

Report of the Commissioner of Public Health / Western Australia.

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1949
WESTERN AUSTRALIA

REPORT
OF THE
COMMISSIONER
OF
PUBLIC HEALTH
FOR THE YEAR
1948



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Report of the Commissioner of Public Health.

The Hon. the Minister for Health—

I have the honour to submit a report on the Department of Public Health for the year 1948:—

ADMINISTRATION.

Assistant Commissioner.

The Department suffered a serious loss on the 22nd November, 1948, with the retirement of Dr. A. Neave Kingsbury, the Government Bacteriologist and Deputy Commissioner of Public Health. Since his appointment in November, 1941, Dr. Kingsbury had shown that, not only was he a distinguished bacteriologist and epidemiologist, but that he was a wise and tactful administrator. He was Acting Commissioner of Public Health for a considerable time and did much to influence the general policy of this Department. The professional members of the staff will miss both his inspiring personality and the benefit of his experienced advice.

Local Authorities.

Advocacy that adjoining local health authorities unable individually to support a full-time inspector should co-operate to share such an officer collectively, resulted during the year in the formation of six groups embracing 33 authorities.

These were:—

Leschenault Health District comprising Bunbury Municipality, Bunbury, Capel and Dardanup Road Districts.

Victoria Health District comprising the Geraldton, Greenough, Irwin, Northampton, Mingenew and Upper Chapman Road Districts.

Stirling Health District comprising Broomehill, Cranbrook, Denmark, Gnowangerup, Kent, Kojonup, Plantagenet and Tambellup Road Districts.

Dale Health District comprising Beverley, Brookton, Cuballing, Marradong, Pingelly, Wandering, Wickepin and Williams Road Districts.

Avon Health District comprising the Cunderdin, Kellerberrin, Quairading and Tammin Road Districts.

Newcastle Health District comprising Chittering, Toodyay and Victoria Plains Road Districts.

Two additional road districts—Coolgardie and Westonia—arranged with the Department for routine inspection by Departmental inspectors.

Having regard to the sparsity of white population, the relatively heavy native population, the risks of endemicity of tropical disease and the possible introduction of quarantinable disease by air, responsibility for supervision of the ten Northern and North-Western road districts was undertaken by the Department.

Negotiations are proceeding for the constitution of three additional groups:—

Blackwood Health District including Boyup Brook, Bridgetown, Greenbushes and Nannup Road Districts.

Lakes Health District including Beneubbin, Dowerin, Koorda, Kununoppin-Trayning, Mt. Marshall, Mukinbudin, Nungarin and Wyalkatchem Road Districts.

Gascoyne Health District including Carnarvon Municipality, Gascoyne, Minilya, Shark Bay and Upper Gascoyne Road Districts.

Negotiations are proceeding with the Corrigin, Kondinin, Kulin and Narembeen Road Districts with a view to the Department undertaking routine health inspection at the cost of the boards.

With the completion of negotiations pending, it is hoped that permanent or adequate periodic health supervision will be assured for the whole State with the exception of 10 sparsely populated and remote road districts in respect of which action has not been deemed a matter of immediate urgency.

During the year one municipality and 16 road boards adopted the Model By-laws under the Health Act necessary to enable them to function as local health authorities.

At the close of the year seven road boards, namely, Chittering, Gascoyne-Minilya, Kent, Narrogin, Tammin, Wagin and York were still unprovided with these by-laws. Action in respect of these is proceeding.

Administrative Inadequacy.

One cannot escape the conclusion that effective health administration is seriously impeded and the extension of activity into new fields largely frustrated by the out-moded and irrationally devised establishment of the Department.

In the past the apotheosis of the lay administrative officer and the traditional reliance upon him to determine the scope and design of the Department, have developed a structure which, though doubtless in harmony with Treasury and Public Service preconceptions, is ill-adapted for its avowed purpose and alien to technical requirements.

The functions of a Department of Public Health should be—

(a) To study the incidence of disease and the causes of morbidity and mortality in the community.

(b) To identify factors which are preventable and to devote itself to removing them.

(c) To conduct research into improved diagnosis and methods of treatment in order to shorten the period of illness, avert a fatal outcome or mitigate the effects of irremediable lesion, and actively to engage in extending the knowledge of and facilities for the universal application of these.

Health Departments as at present constituted are largely the unplanned growth of bodies originally formed to control morbidity and mortality during the last century when the herding of population in cities following the industrial revolution led to the recognition that filth and squalor were important agents in the transmission of disease and when the epidemiology of infectious disease was but imperfectly understood.

These bodies since their original establishment have contributed materially to the control of morbidity and mortality from the filth and infectious diseases, but owing to their origin and to their traditions, the training of the staff and legislation under which they operate, tend to emphasise the importance of waste disposal, drainage, ventilation, quarantine and disinfection. Their procedures are largely outmoded and even archaic when studied in the light of modern advances in our knowledge of immunity, epidemiology and therapeutics.

It is true that from time to time the influence of other factors, industrial hazards for example, in contributing to morbidity and mortality, has become so obvious in modern civilisation that attention has sporadically been given to extending the scope of public health departments into the newer fields.

Speaking generally, however, the long pre-occupation of health departments and their staffs with the narrower field of sanitation and infectious disease control, has contributed to these new functions being vested rather in specialists evolved independently in the occupations and industries affected.

In Western Australia this trend has been even more marked than elsewhere, even such conventional public health activities as sewage disposal, the control of water supplies, the marketing of milk, bread manufacture and industrial hygiene having been vested in other departments of Government unprovided with trained medical staff.

Over a long period the inadequate professional staff of the Health Department has been pre-occupied with traditional sanitary routine and its predominantly lay organisation has received or responded to no inspiration from contact with medical practice and advances in medical knowledge.

Meantime the medical practitioner actually in contact with disease has become accustomed to leave prevention to the organisation provided for that purpose and has devoted all his attention to curative medicine and to encompassing the many rapid advances made in this field in recent years.

The local health authorities upon whom lies the responsibility of administering the Health Act in local areas are in consequence deprived of advice or inspiration from medical practitioners with a high sense of public health responsibility or adequate knowledge of modern methods of control. Under the general influence of a static central authority and lacking trained admonition, they have gradually fallen into a retrograde and outmoded routine hardly to be differentiated from negligence.

The subjoined graphs will at a glance reveal the progress of the major killing diseases since control by a department of public health has been undertaken. They show that those diseases which are largely associated with filth, contaminated food and polluted water, have been substantially reduced until from being important agents of morbidity and mortality they are now comparatively unimportant.

A new field for an efficient and re-organised Health Department is disclosed. The graphs show that there are a number of causes of death apart from those directly associated with the ageing of the population, to which a re-organised health Department might profitably devote attention. For this purpose, however, it would be essential to establish the Department on a basis where there was the closest liaison between the administration and the practising medical profession. This is a field of activity not generally or effectively hitherto undertaken by a health department, but is a logical function already cited in (c) above.

