Endplate Potential of Frog Muscle" (J. C. Eccles and W. V. Macfarlane). *J. Neurophys.*, *Vol. 12*, 59–80.

Submitted for publication :—

(*c*) "Effects of Changes in Ionic Environment on the Action Potential of a Sympathetic Ganglion" (J. W. Saunders and J. D. Sinclair). Accepted by *J. Neurophys.*

(*d*) "Electric Potentials Generated by Antidromic Volleys in the Quadriceps and Hamstring Motoneurones" (T. H. Barakan, C. B. B. Downman, and J. C. Eccles). Accepted by *J. Neurophys.*

(*e*) "A Review and Restatement of the Electrical Hypotheses of Synaptic Inhibitory and Excitatory Action" (J. C. Eccles). Contribution to Internat. Cong. of Neurophys., Paris, April, 1949.

(*f*) "Afterpotentials and Excitability of Spinal Motoneurones Following Antidromic Activation" (C. McC. Brooks, C. B. B. Downman, and J. C. Eccles). Forwarded to *J. Neurophys.*

Dental Research. Annual reports submitted by F. W. Craddock and R. E. T. Hewat.

Awaiting publication:

(*a*) "Variations in the Incidence of Dental Caries in the Lower Half of the North Island of New Zealand." (R. E. T. Hewat). Delivered at 7th Pac. Sc. Cong.

(*b*) "Control of Dental Caries by Topical Applications of Sodium Fluoride: Experimental Study on 97 Children in Wellington" (R. E. T. Hewat and F. Bruce Rice).

Obstetrical Research.—Annual report received from Sir Bernard Dawson.

Cancer Research.—Annual reports made available on behalf of New Zealand Branch British Empire Cancer Campaign Society, by Mr. G. E. Roth, Physicist in Charge, Dominion X-ray and Radium Lab., Christchurch; F. Bielschowsky, Director of Cancer Research Laboratory, and Mr. W. H. Hall, Cancer Research Laboratory, Medical School, Dunedin.

Island Territories Research. Report received from Sir Charles Hercus.

Nutrition Research. Annual report received from Dr. Muriel Bell.

Publications:—

(*a*) "The Effect of Sunlight on the Nutritional Properties and Flavour of Milk in Glass Bottles" (McDowall, McDowell, Clemow, Bell).

(*b*) "Fluorine Content of New Zealand Teeth" (Marion F. Harrison).

Thyroid Research. Annual report received from Sir Charles Hercus.

Microbiological Research.—Annual report received from Dr. N. L. Edson.

Publications:—

(*a*) "Use of the Developing Chick Embryo in the Study of Viruses" (L. B. Fastier). *Jrnl. N.Z. Branch of R.S.I.*, *9*, 339 (1948).

(*b*) "Factors Influencing the Carrier Rate of the Group A Hæmolytic Streptococcus" (L. Kirschner and D. J. A. Gallagher). *N.Z. Med. J.*, *48*, 10 (1949).

Awaiting publication:—

(*c*) "An Antibiotic Substance Produced by a Member of the Shigella Group" (L. B. Fastier). Submitted to *J. Immunol.*, 1949.

(*d*) "A Study of the Serological Types of Hæmolytic Streptococci in the Epidemiology of Scarlet Fever in Dunedin" (L. Kirschner and D. J. A. Gallagher). *N.Z. Med. J.* (in press).

(*e*) "Investigation of the Incidence of Athlete's Foot Amongst a Group of Students" (M. J. Marples). *Med. J. Austral.* (in press).

National Health Institute

During the year further progress was made toward the establishment of a National Health Institute for the Dominion. A building in Wellington has been purchased, and plans are now being prepared to have the building strengthened and altered to meet the requirements of the Institute. In addition, some of the necessary staff for the Institute have been appointed.

The main functions of the Institute will be—

(*a*) To assist the Department in its work by stimulating an interest in preventive medicine.

(*b*) To assist public health and hospital laboratories to work more efficiently and uniformly.

(*c*) The analysis and interpretation of vital statistics to give the necessary knowledge on which to base policies for the prevention and control of disease.

(*d*) To undertake chest radiography, tuberculin testing, and to control the B.C.G. vaccine immunization training unit.

(*e*) The inspection and testing of x-ray equipment.

Arrangements were also finalized during the year for the transfer of the Census and Statistics Department's Vital Statistics Branch from that Department to this Department. This unit now becomes the Medical Statistics Branch of the Department, and it will ultimately form part of the National Health Institute.

New Zealand Representation Abroad

During the year New Zealand was represented at the following overseas gatherings connected with health matters:—

(1) Fourth International Congress on Tropical Medicine and Malaria, held at Washington, U.S.A., in May, 1948, by Dr. J. C. Lopdell, Chief Medical Officer, Samoa.

(2) First International Poliomyelitis Conference, held at New York, U.S.A., in July, 1948, by Dr. Duncan Cook, Director of Health Benefits, Department of Health.

Reference is made above to New Zealand's representation at the First World Health Assembly.

Visitors from Overseas

During the past year distinguished visitors to New Zealand from the health point of view have included Professor J. C. Spence, Professor of Child Health of the University of Durham, England; the Hon. Tuam Haji Mahomed Ensoff, the Malayan delegate to the Economic Commission for Asia and the Far East; and Dr. Charles N. Leach, of the International Health Division, Rockefeller Foundation. In addition, an Australian dental delegation, consisting of ten members representative of the Commonwealth Department of Health and the Australian Dental Association, visited New Zealand to inspect the dental services in Wellington and to observe the operation of the School Dental Service in the field.

Staff

The following changes have occurred among the senior staff of the Department during the past year:—

Dr. L. S. Davis (formerly Medical Officer of Health, Auckland) has been appointed Director, Division of Child Hygiene.

Dr. Doris Gordon resigned from the appointment of Director, Division of Maternal and Infant Welfare.

In conclusion, I would like to express my appreciation of the willing co-operation the Department has continued to receive during the past year from the bodies and organizations with which it is associated. I would also express my thanks to all members of the staff of the Department for their work during the year and for the way in which they have done everything possible to cope with the hindrances caused by shortage of staff and inadequate accommodation.

T. R. Ritchie, Director-General of Health.

POLIOMYELITIS IN AUCKLAND, 1947-49: AN EPIDEMIOLOGICAL STUDY

(By A. W. S. THOMPSON, O.B.E., M.B., M.R.C.P., D.P.H., Medical Officer of Health)

FOREWORD

IN conjunction with its predecessor published last year, this report records an attempt—perhaps the first of its kind—to trace the course of an epidemic of poliomyelitis in all its manifestations, subliminal and overt. The Auckland district was ideal for the purpose. It has now been recognized that very large scale studies involve so many doubtful factors of time and local circumstance that their epidemiological value is small. There is therefore a definite place for intensive field investigations of limited scope. The present inquiry is concerned with a population of about 350,000, in which there were nearly 350 positive cases, and perhaps 100,000 cases never definitely diagnosed. In its concentration on these last lies the chief interest of this inquiry.

A. W. S. THOMPSON.

Auckland, 6th June, 1949.

CONTENTS

I. INTRODUCTION

The Auckland poliomyelitis epidemic of 1947–49 commenced in November, 1947. By the end of April, 1949, it was approaching what is usually regarded as the saturation point for any extensive outbreak, 345 cases having occurred in a population (whole district) of just over 350,000, or almost 1 case per 1,000.

This paper is a sequel to a report* prepared about a year ago dealing with an investigation of the background of the early stages of the epidemic. It is a study of the further course of the epidemic in the light of the findings of that investigation.

II. RESULTS OF PREVIOUS INQUIRY

These may be briefly summarized:—

(*a*) The epidemic had been preceded, and was accompanied, by large numbers of cases of minor illness, characterized by fever, headache, sore throat, vomiting, and diarrhœa, and sometimes pains in the abdomen and neck. Evidence was produced to show that these were in reality minor forms of the more serious disease.

(*b*) The ratio of these "suspect illnesses" to positive cases appeared to be higher than has generally been estimated elsewhere. The overall ratio was about 300 : 1, but there was considerable variation between one age/sex group and another.

(*c*) The disease had already established itself widely, in the form of these "suspect illnesses," before the appearance of positive cases revealed its presence. The facts would have been consistent with an increase in the virulence of the causative organism during the months of October and November, 1947.

(*d*) One result of the investigation was to focus attention on the schoolboy aged 10 to 15 years, and to a lesser extent on the girl aged 5 to 10 years. The older schoolboy appeared to be the person most frequently responsible for introducing the infection into households in which positive cases later occurred. Before, or concurrent with, the onset of the positive case in any family, 50 per cent. of the two age groups mentioned above had a "suspect" illness, which appeared to afford them personal protection later.

(*e*) Study of the intervals occurring between successive illnesses (suspect or positive) in the same household pointed to a comparatively poor capacity of the organism to pass from person to person in the home. This, and other evidence, suggested that faecal organisms, rather than droplet infection, played the major part in propagating the disease. The suggestion was made that dust-borne infection might be an important means of spread, as is believed to be the case with threadworms.

III. COURSE OF THE EPIDEMIC

The Central Auckland Health District comprises an area of almost 1,900 square miles and a population of about 350,000. In the centre of the district the City of Auckland has a compact population approaching 275,000. The Waitemata Harbour cuts off a portion known locally as the North Shore, and

* "A Contribution to the Epidemiology of Poliomyelitis in New Zealand." (Annual report of the Department of Health, 1948.)

to the south of the city certain independent urban populations (Otahuhu, Papatoetoe, Papakura) are functionally very closely connected with its life. The remainder of the district is semi-rural, although there are numerous small urban aggregations scattered here and there.

The course of the epidemic is shown on the graph (Fig. I, page 93), in which distinction has been drawn between the three main subdivisions of the district as described above. The initial peak occurred in December, 1947, and a similar flare up but with only half as many cases followed in January, 1949. Between times, in the middle of 1948, there was a moderate build up of cases affecting all areas. The similarity of the curves for the city area and for the semi-rural districts outside is interesting. Most of the early notifications were from Auckland itself, but Papakura, nineteen miles to the south, and the remote country district of Hunua, thirty miles to the south-east, produced cases at the very beginning.

IV. INCIDENCE IN DIFFERENT AREAS

The graph gives a misleading impression of the relative intensity with which these areas were affected. By the end of April, 1949, a total of 345 cases had occurred, equal to 9·8 per 10,000 population. They were distributed as follows:—

(*a*) Auckland urban area: 218 cases, or 8·0 per 10,000.
(*b*) Otahuhu, Papatoetoe, Papakura: 30 cases, or 21·5 per 10,000.
(*c*) Remainder (semi-rural): 97 cases, or 15·4 per 10,000.