Effectively to embrace this wider field, the Central Health Authority will require the close co-operation of every medical practitioner throughout the State, more particularly for the purpose of:—

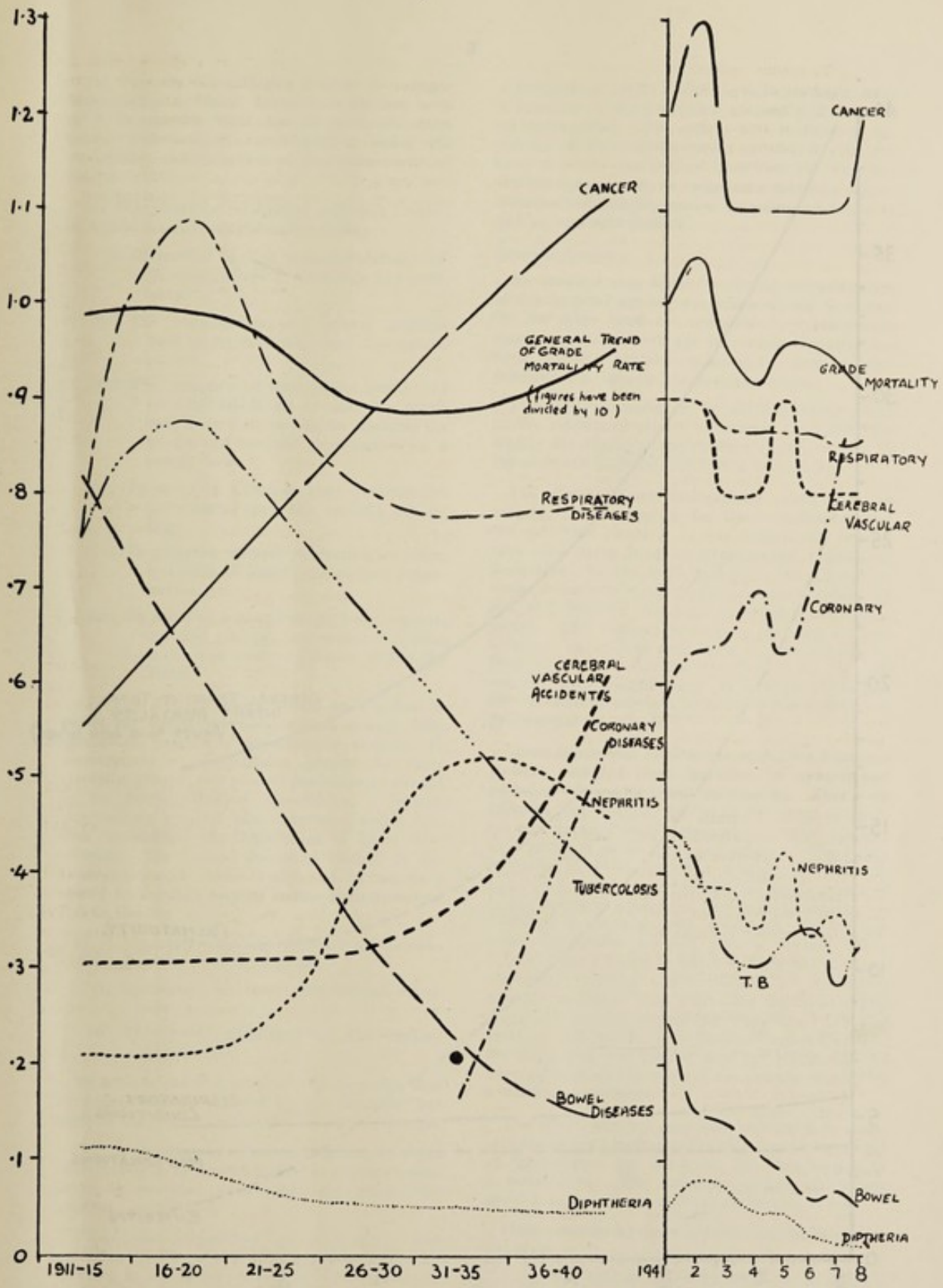
- (a) Assuring a high standard of ante-natal care and midwifery practice.
- (b) Maintaining adequate medical supervision of the pre-school and school child.
- (c) Assuring a progressively higher standard of medical practice, the collection of such statistical and clinical information as may be required for purposes of research and organising the early and universal application of improved methods of diagnosis and treatment.
- (d) Ensuring the discharge of public health obligations in association with this medical practice at consistently high level of efficiency and uniformity.

It will also require constant access to specialist advice in all branches of medicine, but particularly in paediatrics, obstetrics, medicine and surgery. The State can ill afford to appoint such advisers on a salaried basis to its Health Department staff, but they are accessible in the community itself, and are doubtless willing to serve the State whenever required. It remains but to provide the organisation through which this advice may be obtained.

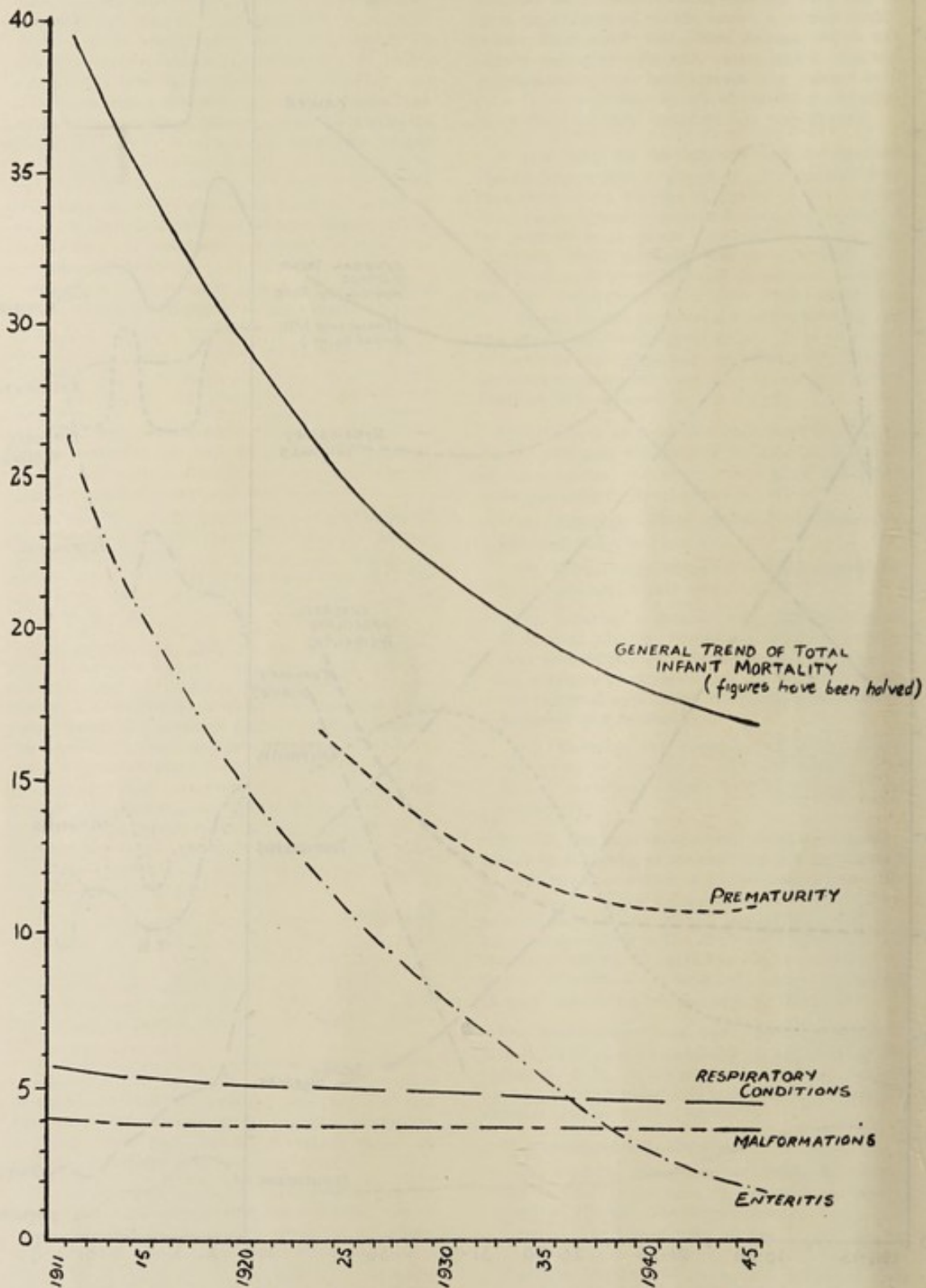
The Health Department must obtrude prominently into the field now administered by the Medical Department, a lay administration nominally advised by a Principal Medical Officer who has no prescribed function and no defined authority.

It is recommended, therefore:—

- (a) That the Department of Public Health and the Medical Department be united as a Department of Health. The Department of Local Government, the Department of Native Affairs, the Child Welfare Department and the Shops and Factories Department, have many points of close contact with health administration and require specialist advice and guidance. Unless this is to be provided for them independently it would be well to integrate these Departments closely, preferably under one Minister.



TOTAL MORTALITY RATE
Specific Diseases
 (per 1000 population)
WEST. AUST



INFANT MORTALITY RATE (per 1000 live births)
SPECIFIC DISEASES.
WEST. AUST.

(b) That the Local Health Authority—whether Municipality or Road District—in its own area or in co-operation with adjacent areas, undertake health and hospital administration under the supervision and direction of the Department of Health.

(c) That there be established a Health Council of which the functions should include:—

- (i) Discussion of and recommendations regarding factors of morbidity and mortality.
- (ii) The organisation of medical practice both in its preventive and therapeutic phases.
- (iii) The initiation of such public health and hospital legislation as may be necessary from time to time to establish the health and medical organisation on a secure basis.
- (iv) To serve as a liaison body between the Government and the medical profession.
- (v) To give the medical profession an effectual voice in health and medical organisation.
- (vi) To serve as a co-ordinating body organising the medical profession in public health and medical practice within the State.

(d) This Council which should have power to co-opt for special purposes should include four specialists, namely, a physician, a surgeon, an obstetrician, a paediatrician elected by their specialist groups; two general practitioners elected by the British Medical Association; a layman representing hospital administrators; and a layman representing the Department of Local Government. The Council should be chaired by the Commissioner of Public Health and its Secretary should be a public servant in the Department of Public Health.

It is important that the professional persons appointed to the Council shall be:—

- (i) Spokesmen of their professional categories.
- (ii) Themselves specialists of the highest qualification.

To achieve the first purpose it is desirable that they shall not be selected by the Minister, but shall be the elected representative of their groups.

(e) As opportunity offers local authority areas individually or in regions, might, as appears necessary, be provided with subsidiary committees similarly constituted.

These local committees of professional and executive members would be responsible for implementing in their areas the policy of the Council.

Routine administration throughout the State should continue to be conducted by the Department of Health under the professional guidance of the Council, and in local authority areas by municipal councils and roads boards under direction of the Department.

Enlightened health control in our time has become a function of the practising medical profession in all its branches. The system here outlined is calculated to mobilise the forces in contact with disease, to study and control it so that this function shall not continue to be vested in a detached administrative body largely guided by outmoded tradition and an atavistic outlook.

Hospital System:

No forward step towards efficient reorganisation of the hospital system was taken during the year. On the other hand the anomalies and embarrassments associated with the increasing disparity between existing hospital organisation and current requirements became increasingly acute.

This disparity stems in an early divergence and prolific subsequent growth of hospital needs from the tardily developing administrative system, rooted in the economic and social soil of a by-gone era.

The existing system derives from a time when the hospital was an asylum for the friendless invalid and moribund pauper. It was a charitable institution little more than an overcrowded residential, maintained by the local authority, the Church or some philanthropic organisation to accommodate the sick and destitute who must otherwise remain neglected. The medical profession provided medical attention on an honorary basis for the inmates of these institutions, but the more well-to-do and the wealthy were treated for a fee in their homes and nursed there by relatives or more or less experienced professional attendants.

These benevolent institutions with their honorary staffing provided ideal facilities for clinical and pathological research and instruction. They contributed immeasurably to the improvement of medical and surgical techniques and the recent remarkable advances in medicine and surgery. These very advances in turn created a necessity for elaborations of hospital structure and the development of costly technical equipment to facilitate modern refinements in diagnosis and treatment. In the outcome the public hospital rapidly become transformed from a hostel in which nothing but the most elementary nursing was possible to an institution lavishly equipped with expensive therapeutic and diagnostic devices inaccessible elsewhere. Costs of erection and maintenance became tremendous and the daily cost per patient now far transcends the average medical fee charged his private patient by a medical practitioner.

The effort, however, has been continued to maintain the public hospital exclusively for the treatment of the indigent and admission has been subject to a means test. The honorary system of staffing seemed to permit no alternative to this course.

Home nursing has now become largely impossible owing to:—

- (a) The almost universal diversion to employment of adult members of the family formerly available to nurse its sick.
- (b) Overcrowding of residential accommodation and the acute housing shortage.
- (c) The special nursing and equipment needs of modern therapy.

In the past persons excluded from public hospitals had access in illness to private hospitals. Advances in medicine, however, have recently been so rapid, new necessities have evolved with such unrelenting frequency and speed and new requirements in structure and equipment have become so elaborate that the capital and maintenance expenditure for the ultimate in hospital provision is now beyond the capacity of the private hospital and most modern refinements can only be found in public institutions.

Thus has developed the anomaly that the well-to-do, who financed the old public hospitals by voluntary subscription, must, when ill, be content to pay for hospital accommodation less elaborate and in many cases less satisfactory than that they have provided free of charge for the indigent. Simultaneously, improvement in the economic status of the individual has practically eliminated the pauper from the community and modern social legislation, which levies a hospital contribution from all wage earners, has created a demand for the universal right of access to the public hospital.