It will be seen that the incidence was almost twice as great in the semi-rural areas as in Auckland itself, but that the urban areas lying between city and country were affected more heavily still.

The next illustration (Fig. II, page 94) shows this in greater detail. It covers the period to the end of 1948 only. Cases are shown by age groups.* The incidence in Papakura was remarkable, 5 cases per 1,000. In form generally the figures for the different areas have little in common, but there is one consistent feature which is of considerable interest. Scrutiny will show that as the incidence increases from Auckland, through the semi-rural districts, through Otahuhu and Papatoetoe, to its climax in Papakura, so the length of the column for the 5- to 10-year olds in either sex grows too. In other words, there appears to be a positive relationship between the incidence as a whole in any area and the incidence in this particular age group. Children of this age are peculiarly situated in regard to infection and immunity. No child under the age of 10 in 1948 can have passed through the 1937 epidemic; above that age the majority must have had some opportunity of acquiring immunity at that time or in previous outbreaks. The pre-school child, however, has relatively few opportunities of becoming infected at any time. If, therefore, we find that the 5- to 10-year-old group produces few cases during the epidemic, the presumption is that it must have gained immunity during the preceding inter-epidemic interval. Study of Fig. II therefore suggests that a lighter general incidence in some areas than in others may be due to more effective circulation of the virus in these areas between epidemics, and that the converse is true of areas which suffer heavily.

* Figures for age and sex composition of these populations are not available. Cases in each age group have therefore been related to the total population in each area. In other words, the graphs have been constructed as if the populations concerned were equally distributed between the eight age/sex groups. The principal effect is to exaggerate the importance of cases amongst "over 15's."

This explanation seems plausible enough when we compare a densely populated area like Auckland, where free circulation of infection is probable at all times, with country districts, where there must normally be little interchange of infecting agents. But what of the towns lying between city and country—Otahuhu, Papatoetoe, Papakura—where germ exchange must be considerable, and yet the toll of the epidemic has been highest of all?

The answer will be found, I think, in the history of these places. Between 1936 and 1945 their aggregate populations increased by 39 per cent. and they are still growing rapidly. It seems probable that the greater part of this growth is due to influx not from other urban districts, but of people from country areas.

If these people with the low immunity of rural dwellers were subjected to the rapid circulation of a virus at epidemic virulence before they had had time to acclimatize themselves to town life, one would expect the incidence of positive cases amongst them to be high.

The suggestion, then, is that what happens to any population during a poliomyelitis epidemic depends largely on the degree of immunity acquired during the preceding "silent" interval. This, in turn, I have assumed to be dependent on population density. When the circulation of a virus is a matter of only a small proportion of individuals being affected at a time, even minor differences of population density might influence its range. During an epidemic, however, the proportion of the population responsible for spreading the virus must increase enormously; this is what we should expect, and a similar process has actually been demonstrated during epidemics of cerebro-spinal meningitis. In a prolonged epidemic like the present, therefore, it is hardly likely that any ordinary degree of density variation could influence the total number of persons ultimately affected by the virus; but the number reacting unfavourably (positive cases) should be smaller in dense areas than in more sparsely populated districts, at least up to a point. If, however, dispersal is carried to extremes, sooner or later a state must be reached where mere distance between families prevents effective circulation of the virus, even under epidemic conditions.

Let us put the theory to the test, beginning with the broad divisions of the district mentioned above:—

	Persons Per Acre.	Cases Per 10,000 (to 30th April, 1949).
(*a*) Auckland urban area	6·0	8·0
(*b*) Otahuhu	5·6	13·2
Papatoetoe	3·2	17·5
Papakura	1·2	58·3
(*c*) Remainder (semi-rural)	0·05	15·4

It will be seen that as the density falls, the incidence rapidly increases, until we come to the very sparsely populated rural districts, when the incidence drops again. The result is so neat that the reader may wonder why I have bothered to drag in the hypothesis that an influx of country dwellers has boosted the incidence in group (*b*). The reason is that it would clearly be absurd to pretend that density reductions of the order shown could alone account for such enormous differences in incidence. Other factors must obviously be at work.

V. RELATIONSHIP BETWEEN DENSITY AND INCIDENCE

Let us look more closely into this question. To get dependable results we should require figures for a large number of areas similar in all respects except in density. The nearest approach at our disposal consists of the Auckland urban area, less the North Shore, with Otahuhu (which is virtually part of Auckland) thrown in. This area is divided into eleven subdivisions (see Fig. IV) of varying density. Functionally the population concerned is fairly homogeneous, but unfortunately there are many differences, socially and developmentally, between one area and another, and it cannot be held that the requirements mentioned above have been completely fulfilled.

The next illustration (Fig. III) shows, on the left, the area and population of each subdivision, and on the right the incidence of positive cases to the end of March, 1949. An inverse relationship between density and incidence is remarkably well demonstrated down to and including One Tree Hill, especially if we accept that Otahuhu's incidence may have been boosted by influx from the country. Beyond that something appears to have gone wrong. That Ellerslie and New Lynn should have escaped so lightly seems very strange; though relatively sparsely populated, they show incidences such as we should have expected only from the heart of the city.

Ellerslie would not have puzzled a racing-man for so long as it puzzled me. I have been told (by an Aucklander) that its racecourse is the most important in New Zealand. Several times each month the actual density of persons within Ellerslie's confines is intense. For this reason its proper place is probably at the head of the column, and its low incidence is in accord.

New Lynn is not so easily accounted for; in its case the story is perhaps not complete. (Two of the seven cases notified in April in the area now being discussed were from New Lynn, bringing its incidence to 6·3 per 10,000; this was the only area significantly affected during April.) It is a district, however, whose expansion (23 per cent. between 1936 and 1945) has been largely due to an influx of urban dwellers from the city, and it differs sharply in this respect from the heavily affected towns on the southern side.

It is at least arguable, therefore, that these two apparent exceptions are not really exceptions at all, and that, in fact, their closer study lends support to the theory. If we ignore them for the moment, the other areas of low density (Mount Roskill and Mount Wellington) may perhaps be regarded as showing the early effects of increasing dispersal in eventually curtailing the incidence.

If the reader will look at Fig. III he can imagine Papatoetoe (3·2 per acre) just below New Lynn, with its incidence bar (17·5) projecting just below the edge of the diagram; and Papakura (1·2 per acre) second from the bottom, with its bar (58·3) projecting right off the page, more than three times as long. It is obvious that while they follow the same general tendency as the others, in their cases the effect is widely exaggerated, probably for the reasons mentioned above.

If Fig. III is held at arm's length, the eye gets some impression of the actual differences in density between the areas concerned. It is admittedly not easy to believe that variations of density of the order shown between, say, the seven most closely settled areas could produce the effects attributed to them. But it would be even more difficult to believe them due to chance or to the operation of some factor unrelated to density.

VI. PREVIOUS EPIDEMICS AND "SILENT" INTERVALS

It is difficult from the records now available to arrive at strictly comparable figures, but the following is an estimate of the incidence in the Central Auckland District during the three previous major epidemics:—

1916	15·5 per 10,000
1925	7·8 per 10,000
1937	2·6 per 10,000

Between these years the disease was constantly active in New Zealand. In the Auckland Province during the eleven years intervening between epidemics of 1925 and 1937 there were 90 cases, an average of 8 per annum. Following on the 1937 outbreak, however, there was a significant lull. Details are lacking for the first three years, but here is the record for the Auckland urban area and Otahuhu from 1941 on:—

1941	Nil
1942	1 case
1943	Nil
1944	Nil
1945	1 case
1946	5 cases (plus 1 just outside)

The lull ended with a crash, the new epidemic commencing earlier in the season than ever before and producing more cases in a month than the last epidemic cast up in its full course. The incidence to date, 9·8 per 10,000, is sufficient to put it in a different class from the outbreaks of 1925 and 1937. If we consider the successively declining toll of the first three epidemics and the continuing activity between them, it becomes clear that the 1937 affair was merely the final movement of a composition which began in 1916, and that in 1947 we were in the presence of a new opus.

It would be interesting to know what was really happening during the lull, which can hardly have been a period of complete inactivity. Figure IV shows the location of the positive cases which came to light after 1940. They were pretty well dispersed. The two most densely, and the three most sparsely, populated of the districts shown in Fig. III produced no cases; the middle group had 1 each, except for Auckland City, which had 3. The 3 cases recorded in the early part of 1947, before the epidemic began, were also widely separated; similarly with the 6 occurring in 1946.

If our theory is correct, all this time a furtive but beneficent process was going on, in which an attenuated virus was passing from person to person and silently conferring immunity. This process, it would seem, was most effective in the more densely populated areas—in Newmarket, Mount Eden, and Mount Albert, for example. This could only be the case, however, so long as the number of spreaders, and perhaps the dispersive powers of the virus, remained low. Once they increased beyond a certain point, the differences between areas must be reduced to insignificance.

The results, if the virus increased in virulence as well as in dispersiveness, must now be very different. Those who had previously been visited might respond with a minor illness, or not at all. In areas where there had previously been little circulation, however, the path of the new invasion would be strewn with positive cases. These alone find their way into hospital, and appear in the statistical returns; of the minor reactions we normally hear nothing.

Precise records being available for the 1937 epidemic (but not, unfortunately, for previous ones) it has been possible to plot incidence against density for the 43 cases which occurred in the areas dealt with in Fig. III. In Fig. V the result is compared with the position in the present epidemic. It will be seen that in the four Auckland areas affected, incidence in 1937 was related directly to density, the opposite of our experience now. This diagram also distinguishes cases with paralysis or paresis from those without either, in case an altered standard of diagnosis should have obscured the issue. This does not help very much, however, the effect in the case of the present epidemic being complete confusion.

There are three possible explanations of this anomaly:—

(*a*) The apparent inverse relationship shown in the latest epidemic may be false. Such a relationship has been noted elsewhere,* however, and the results are too consistent to be lightly dismissed. If anything, the 1937 diagram is less likely to be reliable in view of the small number of cases involved.

(*b*) The very small proportion of non-paralytic cases in the 1937 record suggests that the picture may be incomplete. Present standards of hospitalization might have told a different story.

(*c*) It has been suggested above that the 1937 outbreak was not in reality an epidemic complete in itself, but merely a last flare-up in a process which began much earlier. The tail end of an epidemic might well be irregular. As I have already pointed out, when the spreading process is rapid the effect of variations of density must be slight or nil. If most of those who escape in the closing phases of an epidemic are persons who have gained immunity during the earlier stages, one would expect to find most signs of activity in the regions least affected when the process was at its height. Imagine a shower of sparks continually falling on heaps of materials, some of which are much less inflammable than others: at the end only the heaps which burn least readily will be alight.

The last seems the most likely explanation.