To meet this situation, attention was given to provision of private and intermediate wards in public hospitals in which the well-to-do might have access to special equipment and attention on payment of a hospital fee, or in which they might receive attention from their medical practitioner of choice.

Building costs, staffing necessities, and similar considerations, make it impracticable to provide more than relatively few such private and intermediate wards in all public hospitals.

Recently again the development of highly specialised surgery of a delicate nature upon organs which were formerly beyond the reach of the most ambitious surgeon, has necessitated the diversion of private and intermediate wards in larger and larger measure to the exclusive use of special clinics, to which the special case occupying a public bed must be given priority. So far has this developed that a private case which in the original conception would properly have had access to such a ward, may now be regarded as unwarrantably obstructing the admission of an indigent for special treatment.

Meantime the limitation of public hospital practice to the accredited honorary medical staff of the hospital prevents the general practitioner treating his own patients in hospital, thereby depriving the patient of the service of his doctor of choice, denying the doctor the fee which his livelihood requires, and imposing upon the honorary staff of the hospital the necessity of treating free of charge a patient who can afford and is willing to pay.

The major public hospitals with their consultant staffs must increasingly tend towards specialisation. If the standard of professional attainment in the general practitioner is to be maintained and raised, if the well-to-do patient is to have access to that quality of sick accommodation and nursing which his contribution to the maintenance of the public hospital warrants, and if the consultant staff in public hospitals is to escape the vicarious necessity of treating maladies beyond the scope of the specialities, there must be a substantial increase in the number of beds available elsewhere for the treatment of the common categories of disorder in hospitals by family doctors.

These may well be established in appropriate situations and conducted by local authorities. Local authority management, sensitive as it is to local public opinion and appreciative of local needs, must prove more satisfactory to the individual than centralised control, which tends to a uniformity of administrative method founded on formulae devised as appropriate for centres of heavy population whose requirements are often quite dissimilar to those of the generality of small communities.

For reasons outlined in the report for last year, it is highly desirable that the honorary system of staffing in public hospitals should in great measure be retained. However, the disappearance of the pauper, the financing of public hospitals by taxation and the incongruity of the means test, all demand a drastically revised concept of the entitlement to occupy a public bed. A solution would appear to lie only in the complete reorientation of the public hospital in its relation to the general practitioner, the consultant, the clinical condition and the economic status of the patient.

This complex problem cannot be solved by an administrative organisation based upon the outmoded concept of State responsibility for the pauper, rooted in the public service, guided by outmoded formulae devised in the past to meet immediate convenience and lacking contact with the medical and personal problems involved.

Nor can progress be served by the claimant criticism of a harassed and embittered medical profession pre-occupied with its own immediate problems which loom so disproportionately as to obscure those of greater concern to the patient or to the State.

If the attempt be made to meet current demand by temporising with the existing establishment, the best that can be expected is frequent recourse to hastily devised expedients to meet new and ever recurring crises.

The necessity remains to constitute an authoritative body with access to all sources of information which can, throughout the year and throughout the years keep itself fully informed of the problems as they are presented and as they promise to trend so that hospital and medical planning may be as fluid in conception, as dynamic in force and as effective in execution as is necessary to meet and cope with the ever changing problems developing in the rapidly changing social structure.

The problem is one to be studied carefully by a body on which are represented—

- (a) Consultants speaking with the authority of their specialist groups;
- (b) general practitioners fully informed of the problems confronting the family doctor;
- (c) hospital administrators enjoying the confidence of Government;

such a body, in short, as has already been recommended as a Health Council for the reorganisation of health administration.

SANITATION.

During the year attention was given to the sanitary conditions in holiday camps, caravan parks and construction camps. For the most part no ordered system of water supply, rubbish or night soil disposal has been evolved for these.

The heavy fly infestation produced by insanitary disposal of organic wastes, the failure to prevent access by such flies to infective nightsoil promiscuously deposited in the adjoining bush or in primitive privies and the migration of the campers to widely dispersed areas of the State, are considered to play an important part in the serious epidemics of bowel infection which afflict this State during the summer and autumn months.

Action is planned to draft model by-laws for the control of such camping areas. Local authorities of areas including popular camping resorts, will be addressed upon the necessity of prohibiting camping outside areas especially set aside for the purpose and provided with—

- (a) A prescribed minimum space per camp or caravan;
- (b) an adequate supply of potable water;
- (c) an adequate number of privies connected to a bacteriolytic sewage system;
- (d) a prescribed minimum of ablution and laundry facilities;
- (e) an approved wastes collection and disposal service.

NURSING.

Additional nursing training schools were established during the year in connection with the hospitals at Geraldton and Merredin. The hospitals at Katanning and Busselton were approved by the Nurses' Registration Board as training schools.

Ninety-three students passed through the preliminary training school at Northam. Three female and 10 male students of this number were appointed to Wooroloo Sanatorium and two male nurses to the Royal Perth Hospital. The remainder were drafted to the country training schools. Seven discontinued their training during the year.

Junior tutors appointed to the country training schools have done very good work in the hospitals giving revision lectures, correcting case books, arranging bedside clinics and assisting with ward work.

Work in Collie during the year has shown marked improvement but not as much as had been hoped for. The inadequacy of the hospital building with its lack of food pantries and casualty theatre is greatly responsible for this.

Narrogin has not shown the improvement possible. Shortage of trained nurses and domestic staff and lack of accommodation for further trainee nurses, have been crippling features.

Northam has shown some improvement but the need for refresher courses is very evident among trained staff here. They lack the ready co-operation which should be forthcoming if the hospitals are to be satisfactory training schools. The building has not been improved adequately.

Geraldton commenced as a training school on the 29th March, 1948, and the work of the tutor and trainee nurses has been outstandingly good throughout. Every help has been given them by matron and doctors. Lack of stability of other trained staff is, however, a bad feature at Geraldton, and quarters are inadequate.

Merredin commenced as a training school on 12th November, 1948, and so far the tutor and trainees have done excellent work with the full co-operation

of doctors and matron. Nurses' accommodation is of very poor quality and very inadequate.

Kalgoorlie was visited by the organiser of nursing training on three occasions for the giving of senior nursing lectures.

All hospitals have suffered through inability to obtain modern essential equipment.

During 1948 the search for a site for the central training school was continued without success. Finally arrangements were made for the purchase of Devonleigh Private Hospital at Cottesloe.

As the teaching increased and work of organisation opened up, it was realised that there was need for a suitably qualified person to take charge of the central training school and leave the organiser more free to do the work intended. Ministerial approval for appointment of such a tutor was obtained. After reception of applications and final choice it was thought this sister would arrive in Australia about September, 1948. This was hoped for as the first-year students would in October be returning for their first block.

In October no other tutor was available and an unused building at King Edward Memorial Hospital had to be used to house the nine students for this first "Block" School, and this further teaching fell to one.

This extra teaching and organising left little time for school visiting which it had been hoped would have been possible in order to follow up the work begun during the year to advance the recruitment of nurses.

However, three wireless broadcasts to interest girls in nursing were given during the year and schools were visited.

Psychology and Physics and Chemistry lectures were arranged at the Central School during the year for the junior tutors.

Pre-Nursing Courses.

The Correspondence Classes of the Education Department have been particularly helpful with regard to these courses and as many as 60 students commenced the course last year.

Some high schools and private secondary schools have also been interested and have put through students for the First Part of the nurses' First Professional Examination. After discussions with school principals, plans were made for increasing the leaning towards nursing in these classes, by the introduction of first aid in the first year and home nursing and invalid cookery in the second.

It is felt there is a greater field for work here to ensure adequate recruitment of suitable students with a fitting educational background.

HOSPITALS.

Private Hospitals.

The number of private hospitals (other than Maternity Hospitals) registered during the year was 37, consisting of:—

"A" Class General, 11 hospitals to provide 310 beds.

General and Maternity, 14 hospitals to provide 580 beds.

Convalescent, 12 hospitals to provide 148 beds.

Maternity Hospitals.

Maternity hospitals licensed during 1948, numbered 15 for 142 beds. Maternity beds licensed in hospitals registered as general and maternity hospitals were 160 giving a total of 302 maternity beds in private hospitals.

343 maternity beds were registered in country hospitals and 108 at the King Edward Memorial Hospital, Subiaco.

Maternity hospitals in the metropolitan area were inspected twice and in the country once during the year. The usual supervision of practising midwives was effected. Appliances, records and attendances of midwives on district work were checked.

Twenty-two births were notified as having taken place in private dwellings, a figure which emphasises the modern flight from home nursing.

Maternity deaths notified from private maternity homes totalled seven. Reports on these cases were forwarded to the Coroner by the medical practitioner and the midwife concerned. After the circumstances attending the death were studied by a specialist obstetrician and a midwife, professional attendants were pronounced free from blame.

Metropolitan Hospital Provision.

The formulation of a comprehensive policy in respect of the provision of beds in both private and public hospitals in the metropolitan area cannot longer be delayed.

1. Maternity Beds:

In 1939 there were in the metropolitan area 37 licensed maternity hospitals in addition to the King Edward Memorial Hospital. The bed state at that time was:—

	beds.
Private Hospitals	327
King Edward Memorial Hospital	75
Total ..	402

At that time the estimated population of the metropolitan area was 224,000, giving approximately 1.8 beds per 1,000 of population. The birth rate in that year was 17.27 per 1,000.

The number of private maternity homes has now been reduced by 20 to a total of 17, the premises having reverted to use either as private homes, apartment houses, boarding houses, or the like. During the same period accommodation at King Edward has been substantially increased and the bed state at the present time is:—

	beds.
Private Hospitals	196
King Edward Memorial Hospital	123
Total ..	319

The present population is estimated to be 285,000 and is being rapidly and substantially increased by fostered immigration. The birth rate for 1948 was 25.12 per 1,000 of population, a substantial increase on the 1939 figure. Maternity bed provision in the metropolitan area, is 1.1 per 1,000 of population, a fall of 0.7 since 1939, notwithstanding the 50% increase in the birth rate. For a population 61,000 greater, there are now 74 fewer maternity beds.

The increase in the number of beds at King Edward Memorial Hospital has in great measure been effected by the utilisation of verandahs, solarium and ward space intended for other purposes. No further increase is practicable—on the contrary, a drastic reduction in the admission rate to King Edward is indicated.

Of the remaining 17 licensed maternity hospitals, one (Devonleigh) is being kept open by the Department, and a second (of nine beds) is expected to close.

Nurses conducting private hospitals work arduous tours of duty over long hours but claim that under the price-fixing system they complete the year with a personal remuneration well below what they could earn with much more leisure and comfort as employees of public hospitals.

2. General Beds:

General hospitals (other than public) were licensed by local authorities in 1939 and information of the number of licensed beds is not available. In 1943, however, the number of general beds, private and public, per 1,000 of population was 6.8. These were available as follows:—

	beds.
24 Private Hospitals	767
Public Hospitals	998
Total ..	1,765

By the end of 1948 six private institutions had closed. Meantime, additions to the Children's Hospital and to the Royal Perth Hospital have increased the number of public beds, which are now as follows:—

	beds.
Private	576
Public	1,119
Total ..	1,695

The rate of provision of general beds per 1,000 of population is now 5.9, a decrease of .5 per 1,000 since 1943.

No increase in the provision of public beds is at the moment contemplated at any of the major hospitals to compensate for increased population or to offset the closure of private institutions. Already the increased demand for admission to hospital by the public created by the inability of the sick to be nursed at home has demonstrated that the number of general beds available is far from adequate and must be increased.

NURSES' REGISTRATION BOARD.

Twelve meetings were held during the year.

The St. John of God Hospital, Subiaco (midwifery section), was approved as a training school for midwifery nurses. The Nurses Registration Regulations being amended by the addition of the following clause:—

"Providing that there exist special facilities for training by specialist obstetricians, the Board may approve as a training school a midwifery hospital having not less than 35 occupied beds."

Item (d) of Appendix II of the regulations was amended to provide for an increase in the entrance fees for the educational examination from 2s. 6d. to 5s.

A sub-committee was appointed to make a complete and detailed survey of nursing training and practice.

A pre-nursing course for girls who were too young to commence their training, was commenced. Candidates were allowed to sit for Part I of the first year professional examination in the subjects of anatomy and physiology and hygiene.

The Repatriation General Hospital, Hollywood, was approved as a training school for male tuberculosis nurses, also for female tuberculosis nurses holding a general certificate.

The number of nurses registered in the various divisions of the register was:—

	1948	(1947)
General	1,858	(1,809)
Midwifery	998	(965)
Infant health	199	(209)
Children's	17	(40)
Mental	60	(68)
Tuberculosis	13	(3)

Figures in parenthesis are those of 1947 for comparison.

Two names were restored to the midwives register.

Fifteen examinations were conducted during the year, as follows:—

General	3
Midwifery	3
Tuberculosis	3
First year professional	2
Mental	1
Educational	3

Geraldton, Katanning, Busselton and Merredin hospitals were approved as full-time training schools for general nurses.

INFANT HEALTH.

During 1948 two new travelling centres in Three Springs and Mundaring were opened. The Three Springs centre serves the northern agricultural area on both the Midland and Geraldton lines between Mullewa in the north and Coorow in the south. The Mundaring centre serves the heavily populated district between Northam and Greenmount.

In addition, eight new sub-centres to be conducted by existing centres were opened.

Infant health provision now totals 38 full-time centres.

The total number of attendances at centres and visits of sisters to infants' homes was 184,209, a substantial increase compared with the previous year. 17,488 infants individually attended centres throughout the State, an increase of over 2,000 compared with the previous year.

A full report by the Medical Supervisor of Infant Health is included as Appendix III.

SCHOOLS MEDICAL SERVICE.

A report by the Senior Medical Officer of Schools upon the Schools Medical Service is included as Appendix IV. 13,272 children were examined in the metropolitan area and 9,965 in country districts.