VII. SPREAD IN THE AUCKLAND URBAN AREA

In my previous paper spot maps were presented showing that in the early stages of the epidemic there was nothing to indicate spread from any particular focus. The next four diagrams (Figs. VI–IX) show the further course of the epidemic in the urban area.† Cases in residential institutions have not been included.

A certain ebb and flow over the area is apparent, but no tendency to centrifugal spread. The pattern of the last 50 cases is not unlike the first. The story is one of victims struck down at random almost simultaneously, and a battle fought to a finish without shifting ground. When poliomyelitis comes, it comes not single spies, but in battalions; not uniformed troops, but fifth-columnists, quietly infiltrating; then suddenly, here and there, the guise of a minor illness is thrown off, and paralysis is in our midst.

* In London in 1947. Sir Allen Daley and B. Benjamin (1948): *The Medical Officer, 80*, 171.

† Figure VI corresponds to Fig. I (I) in the previous paper. Some minor corrections have been necessary.

Some of the most popular beaches in the Auckland district are situated along the coast-line shown near the top right-hand corners of these diagrams. Auckland's main sewer discharges at a point about a quarter of the way along from the right-hand border of the diagram, and beaches crowded with bathers in the summer months stretch for a couple of miles to the east, beginning not far from the outfall. The sea-water at these beaches has been heavily polluted for years. It is interesting to note that although the contiguous areas are quite densely populated, and the local inhabitants probably use these beaches more than any one else, the distribution of poliomyelitis cases in this neighbourhood is very sparse indeed. An unbiased observer might even say of these diagrams that it looked as if this area had been specially favoured in its avoidance by the virus. This is interesting in view of the fact that in the earlier stages of the epidemic certain interested parties made efforts to throw the entire blame for the outbreak on the state of the harbour, arguing (incorrectly) that poliomyelitis cases had been commonest near the beaches.

VIII. SEVERITY OF DIFFERENT AGES

In the previous inquiry an estimate was obtained of the ratio of minor illnesses related to poliomyelitis ("suspect" illnesses) to positive cases. Separate estimates were made for different age/sex groups, as follows:—

Ratio of Suspect Illnesses to Positive Cases

Sex.	Age.	Calculated Ratio.	Round Figures.
Males	0–	112 : 1	100 : 1
	5–	99 : 1	100 : 1
	10–	319 : 1	300 : 1
	15 and over	546 : 1	500 : 1
Females	0–	203 : 1	200 : 1
	5–	230 : 1	200 : 1
	10–	168 : 1	200 : 1
	15 and over	972 : 1	1000 : 1
Total	..	301 : 1	300 : 1

These results were based upon the incidence of "suspect" illnesses recorded amongst families in various parts of the city from November, 1947, to February, 1948, inclusive (applied by calculation to the urban area as a whole), and the incidence of poliomyelitis over the same period. The latter included all positive cases admitted to hospital. The proportion of cases with paralysis or paresis was not taken into account and at that time was not known. As can be seen from Fig. V, the relationship of cases with paresis to total notifications is, in any case, extremely irregular.

As no further investigations have been made into the occurrence of minor illnesses in the general population, the accuracy of these estimates cannot be checked directly. An indirect test of limited value is available, however.

This consists of a comparison between the incidence of cases *with paralysis or paresis** in each age group with the ratio of suspect to positive cases as previously estimated. A high ratio of suspect to positive cases in one age group and a low ratio in another suggests that in the first age group the disease is less severe than in the second. We should therefore expect to find relatively fewer paresed cases in the former age group.

Figure X (page 100) shows this comparison graphically. On the right-hand side incidences of paresed cases are shown from the beginning of the epidemic to the end of March, 1948 (end of the initial surge, and of the period covered by the previous inquiry), and from then until the end of the year. It will be seen that in each age group the higher the ratio of suspect to positive cases, the lower the incidence of paralysis or paresis. The diagram also shows that the severity of the disease is greater in males than in females, except in the age group 10 to 15 years, when the opposite is the case.

Some confirmation is therefore forthcoming in support of ratios of suspect to positive cases arrived at in the previous inquiry. In that it is based on figures from a much longer period, and on data not available when these estimates were made, it is of interest, despite its admittedly doubtful reliability.

IX. PERCENTAGE AFFECTED IN DIFFERENT AGE GROUPS

By applying these ratios to the cumulative totals of positive cases in each age group, it is a simple matter to calculate the total numbers of persons who must have had the disease in one form or another since the beginning of the epidemic. If we also know the population in each age group in the area, we can discover what percentage of the total has been affected to date.

The accompanying diagrams (Figs. XI and XII) have been constructed accordingly. They apply only to the Auckland urban area. At the bottom of each chart the cumulative totals of cases, male and female, are shown month by month. The graphs indicate the presumptive progress of the epidemic in the age group as a whole. The reader will see at once, on glancing at Fig. XII, that this report carries the story to a most interesting and critical point. One age group, that of boys aged 10 to 15 years, had just touched 100 per cent. by the end of April, 1949.

* Figure V shows that the proportion of positive cases with paralysis or paresis varies enormously, and irregularly, between different localities. The irregularity is too gross to be accounted for by differences in age/sex composition, although wide variations also occur between the age groups. Cases to the end of 1948 from Auckland itself included the following percentages with paralysis or paresis:—

	Percentage of Cases With Paresis.		Percentage of Cases With Paralysis.	
	Males.	Females.	Males.	Females.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
0–	50	23	7	23
5–	29	24	6	12
10–	11	31	21	19
15–	27	33	45	28

It might be thought that the presence or absence of paralysis (or paresis) would be a more reliable criterion for statistical purposes than a clinical diagnosis on general grounds, but such does not seem to be the case. Epidemiologically paralysis is a mere accident, unpredictable, and totally unreliable as a standard of comparison.

The steady progress to saturation point of the male group aged 10–15 years contrasts sharply with the behaviour of the disease in girls of the same age. In their case a tendency to settle down about the 40-per-cent. mark was evident as early as May, 1948.

In the pre-school groups there were more positive cases in males than in females (34 males, 21 females), but it is probable that the percentages affected by poliomyelitis in some form or another was identical. By the end of April, 1949, about one-third had been attacked.

Amongst 5- to 10-year olds progress was remarkably steady throughout, especially in girls. The graph for female percentages begins at a lower level and ascends more steeply than that for males. In this age group I do not think that the apparent differences between them are illusory.

The diagram for ages 15 and over has been omitted, being of little interest. By the end of April, 1949, 30 male cases and 19 female cases had occurred in these age groups. By then the calculated percentages affected amounted to 16 per cent. and 17 per cent. respectively. Throughout most of the epidemic the female percentage was higher than the male, but they ran together at the beginning of 1949. It is seldom appreciated that this age group comprises nearly 80 per cent. of the total population. They contributed only 22 per cent. of the positive cases in the Auckland urban area.

To summarize, here are the calculated percentages of each age group which had been affected by poliomyelitis, whether "suspect" or positive, by the end of April, 1949:—

Table I—Calculated Percentages of Age Groups Affected by Poliomyelitis, "Suspect" or Positive, by the End of April, 1949

——	Age 0–5.	Age 5–10.	Age 10–15.	Age 15 and Over.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Male	29	50	100	16
Female	38	61	44	17

X. COMPOSITION OF FAMILIES OF POSITIVE CASES

Multiple cases were admitted to hospital from five families in the Auckland urban area and from six families living elsewhere in the district. In each of these instances there were two cases, except for one family in a rural area which produced three. Several other instances came to notice in which undoubted clinical cases occuring amongst the family contacts of positive cases were not admitted to hospital and do not therefore appear in the published figures.

In the earlier investigation forty households in which positive cases had occurred were observed over a period of about three months. During this time a second positive case occurred in four different houses and 43 per cent. of the remaining contacts had an illness which (for reasons explained in detail in the report) might be regarded as poliomyelitis in a mild form. Six seen during the attack were definitely diagnosable on clinical grounds, but were not admitted to hospital.

It appears, therefore, that multiple family illnesses related to poliomyelitis must be far commoner than hospital returns alone would lead us to believe.

Visiting the homes of positive cases in the early stages of the epidemic left one with two impressions about them: (*a*) that better-class homes appeared to predominate; (*b*) that these households included school-children more frequently than the average family.

The first, about the class of family affected, was undoubtedly correct. Part V of this paper, showing an inverse relationship between density and incidence, confirms it.

The second appears to be wrong. An analysis was made of the composition of families in which positive cases had occurred, and of families including children of the same age group in the general population. (The latter were the families visited in the house-to-house inquiry during the previous investigation.) No significant difference could be demonstrated. Amongst pre-school children affected by poliomyelitis the percentage of only children was rather low (9·3 per cent., as against 16·8 per cent. in the general population) and 69·8 per cent. were in families which included school-children, as against 64·3 per cent. in the general population. In neither case was the difference statistically significant. The families of poliomyelitis cases aged 5–10 years appeared to be quite typical of those including children of this age in the population generally. It was not even possible to show that boys aged 10–15 years were any more likely to figure in the background of positive cases than in the average family including children.

This failure to demonstrate any peculiarity in the composition of the families of positive cases was rather surprising. It is another indication of the extraordinarily widespread nature of the subliminal epidemic, whose ramifications we are, of course, unable to follow directly. In the early stages of the outbreak the pre-school child's comparative isolation may, perhaps, afford some protection; but as time goes on it seems as though he is just as likely to pick up infection from his parents, or from the children outside the home, as to have it brought to him from school by an older brother or sister. It is interesting to recall that the earliest evidence of the epidemic found during the previous investigation was an outbreak of suggestive illnesses in *adults*, especially adults in families without children. This finding was so unexpected that it was felt to be of doubtful significance, and reasons were mentioned why too much reliance should not be placed on it. I am inclined to a rather different view now.

XI. INCIDENCE IN SCHOOLS

In September, 1948, all schools in the Auckland area were visited by Health Inspectors, who called attention to sanitary defects, and prepared reports giving details of numbers on the roll and of the closet and ablution facilities provided. These schools can therefore be classified according to the proportion of water-closets or hand-basins available. In addition, lists can be given of schools which, judging by the Inspectors' remarks, made a particularly good impression generally, and those in which serious sanitary defects were specially noted.

It is obvious, however, that one school may have a smaller number of hand-basins, for example, than another school of equal size, and still be less hazardous from the sanitary point of view. A moment's thought will show that ratios of sanitary accommodation to pupils are more reliable as a general index of overcrowding than of anything else. If there is any truth in the theory put forward in my previous report that the virus of poliomyelitis may be dust spread, especially through contaminated particles in the dust of school closets, then the school with the smallest proportion of closets per hundred pupils should provide the heaviest concentration of virus, other things being equal. But "other things" never are equal; the school with the best accommodation is sometimes the worst maintained. Similarly, the number of hand-basins in a school is no indication of the amount of hand-washing done by the pupils.