The respective numbers requiring ophthalmic or tonsillar treatment were:—

	Metropolitan.	Country.
Ophthalmic	2.7	3
Tonsillar	17	8.5

SCHOOLS DENTAL SERVICE.

The report of the Senior Dental Officer is included as Appendix V.

The dental staff continues hopelessly inadequate for its purpose. 2,957 children were examined and 1,792 treated. The number examined was less than the number for the preceding year. Eighty-three per cent. of those examined required attention. Of those requiring attention, only 20 per cent. elected to arrange for private treatment.

FOOD AND INSPECTION STAFF.

One meeting of the Food and Drug Standards Advisory Committee was held during 1948.

All members were present.

On the recommendation of the Advisory Committee, the Food and Drug Regulations made under the Health Act were amended to provide that in addition to gelatine, a vegetable thickening agent, approved by the Commissioner of Public Health, may be used in the manufacture of ice-cream and flavoured ice (Regulation 46, Sub-section 2).

The Annual Conference of Health Inspectors was held in Perth on 8th and 9th July, 1948, and was well attended by officers of local health authorities.

The work of the inspection staff increased considerably during the year in pursuance of the Department's policy of active intervention to improve health administration on local authority areas.

In addition the routine activities of the inspection staff proceeded at an increased tempo.

Meat Inspection.

Carcase meat inspection is carried out in the metropolitan area at Midland Junction State Abattoirs, West Australian Meat Export Company's Abattoirs, Robbs Jetty, Bacon Factories at Spearwood and Bellevue and State Abattoirs, Kalgoorlie. This work is also carried out at the following centres:—

Municipalities.	Population.
Geraldton	7,000
Bunbury	6,000
Albany	4,700
Northam	4,600
Collie	4,500
Narrogin	2,500
Busselton	2,000
York	1,600
Wagin	1,100

Road Board Areas.

Manjimup	6,000
Merredin	3,000
Katanning	2,100
Preston	2,000
Rockingham	1,800

Tuberculin Testing of Dairy Cattle.

2,764 reactor cattle were slaughtered in metropolitan abattoirs during the year.

Post-mortem examinations were conducted by the meat inspection staff with the following results:—

Generalised Tuberculosis	530
Localised Tuberculosis	1,170
No visible lesions	1,064

Inspection of Imported Frozen Fish.

During the year imports from Great Britain and South Africa amounted to 3,287,004 lbs. Inspection fees at 1d. per 14 lbs. amounted to £978 5s. 6d.

Imported fish condemned, 11,718 lbs.

Frozen Crayfish Tails.

During the year the Department examined on behalf of the Commonwealth Government for export to the United States of America 35,726 cases of frozen crayfish tails of a total weight of 1,071,216 lbs., and value approximately £142,900.

In addition several small parcels of cooked crayfish were examined for export to Great Britain.

Analysis of Food.

The following samples of food were submitted for analysis:—

Chemical Analysis.	No. of Samples.	No. which failed to comply with Regulations.
Bread	1	1
Butter	1	—
Coffee Essence ..	2	1
Coffee Powdered ..	1	—
Crayfish	1	—
D.D.T.	1	—
Fish	5	4
Fish Paste	7	—
Fish (tinned) ..	1	—
Flour	1	—
Fruit Squash ..	4	3
Fruit Juice Cordial	2	—
Ice Cream Mix ..	2	—
Imitation Cream ..	1	—
Invalid Food ..	1	—
Lemon Cheese ..	5	4
Lemon Barley Water	1	—
Meat (tinned) ..	1	—
Milk	10	3
Olive Oil	1	1
Pastry Mix	1	—
Sandwich Fillings ..	5	—
Salt	1	—
Sugar	1	—
Tea	4	—
Water	2	—
	<hr/>	<hr/>
	63	17

Bacteriological Examination.	No. of Samples.	No. which failed to comply with Regulations.
Concentrated Milk	1	—
Cream	1	—
Ice Cream	6	—
Meat (tinned) ..	3	—
Milk	12	4
Water	3	—
Wash Water	2	—
	<hr/>	<hr/>
	28	4
	<hr/>	<hr/>
Grand Total ..	91	21

Legal Proceedings.

	No. of Cases.	Fines.			Costs.		
		£	s.	d.	£	s.	d.
Understandard Milk ..	3	6	0	0	2	17	0
Dirty Food Premises	2	Both dismissed.					
Meat Branding Regulations (Unbranded meat)	3	30	0	0	0	9	0
Venereal Disease .. (Health Act, Sec. 271)	1	5	0	0	0	13	6
Feeding Uncooked Offal to Swine .. (Health Act, Sec. 184)	1	7	0	0	0	3	0
Dairy By-laws ..	1	3	0	0	0	3	0
Cases withdrawn ..	2						
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Totals	13	51	0	0	4	5	6

Bacteriolytic Sewage Disposal.

Under Division 4 of the Health Act, 1911-1944, all treatment systems must be approved by the Commissioner before the work of installation is commenced and a certificate by the local authority that the system has been constructed in accordance with the approved plans must be obtained before the system is used. During the year plans inspected and approved totalled 2,669. Revenue from this source amounted to £2,753 of which the local authority received 50 per cent. for final inspection and issue of certificate to use. Fee for tank of 300 gallons or under is 20s.; over 300 gallons 40s.

INFECTIOUS DISEASES.

Poliomyelitis.

The outstanding epidemiological feature of the year was an outbreak of poliomyelitis. Commencing with sporadic cases in the early months of the year, it assumed epidemic proportions in May, reaching a fastigium in July and thereafter subsiding gradually, though monthly notifications still continued relatively high at the close of the year.

Three hundred and eleven cases with 25 deaths were reported during 1948, giving an attack rate of 62 per 100,000 of population. A detailed report upon the outbreak by Dr. D. J. R. Snow is included as Appendix XV.

Outstanding features were:—

- Infrequency of history suggesting contact infection.
- The fastigium in the winter months.
- The influence of school holidays in disseminating infection and raising the notification rate.
- The relatively high death rate in the young adult group.

To meet the situation created by the epidemic, the following special measures were taken:—

- Specialist advice for the medical profession.*—Early in the outbreak the Government arranged for Dr. Stubbs Brown of Queensland, a specialist in orthopedics who had studied poliomyelitis in the United States on behalf of the Queensland Government, to visit Western Australia and to address and discuss with the medical profession the diagnosis, modern treatment and after care of poliomyelitis.

Dr. Stubbs Brown also reported to the Department on measures he considered necessary to facilitate adequate treatment and aftercare.

Later, to meet requests from the medical profession to have also the viewpoint of Dr. Jean McNamara, the Government arranged with her to visit Western Australia for a similar purpose.

Following Dr. McNamara's visit and in conformity with her recommendation, Dr. McComas of Melbourne undertook an itinerary through country districts where poliomyelitis had been and was epidemic, in order to review the condition of discharged patients and to discuss with country practitioners the treatment and aftercare of cases.