Keeping these reservations in mind, let us glance at the incidence of poliomyelitis in different types of schools, classified according to the sanitary reports. Confining attention to the Auckland urban area less the North Shore, detailed reports are available for 72 schools, totalling 29,742 pupils. The following analysis is concerned with 77 positive cases in these schools, an incidence of 2·6 per 1,000.

Of the 72 schools reported upon, cases only occurred in 41, totalling 20,992 pupils, an incidence in the affected group of 3·7 per 1,000. In the following tables the incidences in the affected schools, and in the school populations as a whole, are shown separately:—

Table II—Sanitation: General Impression

Inspector's Remarks.	Schools.		Roll Numbers.		Cases.	Incidence Per 1,000.	
	Affected.	Total.	Affected Schools.	Total.		Affected Schools.	Total.
Good	4	6	2,244	2,755	7	3·1	2·5
No comment	29	52	14,089	20,335	57	4·0	2·8
Bad	8	14	4,659	6,652	13	2·6	2·0

Table III—Hand-basins

Scale.	Schools.*		Roll Numbers.		Cases.	Incidence Per 1,000.	
	Affected.	Total.	Affected Schools.	Total.		Affected Schools.	Total.
1 : 30 or more	9	19	4,666	7,261	17	3·6	2·3
1 : 31 to 1 : 49	9	17	4,830	7,492	22	4·5	2·9
1 : 50 or less	12	18	6,704	8,563	18	2·7	2·1

* Details lacking for 18 schools, including 11 affected schools.

Table IV—Water-closets: Boys

Scale.	Schools.		Roll Numbers.		Cases.	Incidence Per 1,000.	
	Affected.	Total.	Affected Schools.	Total.		Affected Schools.	Total.
1 : 30 or more	13	35	2,570	6,210	18	7·0	2·9
1 : 31 to 1 : 40	9	17	2,977	4,629	17	5·7	3·7
1 : 41 or less	7	5	2,453	4,093	15	6·1	3·7

Table V—Water-closets: Girls

Scale.	Schools.		Roll Numbers.		Cases.	Incidence Per 1,000.	
	Affected.	Total.	Affected Schools.	Total.		Affected Schools.	Total.
1 : 15 or more	6	18	1,555	2,878	9	5·8	3·1
1 : 16 to 1 : 20	6	21	1,557	4,140	7	4·5	1·7
1 : 21 to 1 : 30	3	17	1,094	4,624	3	2·7	0·7
1 : 31 or less	7	11	2,504	3,168	8	3·2	2·5

The populations concerned, and the numbers of positive cases, are so small that very wide variations would have to be recorded before the results from an analysis such as the above could be accepted as significant. A statistician would not, in fact, be impressed by any of the differences in incidence shown in these tables, except possibly by some of those in Table V. It is nevertheless interesting to note that the incidences recorded are rather higher, in every case except one, in the group of schools with the best accommodation than in those which were worst. The only valid conclusion from this analysis is, however, that it provides no evidence that differences in standards of sanitary accommodation (and, by inference, overcrowding) have any influence on the incidence of poliomyelitis in schools.

XII. DISCUSSION

This report has traced the course of the epidemic to a crucial point. The incidence as a whole has touched, or almost touched, the 1-per-1,000 mark. If my calculations are correct, one age group—that of boys aged 10 to 15—has just reached saturation.

What happens now?

The answer will be known by the time the report is published, but early in May the writer was rash enough to state publicly that "he would be surprised if, a month from now, the epidemic in the Auckland district was not virtually at an end."

My previous study focused attention on the older schoolboy. It was he who was most liable to introduce infection into the home. He tended to react to it himself at an early stage, getting the disease over quickly in its milder form. By the time the first positive case came to light in the household, half the boys of this age had already had a "suspect illness" and were immune from further trouble. To a lesser extent the schoolgirl aged 5 to 10 years old was similarly implicated.

Some may think that the conclusion that practically every boy of this age in Auckland has either been in hospital with poliomyelitis or has had a "suspect illness" during the present epidemic is absurd. Most of them must have been in Auckland during the last epidemic. Surely many must have gained immunity then?

The answer is: Very probably; if not then, certainly at some time during the intervening years. Many of these "suspect illnesses" must in reality be minor reactions in persons who have had a previous attack—which, of course, will usually have been a minor one too. These suspect illnesses are usually very mild, although recognizable when the observer is on the lookout for them and knows there is poliomyelitis about. Details will be found in my previous paper.

Consider the case of another virus disease, vaccinia. Nowadays for purposes of international certification no such thing as a negative reaction is recognized. A person who has never been vaccinated before normally reacts violently: the result is called a "typical primary vaccinia." Revaccination of one who has been successfully vaccinated before usually results in no more than redness and swelling along the scratch, the so-called "reaction of immunity." Revaccination after a very long interval sometimes produces an accelerated reaction, similar to primary vaccinia, but seldom so upsetting.

It seems to me that in poliomyelitis we meet with equivalents of all these types of reaction, but with a different emphasis. In vaccinia the virus is one whose virulence, though attenuated, is not allowed to fall below a certain level. In poliomyelitis it would appear that the normal condition of the virus, except during an epidemic, is a state of low virulence. Most people when attacked react in a manner akin to the "redness and swelling" of the reaction of

immunity in vaccinia.* Occasionally even during inter-epidemic times some one throws a pukka reaction and comes to notice as a "sporadic" case; various factors might account for this—abnormally low resistance, heavy dosage with the virus, some intercurrent condition which aids the virus, or its own temporarily exalted virulence. When an epidemic occurs, three types of reaction are seen in varying proportions. Those who have never been infected before react to the virulent organism by developing the disease in classical form—a "typical primary reaction." Those with limited immunity from a minor attack a long time before find themselves in hospital as "positive cases" with little or no paralysis or paresis (comparable with the accelerated reaction). Those with good immunity have a minor illness of limited duration, like the well-protected person who on being revaccinated develops a "reaction of immunity."

To take the analogy a little further, everybody knows that primary vaccination in later life is much more severe in its effects than vaccination in childhood. I think the same thing happens in poliomyelitis. For some reason the tissues of the adult react more violently to first contact with some viruses than do the tissues of a child. The average age at death of the fifteen fatal cases in the Auckland district was 22 years; two-thirds were aged 20 or older, although less than one-fifth of all cases came from this age group.

The cycle of poliomyelitis in the community may be regarded as a process of active immunization with a living but attenuated virus, interrupted every ten years or so by one of nature's experiments in which widespread and almost universal inoculation is carried out with a virulent organism. During the "experimental phase" the most closely settled areas came off best, because they have been the most effectively immunized. Distribution of the organisms is, apparently, mainly excremental, and I have suggested that dust spread may be important. It seems as if too great an anxiety to protect a child during the latent periods between epidemics from the ordinary contacts of every-day life may do more harm than good.

If my observations on the incidence in schools are published, some misguided person will no doubt suggest that it would be a good thing to close up half the sanitary blocks in schools and remove all the hand-basins. That would be putting the clock back with a vengeance; although it might, indeed, have some effect on the poliomyelitis incidence: poliomyelitis is unknown amidst the squalor of primitive Asiatic communities, although there is evidence that the organism itself is not lacking. Poliomyelitis seems to be one of the penalties we must pay for bettering our sanitary condition generally; it is a phase we must pass through. In course of time, humanity will adapt itself. It is certainly a lesser evil than the diseases we have abolished by improving our sanitary environment.

There is probably a considerable difference, in any case, between the effects of crowding and poor sanitation during an epidemic and in the intervals. Attention to personal hygiene may not give absolute protection during an outbreak, when spread appears to pass all barriers. But it is the only measure by which the individual can hope to reduce the dose of virus which he himself is likely to get. It may for aught we know make all the difference between a minor attack and life-long paralysis. It is probable that the usual and now familiar precautions taken during an epidemic have no effect whatsoever in reducing the total number of persons ultimately affected; but they may reduce

* I am aware, of course, that the latter is now regarded as being merely a sensitivity reaction to the lymph which can have no real equivalent in poliomyelitis. Nevertheless, a true reaction to the virus probably occurs also, even though it may not be the reaction which we see.

the average dose, and by slowing up circulation of the virus keeps its virulence at a lower level. We know that in many organisms rapid passage exalts virulence.

If, as I anticipate, this epidemic dies down when the incidence has not far surpassed the 1-per-1,000 level, the future can be predicted with some confidence. It must be remembered that in the first big epidemic of 1916 the incidence in the Auckland area was half as great again, being over 15 per 10,000. At that time, however, the population must have been largely unsalted to begin with. I think it is safe to assume that the new cycle will be similar to the last, in which case we may expect a certain number of sporadic cases every year (perhaps an average of 6 yearly in the Auckland district) and another epidemic about half as severe as the present one around about 1957.

There is every reason to believe, however, that this prediction need never come true.

The solution to poliomyelitis will not be found through field studies such as the present, but in the laboratory. Nature has shown herself capable of producing an efficient active immunity. One day, perhaps very soon, the bacteriologists will go one better. Then at last poliomyelitis will be conquered, just as to-day we are conquering diphtheria.

SUMMARY

(*a*) Paper is a study of a poliomyelitis epidemic in the Central Auckland Health District which commenced in November, 1947, and by the end of April, 1949, had produced 345 cases in a population of about 350,000.

(*b*) Incidence per 10,000 reached 8·0 in the city, 15·4 in the country districts, and 21·5 in certain urban areas lying between city and country.

(*c*) In general, incidence was inversely related to population density. Abnormally high incidences in some urban areas was attributed to influx of rural dwellers in recent years. Unusually low incidence in one city area may have been related to the periodic effect of race meetings in increasing the local density.

(*d*) The three previous Auckland epidemics showed a successively declining incidence, and were linked by periods of grumbling activity. The present epidemic was preceded by a lull, and its toll has approached that of the 1916 epidemic. It is probable that a new cycle has begun which will imitate the first, but on a lower scale.

(*e*) Spot maps showed that the disease was already wide-spread before the first positive cases revealed its presence. Some ebb and flow, but no actual movement from one area to another, occurred during its course. An interesting feature was the comparative rarity of cases in the neighbourhood of the city's sewage-polluted bathing beaches.

(*f*) An inverse correlation was noted between the ratios of "suspect" to positive cases established in a previous inquiry, and the incidence of cases with paralysis or paresis in various age/sex groups. High ratios indicated lower severity.

(*g*) It was estimated that by the end of April, 1949, all boys aged 10–15 years in Auckland had been affected by poliomyelitis, either "suspect" or positive. Less than half the girls of this age had been affected. Estimates are given for the other age groups.

(*h*) Families of cases showed no significant difference in composition from the average in the area.

(*i*) No correlation, whether inverse or direct, was found between sanitary conditions in schools and the incidence of positive cases.

(*j*) The cycle of poliomyelitis in the community is discussed in the light of these findings.

APPENDIX

Table VI—Course of the Epidemic

(See Fig. I)

	1947.			1948.											1949.				Total.
	Before Nov.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
Auckland urban area ..	2	16	42	14	12	8	4	11	12	9	14	7	7	4	6	18	14	9	9	218
Otahuhu, Papatoetoe, Papakura	..	3	2	2	1	1	1	3	0	4	3	1	1	1	3	1	0	3	0	30
Remainder of district ..	..	7	15	6	5	8	3	4	2	5	6	1	5	1	3	11	4	6	5	97
Total	2	26	59	22	18	17	8	18	14	18	23	9	13	6	12	30	18	18	14	345

Table VII—Incidence in Different Parts of District

(See Fig. II)

	Population, 1st April, 1947.	Cases to 31st December, 1948.								Cases Per 10,000 Total Population.							
		Males.				Females.				Males.				Females.			
		0–.	5–.	10–.	15–.	0–.	5–.	10–.	15–.	0–.	5–.	10–.	15–.	0–.	5–.	10–.	15–.
Auckland urban area	274,331	29	35	19	22	13	16	16	18	1·1	1·3	0·7	0·8	0·5	0·6	0·6	0·7
Otahuhu and Papatoetoe	11,570	1	4	0	3	0	3	1	2	0·9	3·5	0	2·6	0	2·6	0·9	1·8
Papakura	2,400	2	5	1	0	0	3	0	1	8·3	20·8	4·2	0	0	12·4	0	4·2
Remainder of district	62,959	4	14	11	12	7	9	9	5	0·6	2·2	1·8	1·9	1·1	1·4	1·4	0·8

Table VIII—Density and Incidence in Two Epidemics
(See Figs. III and V)

Authority.	Population, 1st April, 1947.	Density Per Acre, 1947.	Epidemic of 1947–49.				Epidemic of 1937.					Population, 1936.
			Positive Cases.		With Paresis or Paralysis.		Density Per Acre, 1936.	Positive Cases.		With Paresis or Paralysis.		
			Cases to 31st March, 1949.	Incidence Per 10,000.	Cases to 31st December, 1948.	Incidence Per 10,000.		Cases.	Incidence Per 10,000.	Cases.	Incidence.	
Newmarket	3,060	16·8	1	3·3	1	3·3	..	..	..	..	..	2,997
Mount Eden ..	21,100	14·3	8	3·8	2	0·9	12·5	8	4·3	7	3·8	18,515
Mount Albert ..	26,050	10·7	13	5·0	7	2·7	8·1	8	4·1	6	3·1	19,721
Onehunga	15,200	8·1	10	6·6	2	1·3	..	..	..	..	..	11,082
Auckland City ..	131,800	7·2	131	9·9	49	3·0	5·6	18	1·8	16	1·6	102,295
Otahuhu	7,570	5·6	10	13·2	3	4·0	3·9	3	5·1	2	3·4	5,252
One Tree Hill ..	13,050	5·4	15	11·5	3	2·3	..	..	..	..	..	8,027
Ellerslie	3,270	4·4	1	3·1	1	3·1	..	..	..	..	..	2,690
New Lynn	4,720	3·4	1	2·1	1	2·1	..	..	..	..	..	3,492
Mount Roskill ..	14,700	3·1	13	8·8	5	3·4	1·5	6	1·4	4	0·9	6,979
Mount Wellington ..	2,490	0·6	3	12·1	1	4·0	..	..	..	..	..	1,685

Table IX—Progress of the Epidemic, Auckland Urban Area

(See Figs. XI and XII)

(*a*) MONTHLY CUMULATIVE TOTALS OF POSITIVE CASES, BY AGE GROUPS

Sex.	Age Group.	Population, 1945 (Nearest 100).	Ratio, Suspect to Positive Cases.	1948.												1949.			
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Males	0–	11,600	100 : 1	17	19	20	23	24	26	28	28	29	29	29	29	31	33	33	34
	5–	8,800	100 : 1	19	19	20	20	22	24	25	30	30	33	35	35	37	41	42	44
	10–	8,000	300 : 1	4	4	5	5	6	11	13	15	16	17	17	19	20	24	26	27
	15–	92,300	500 : 1	10	13	14	14	15	16	18	19	19	19	20	22	29	30	30	30
Females	0–	11,200	200 : 1	7	8	8	8	10	11	11	11	12	12	12	13	17	19	20	21
	5–	8,500	200 : 1	5	6	7	8	8	9	11	12	12	14	15	16	18	19	22	26
	10–	7,800	200 : 1	6	7	9	10	13	13	13	13	15	16	16	16	16	16	17	17
	15–	110,200	1000 : 1	6	10	11	11	12	12	12	16	18	18	18	18	18	18	19	19

N.B.—Population figures are for 1945, and therefore lower than the actual populations at risk.

(*b*) CALCULATED PERCENTAGE OF AGE GROUP AFFECTED BY POLIOMYELITIS, "SUSPECT" OR POSITIVE

Sex.	Age Group.	1948.												1949.			
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.
Males	0–	15	16	17	20	21	22	24	24	25	25	25	25	27	29	29	29
	5–	22	22	23	23	25	27	28	34	34	37	40	40	42	47	48	50
	10–	15	15	19	19	23	41	49	56	60	64	64	71	75	90	98	100
	15–	5	7	8	8	8	9	10	10	10	10	11	12	16	16	16	16
Females	0–	12	14	14	14	18	20	20	20	21	21	21	23	30	34	36	38
	5–	12	14	16	19	19	21	28	28	28	33	35	38	42	45	52	61
	10–	15	18	23	26	33	33	33	33	38	41	41	41	41	41	44	44
	15–	5	9	10	10	11	11	11	15	16	16	16	16	16	16	17	17

Table X—Incidence of Cases With Paralysis or Paresis
(See Fig. X)

Sex.	Age.	Population, 1945.	Ratio Suspect to Positive Cases.	Paresed Cases to 31st March, 1948.	Incidence Per 10,000.	Paresed Cases to 31st December, 1948.	Incidence Per 10,000.
Males	0–	11,619	112 : 1	10	8·6	16	13·8
	5–	8,772	99 : 1	11	12·5	12	13·6
	10–	7,965	319 : 1	2	2·5	6	7·5
	15–	92,330	546 : 1	13	1·4	16	1·7
Females	0–	11,184	203 : 1	3	2·7	5	4·5
	5–	8,500	230 : 1	4	4·7	6	7·1
	10–	7,822	168 : 1	6	7·7	7	9·0
	15–	110,273	972 : 1	8	0·7	11	1·0

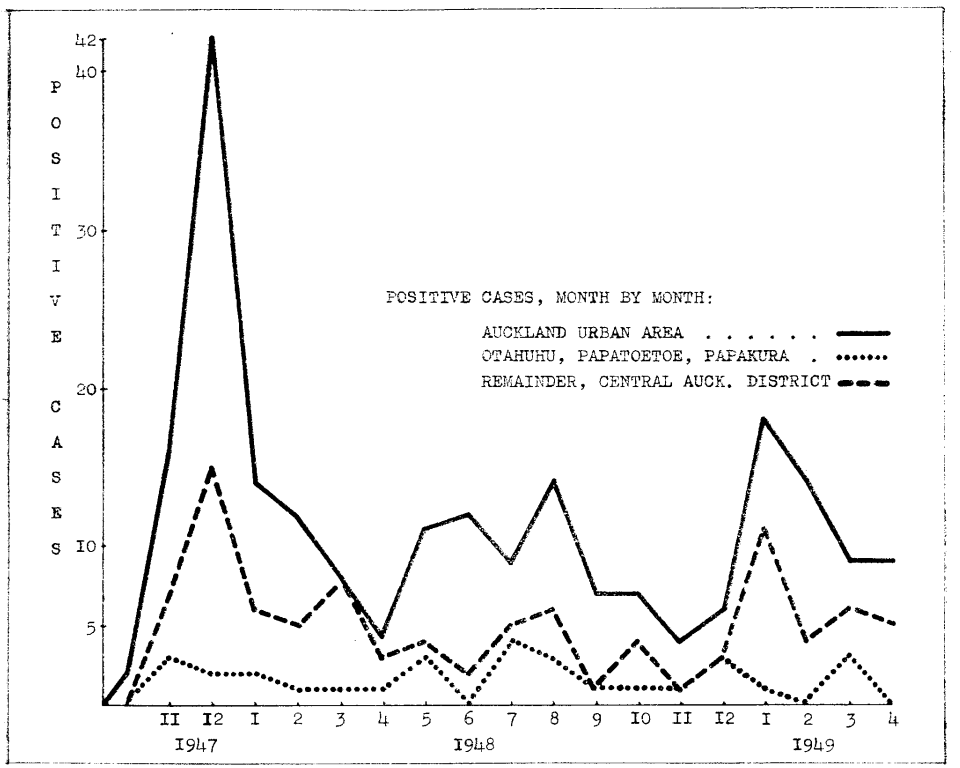

FIG. I— COURSE OF THE EPIDEMIC, CENTRAL AUCKLAND HEALTH DISTRICT (see Appendix, Table VI).