2. *Specialist advice for the Department.*—Early in the epidemic an advisory committee on poliomyelitis was appointed by the Minister for Health, to sit with the Commissioner of Public Health and to advise upon measures to be taken in relation to control, treatment and aftercare. The members of this committee were nominated by the Council of the British Medical Association at the invitation of the Minister. All decisions of the Commissioner were discussed by this committee, and all the committee's recommendations have been and are being implemented by the Government as promptly as possible.

3. *Control.*—Under the Health Act the responsibility for and function of control are vested in the local health authority, which is the municipal council or road board administering the area in which a case occurs.

Local health authorities had no experience of handling an outbreak of poliomyelitis. Many of them had no staff adequate for the purpose, and commonly their medical officers of health were unfamiliar with necessary routine of control. Control was therefore undertaken by the staff of the Commissioner of Public Health, from which special officers were detailed for specific functions in this field.

Under the Health Act, local authorities are responsible for the transport costs and medical expenses of cases of infectious disease ordered into isolation by medical officers of health. Transport costs alone may be recovered from the patient or his relatives.

The demands of treatment, more particularly of aftercare, necessitated in many instances the transfer of patients from remote parts of the State to the metropolitan area thereby involving remote local authorities in very considerable expense which many found it impossible to meet. The Government therefore undertook responsibility for the cost of transport in addition to defraying two-thirds of the hospitalisation costs.

Early in the epidemic the Government was urged to close the schools, but its medical advice was strongly against this course. That this advice was sound and the Government justified in not yielding to public pressure in this direction, is amply indicated by the notification figures for the year 1948. These show that holiday breaks in the schooling period when children returned to their homes and were no longer under school discipline, were almost invariably followed by a considerable increase in cases.

4. *Hospitalisation and Aftercare.*—The Government arranged that between meetings of the Advisory Committee on Poliomyelitis, a sub-committee consisting of the Commissioner of Public Health, the Medical Superintendent of Royal Perth Hospital and the Medical Superintendent of the Princess Margaret Hospital for Children, should be constituted as an Executive to make recommendations and to implement decisions respecting the provision of equipment and staff for the hospitalisation and aftercare of patients.

Financial assistance was made freely available to Royal Perth Hospital to provide an aftercare centre at West Subiaco, and to Princess Margaret Hospital to provide aftercare within the Hospital and, in association with the Red Cross Society, at Lady Lawley Cottage.

In addition to necessary equipment, additional staff has been appointed at the expense of the Government for these institutions.

This staff includes seven physiotherapists and a splint maker who were specially brought from the Eastern States and appointed to these hospitals at the expense of the Government.

Pending provision of intramural facilities at West Subiaco, patients receiving aftercare were, by arrangement with the Repatriation Department, transported for treatment and re-education to the Physiotherapy Department of the Hollywood Hospital, the expense of transport, where it has been effected by St. John Ambulance Association, being defrayed by the Government.

The problem of poliomyelitis control has not yet been solved. Public Health Services the world over are wrestling with a sense of futility and frustration. One authority has stated that apart from the avoidance of crowds no control measure is worth while; another has said that the only measure which is justified is the prohibition of tonsillectomy. All are agreed that the value of any single one of the existing measures at attempted control is highly debatable. All are, essentially, concessions to public demand; and in W.A. at least were intended to allay public uneasiness and to canalise the popular impulse towards prophylaxis, thereby averting undesirable community or individual action.

To what extent the measures taken to restrict the extent of the epidemic succeeded, must remain a matter for individual opinion; but it is not unlikely that these reduced the speed of spread and the total number of cases that might otherwise have occurred.

Tuberculosis.

The Tuberculosis Control Branch has made steady progress during the year, and the opening of the Perth Chest Clinic has permitted a rapid expansion of its activities.

The passage of the Tuberculosis Act by the Federal Government was of vital importance to anti-tuberculosis work in this State, as it is only by means of Commonwealth financial assistance that this work can proceed. The great hardship of lack of hospital beds is still felt and, with the gathering impetus of case finding by mass radiography, the position will become progressively more acute.

Attention should be drawn to the projected survey in the North-West, with particular reference to the aboriginal population. Hygiene in this part of the State is a serious responsibility of this Department.

The 1948 amendment to the Health Act giving greater power to control the recalcitrant infective patient should contribute materially towards reducing the spread of the disease in the community.

Murine Typhus.

Under a grant from the National Health and Medical Research Council research into Murine Typhus was undertaken during the year. In Perth, Dr. W. A. Young, Director of Laboratories in the Department, conducted the laboratory studies and Mr. E. P. Hodgkin of the University of Western Australia, undertook the entomological phases of the research. Specialist research into virus specificity was undertaken at the Walter and Eliza Hall Institute of Medical Research, Melbourne, by Professor F. M. Burnet. Progress of the research was considerably impeded during the early months of the year by the infrequency of cases, an epidemiological feature unusual in Perth of recent years. Work is proceeding.

Eighty-seven cases (75 metropolitan and 12 country), were reported with four deaths. Whilst notifications represent a substantial reduction on those for 1947 (141), the case mortality was twice as high—4.6% compared with 2.1%.

Diphtheria.

There was a further decline in the incidence of diphtheria during 1948, notifications numbering 255 compared to 339 in the preceding year. There were, however, seven deaths, (8 in 1947), all in unimmunised children. These deaths represent an avoidable wastage of child life, which greatly reflects upon the health consciousness and intelligence of the community: Most, if not all, it must be assumed, would have been saved from death by immunisation and opportunities for this prophylactic safeguard were freely available during the year.

Figures for the incidence and mortality of diphtheria represent an attack rate of 49.5 for 100,000 of population and a fatality rate of 1.36, both of which are the lowest for 40 years.

A special anti-diphtheria immunisation card was devised and introduced during the year to assist local authorities:—

- (a) To assess the immunisation rate amongst children in their areas.
- (b) To identify with precision the unimmunised.

Diphtheria will not be eradicated from this State until the annual number of immunisations approaches the annual number of births, which is approximately 13,000.

Venereal Disease.

There was a further substantial decline in the incidence of both gonorrhoea and syphilis during 1948. Gonorrhoea again fell in incidence by 22% and syphilis by 38%.

VENEREAL DISEASES IN WESTERN AUSTRALIA. 1947-1948.

Disease.	Male.		Female.		Total.	
	1947.	1948.	1947.	1948.	1947.	1948.
Syphilis—						
Primary	31	8	13	1	44	9
Secondary	13	8	14	10	27	18
Tertiary	7	22	14	10	21	32
Congenital	4	2	6	2	10	4
Total Syphilis	55	40	47	23	102	63
Gonorrhoea	267	214	49	32	316	246
Chancroid .....	.....	2	.....	.....	.....	2
Granuloma .....	.....	.....	.....	1	.....	1
Total	322	256	96	56	418	312

NORTH-WEST SERVICE.

For the first time for several years, all North-West stations were adequately provided with medical staff for the greater part of the year. Routine inspections of native population were resumed and close attention was given to improving health standards in the area.