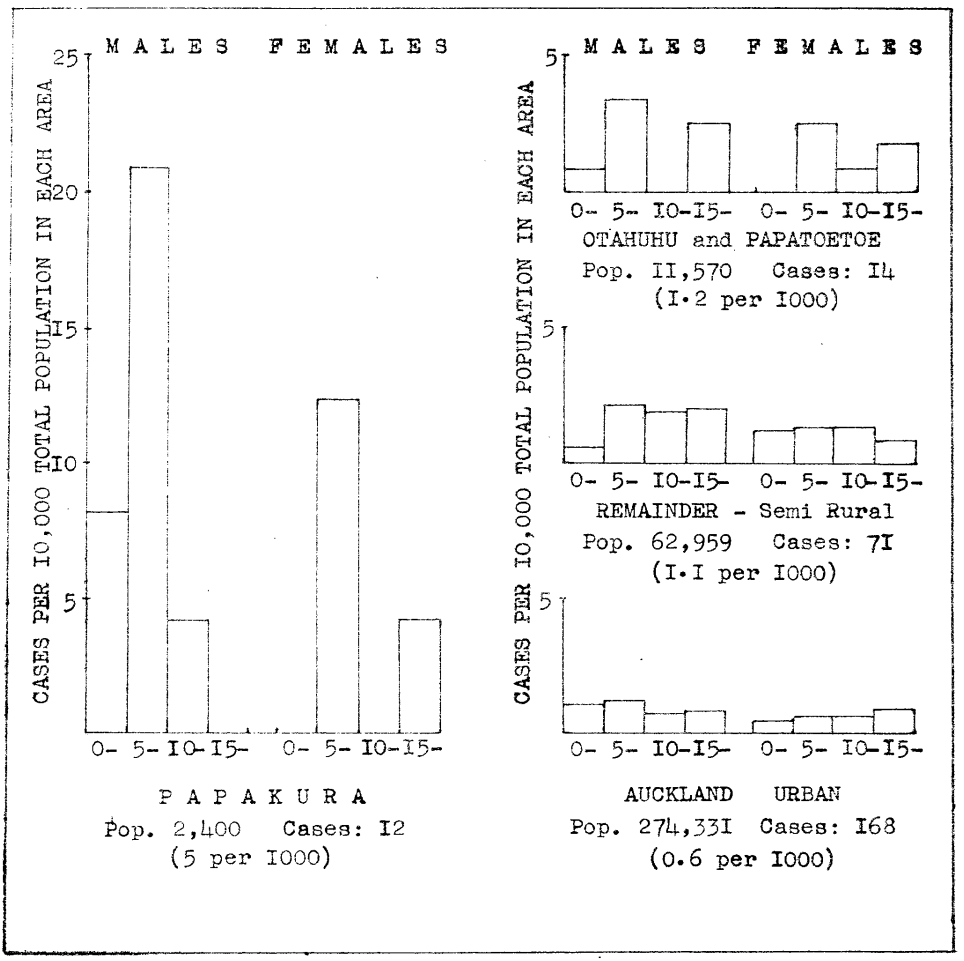

FIG. 11—INCIDENCE IN DIFFERENT PARTS OF DISTRICT: CASES PER 10,000 TOTAL POPULATION IN EACH AREA TO 31ST DECEMBER, 1948 (see Appendix, Table VII).

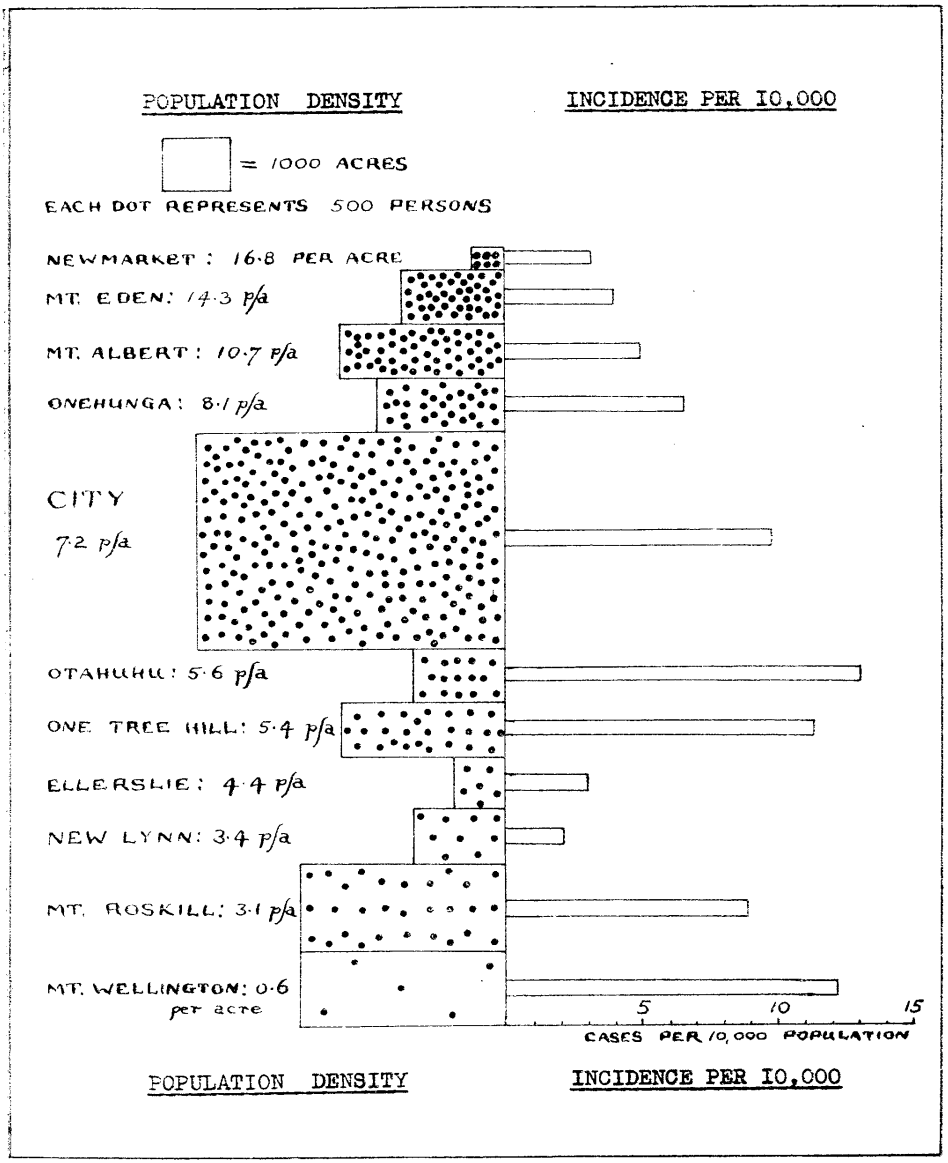

FIG. III—RELATIONSHIP BETWEEN DENSITY AND INCIDENCE: CASES IN AUCKLAND URBAN AREA (LESS NORTH SHORE) AND OTAHUHU TO 31ST MARCH, 1949 (see Appendix, Table VIII).

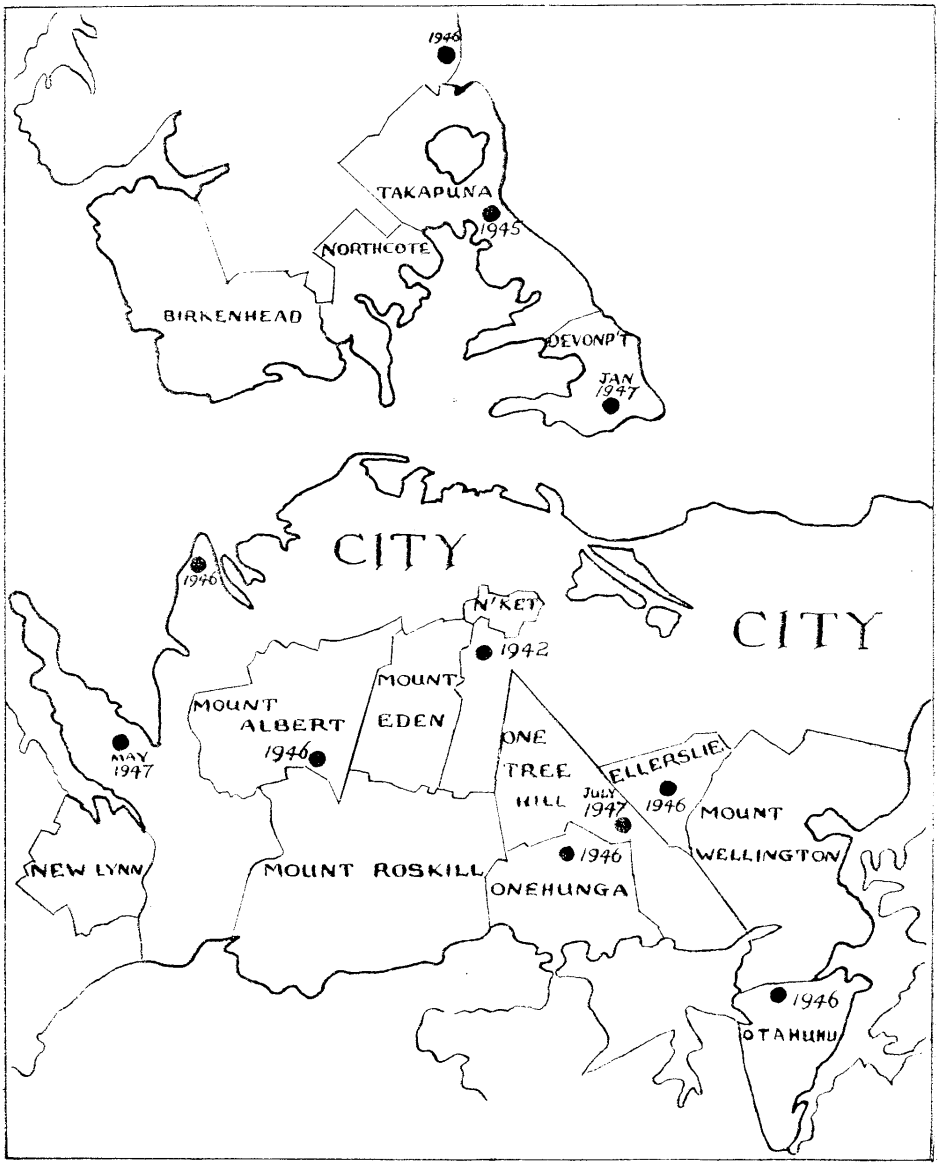

FIG. IV.—AUCKLAND URBAN AREA AND OTAHUHU: LOCATION OF POSITIVE CASES FROM 1942 TO JULY, 1947.

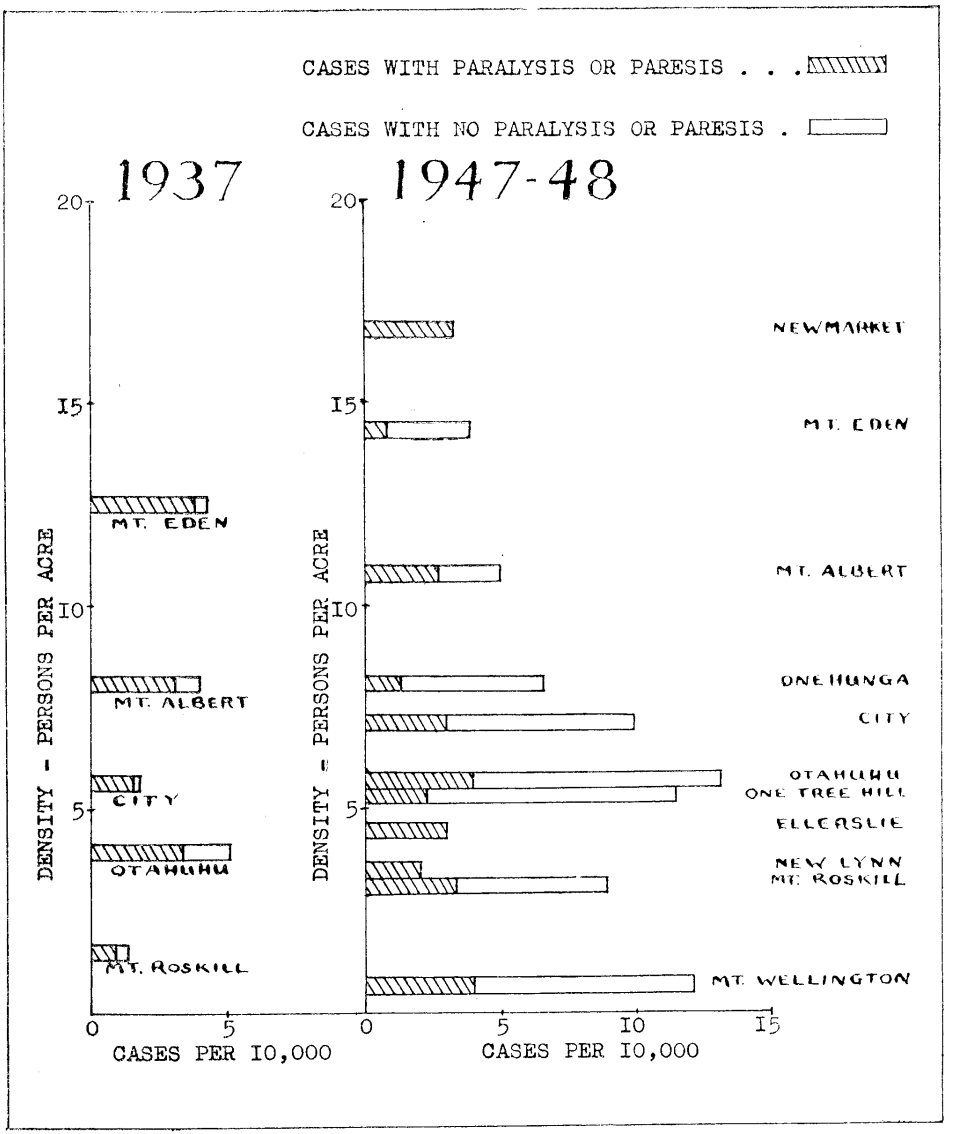

FIG. V—DENSITY AND INCIDENCE IN TWO EPIDEMICS (see Appendix, Table VIII).
(N.B.—1947–49 epidemic: positive cases to 31st March, 1949; cases with paralysis or paresis to 31st December, 1949.)

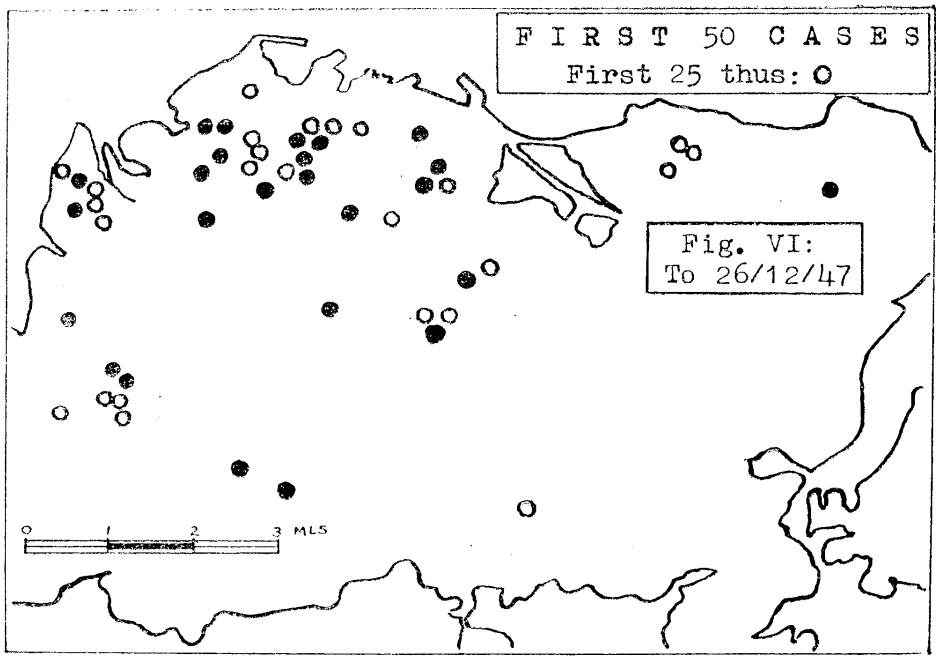

FIG. VI—LOCATION OF FIRST 50 CASES IN THE METROPOLITAN AREA (DATE IS OF NOTIFICATION).

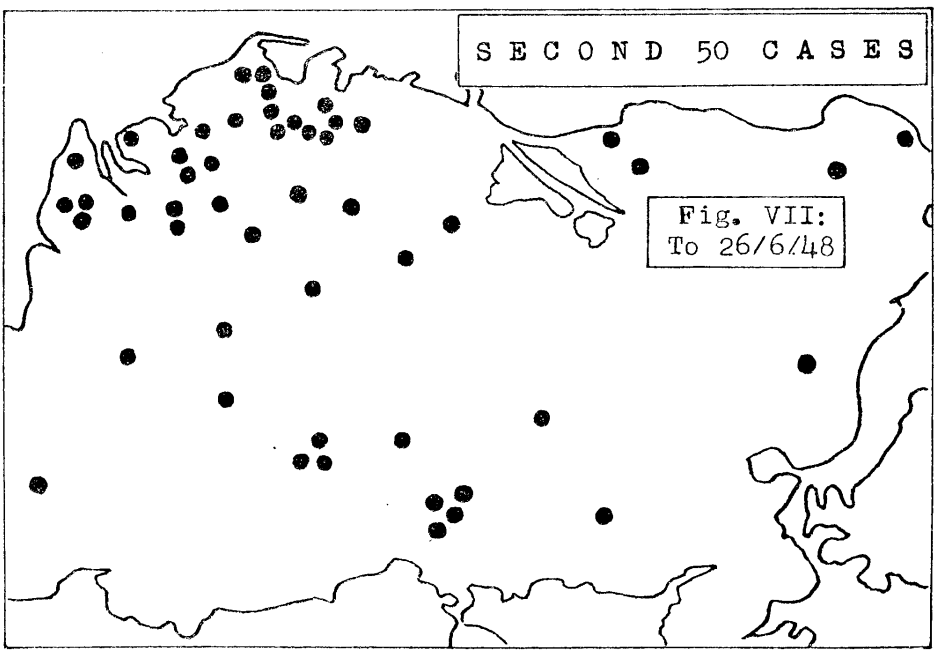

FIG. VII—LOCATION OF SECOND 50 CASES IN THE METROPOLITAN AREA (DATE IS OF NOTIFICATION).

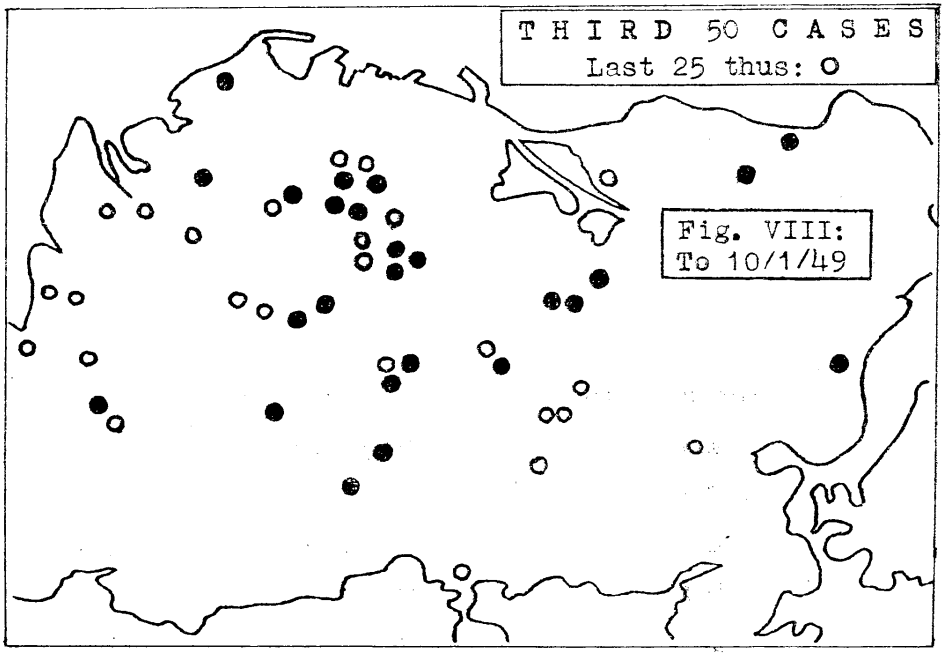

FIG. VIII—LOCATION OF THIRD 50 CASES IN THE METROPOLITAN AREA (DATE IS OF NOTIFICATION).

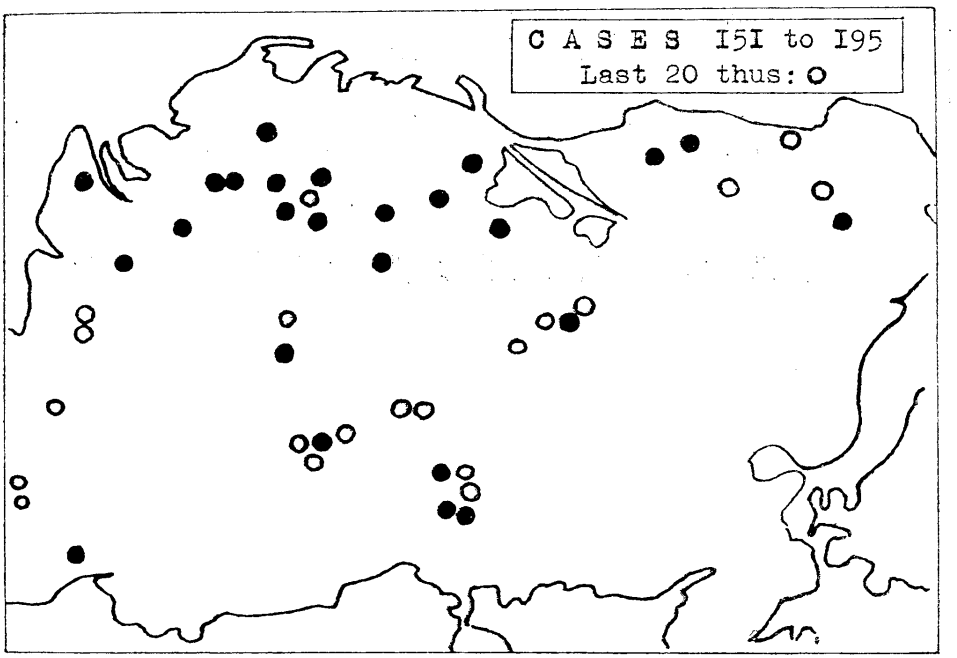

FIG. IX—LOCATION OF CASES NOS. 151 TO 195 IN THE METROPOLITAN AREA (NOTIFIED 6TH JANUARY, 1949, AND 30TH MAY, 1949, RESPECTIVELY).

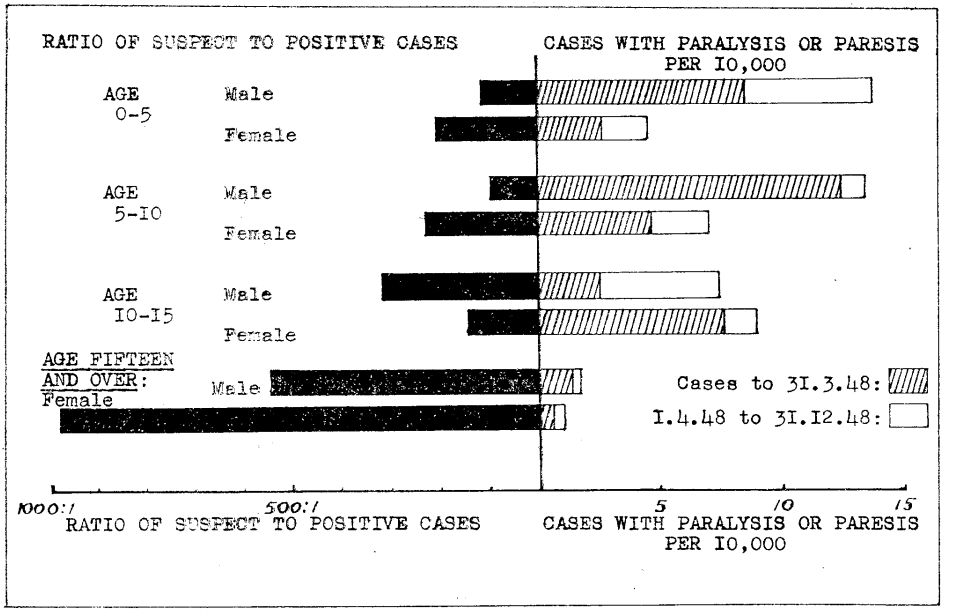

FIG. X—SEVERITY IN VARIOUS AGE GROUPS: RELATIONSHIP BETWEEN RATIOS OF "SUSPECT" TO POSITIVE CASES, AND INCIDENCE OF PARALYSIS OR PARESIS (see Appendix, Table X).

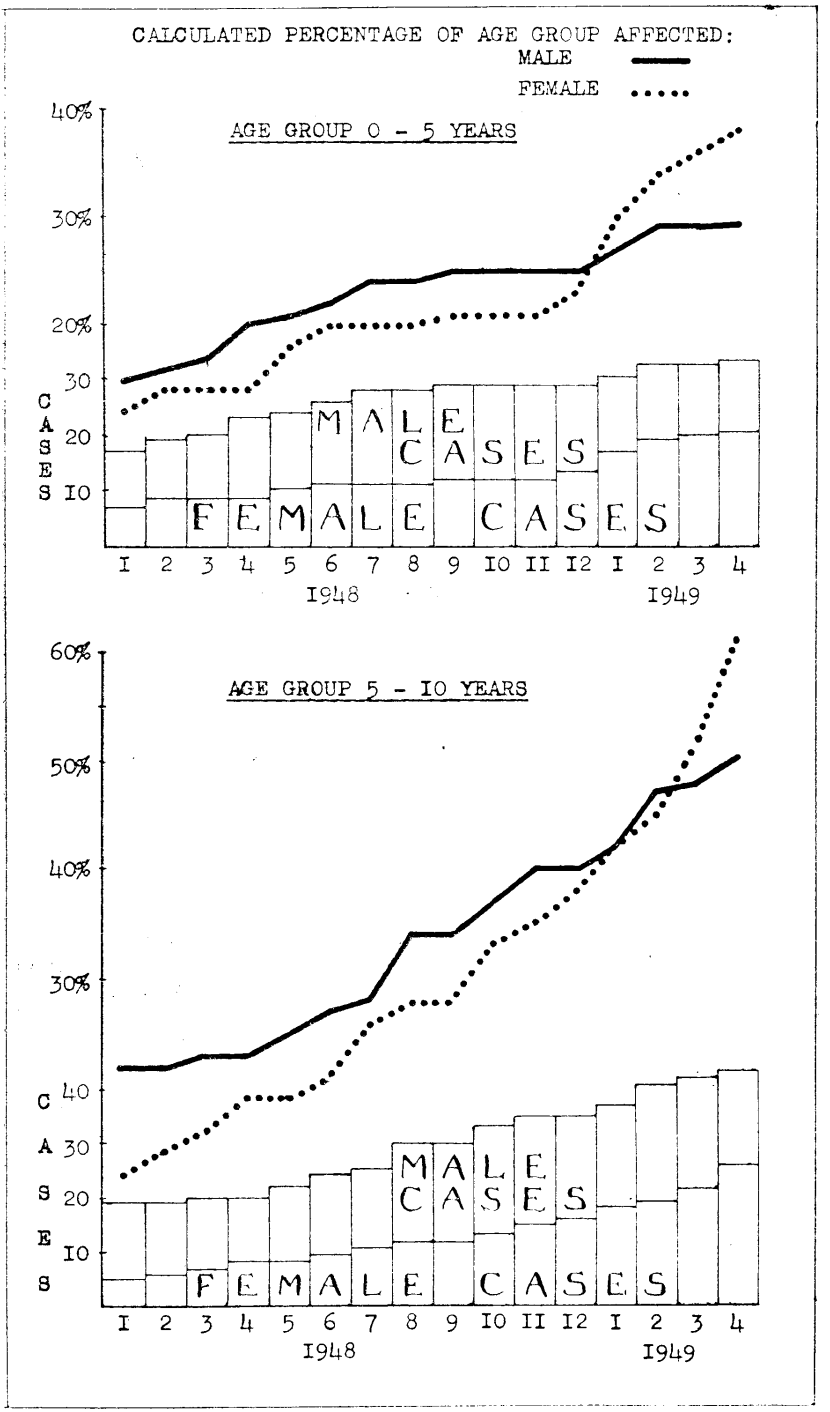

FIG. XI—AUCKLAND URBAN AREA: PROGRESS OF THE EPIDEMIC IN THE YOUNGER AGE GROUPS (see Appendix, Table IX).

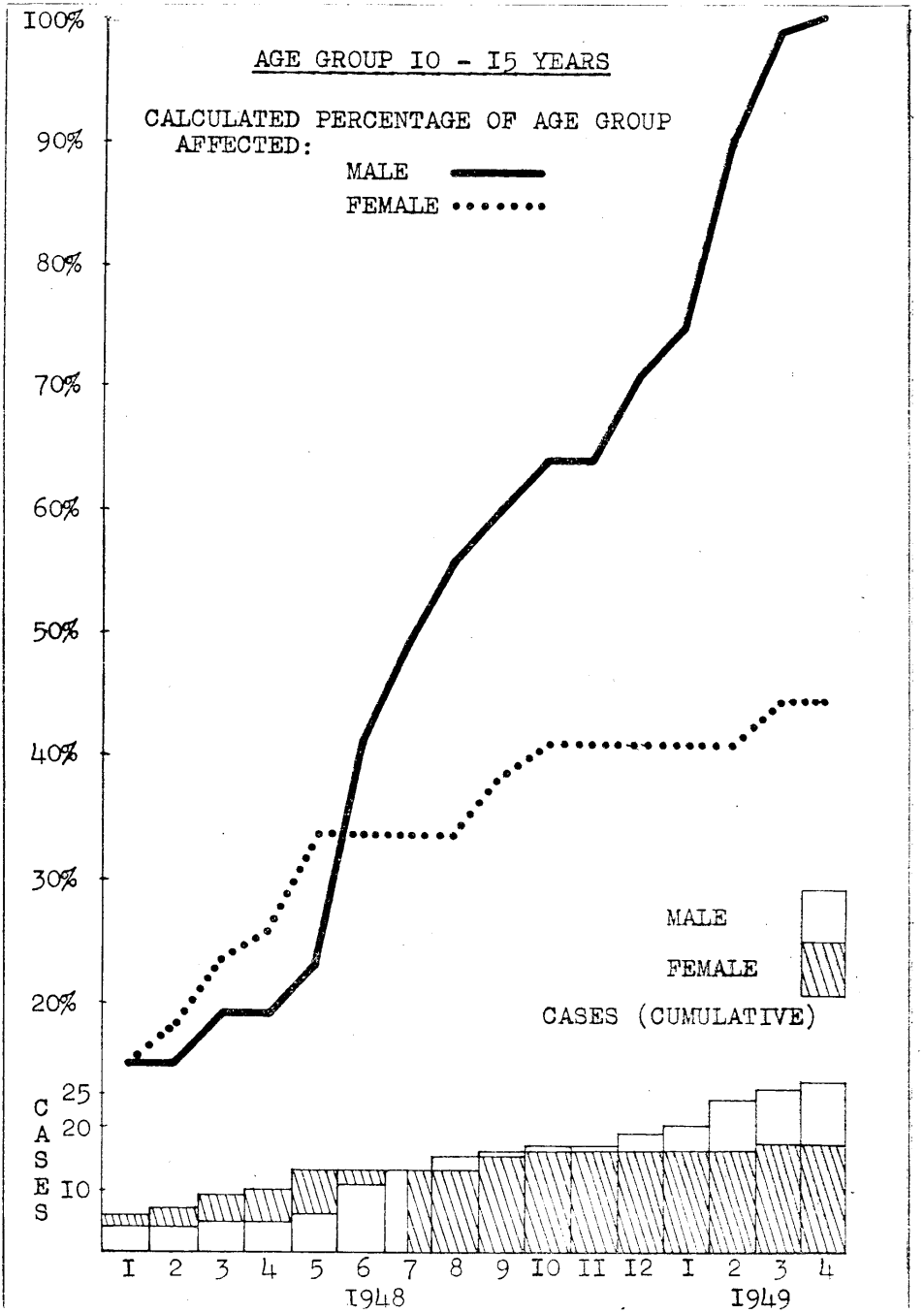

FIG. XII—AUCKLAND URBAN AREA: PROGRESS OF THE EPIDEMIC AT AGES 10–15 YEARS (see Appendix, Table IX).

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