The responsibility for health inspection in the ten northern road districts was undertaken by the department and a senior inspector was made available to conduct a thorough health inspection of all settlements. The reports of this inspector disclose a lamentably low standard of accommodation and sanitation in many parts of the North and amply confirm the general observations detailed in the annual report for 1947.

In respect of Hall's Creek, the inspector reported:—

(a) There is not a single building in the township which is not sub-standard.

(b) There is no sanitary service nor rubbish service. The disposal of nightsoil is left to unsupervised native labour without order or method and with no appointed site for disposal. Rubbish is dumped in the creek bed winding through the town.

(c) Water supply is unsafe and inadequate.

Arising from this report, a strong recommendation was made to the Government that the existing townsite be abandoned and that the small settlement be transferred to a new site nearer the aerodrome.

The observations upon the sanitary condition of the North, published in the Commissioner's report for 1947, were the subject of a bitter attack in the Legislative Assembly by the member for Roebourne, who described them as grossly exaggerated.

Reports by the Department's health inspector more than sustain the Commissioner's observations against this criticism. The following is a summary of the housing situation in various North-West towns as disclosed by inspection:—

Roebourne.

Five dwellings were the subject of report. All were in a bad condition of disrepair and were sub-standard. Two were described as unfit for human habitation.

Of those not condemned, the following is the description of one:—

Four rooms, 10 occupants, flooring white-ant eaten and broken. Kitchen and out-house—flooring badly broken. Privy—very dilapidated. Front and back verandah flooring broken and dangerous.

Of those condemned, the following is the description of one:—

Solid stone building. The whole of the wood-work perished. No roof. Windows missing; verandah flooring broken and dangerous. Privy faces the roadway and has no door.

Port Hedland.

Nineteen dwellings were the subject of report. Eighteen were described as sub-standard. Typical of these were:—

Single wood and iron room with lean-to bedroom and kitchen. Occupiers number ten. Flooring bad throughout. Height of walls 7ft. 6in. Bathroom in yard, unroofed. Privy, a dilapidated structure without an aperture cover or service door.

Two-roomed wood and iron structure. Six occupants. Roof leaking. Pine floors throughout in bad condition. Verandahs structurally unsound. Bathroom built from four sheets of iron. Privy has neither aperture cover nor service door.

Broome.

Eighty-two dwellings were inspected. Twenty-five were condemned as unfit for human habitation. Twelve were ordered to be demolished. Sixty were ordered to be repaired.

Derby.

Fourteen dwellings were the subject of report. Thirteen were in an extreme state of disrepair and dilapidation. Nine were unfit for human habitation.

An example of the first group:—

Two men and a woman living in a bush timber and corrugated iron shed 14ft. x 20ft. with 7ft. walls. Very rough cement flooring. One portion of room screened off by blanket as a bedroom for the woman. Kitchen of bush timber and rusty tin with rough cement floor.

Examples of the second group:—

Dwelling occupied by man, wife and five small children. Extreme state of dilapidation. Large holes exist in floors which are unsafe. Verandahs are collapsing. Premises not only unfit for habitation but extremely dangerous.

Wood and iron dwelling with one room with verandah all round. Verandah partitioned into rooms with canvas screens. Bathroom an extension of verandah floor screened off with canvas. No privy. Laundry lean-to bough shed. Closet panstead requires reconstruction. Roof leaking. Guttering defective and missing. Iron on walls loose. Flooring loose and uneven. Verandah floors rotted and perished.

Another example:—

Shed 24ft. x 12ft. Occupied by man, wife and four children. No door. No kitchen. Cooking is done on sheet of iron on middle of floor. No laundry and no bathroom. Privy, a board over a pan and screened with a few sheets of iron.

Wyndham.

Reports were furnished on 26 houses. Sixteen were described as unfit for human habitation, including the police station.

Examples:—

25ft. x 12ft. wood and iron shed divided into one room and kitchen. Occupied by a man, his wife and five children. A shower provided in an unroofed galvanised iron enclosure in yard. Privy—a 6ft. high screen, no panstead, earth floor.

Single room structure of wood and iron with rough cement floor. Occupied by man, his wife and one child. Lean-to kitchen. Dilapidated iron structure as bathroom. No privy.

Police station:—

In very dilapidated condition. White ants have invaded the whole structure. Flooring is uneven. Windows and doors are out of alignment due to subsidence of floors. Verandah timbers are perished. Plates are rotting from the tops of the posts.

Hall's Creek.

Not one single building fills the requirements of the Health Act.

Particular exception was taken in Parliament to the Commissioner's statement that the conditions in which the slender white population lives in this area were such as to render it probable that the residents would acquire a tolerance for discomfort and squalor such as is normal only amongst un-cultured coloured people. No more striking confirmation of the justice of this expectation could be asked than that a parliamentary representative of the area should endeavour to defend the housing standards detailed in the foregoing summary.

Attention was given during the year to the occurrence of fluorosis amongst residents in the Marble Bar area. A preliminary report on this condition by Dr. Saint of Port Hedland is included as Appendix XVIII. Investigation is proceeding and inquiry is being directed in collaboration with the Government Analyst towards the development of a water treatment routine to reduce the danger of local supplies.

Leprosarium.

The following table analyses admissions and discharges at the Leprosarium, Derby, during the year:—

	Males	Females
Inmates as at 31st December, 1947	136	102
Admissions for period ended 31st December, 1948 ..	29	20
Discharges for period ended 31st December, 1948 ..	17	17
Deaths for period ended 31st December, 1948	6	6
Absconded	1	-
Total remaining in Leprosarium as at 31st December, 1948	146	101

During the year a routine system of recording contacts was formulated so that these should be periodically re-examined over a long period of years.

Treatment by sulphones was undertaken during the year with promising results. A detailed report on this mode of therapy by Dr. Herz at Derby is included as Appendix XVII.

DIETETIC STANDARD.

During the year it was reported that a significant proportion of the population of the South-West timber and dairying districts suffer from an anaemia of moderate to serious degree.

A preliminary survey of school children in widely dispersed areas was undertaken by the Department with a view to verification. At the November meeting of the National Health and Medical Research Council, the Department's report upon this survey was submitted with a request that the Commonwealth Department of Health undertake a special survey of this area to assess the importance of anaemia in the population, to identify its causes and indicate remedial measures necessary.

Prima facie it appears that the anaemia may be of dietetic origin and insofar as school children are affected suspicion rests upon the irregularity and inadequacy of feeding associated with bus transport over long distances between their homes and the central school.

If this proves to be the cause consideration might well be given to the appointment of a dietician to the Health Department staff in order that an adequately trained officer may be available to inform parents of the importance of diet and to study the feeding disabilities confronted in different portions of the State.

Such advice if generally available would make a valuable contribution also to raising the resistance of the population to infectious diseases, in particular tuberculosis, and might well assist in reducing the incidence of toxæmia in pregnancy.

VITAL STATISTICS.

Statistical information supplied by the Government Statistician is included in Appendix XIII.

Population.

During 1948 the population increased by 12,112 to an estimated total of 514,843. Births during the year totalled 12,931, an increase of 57 above the previous year.

The Birth Rate.

The birth rate at 25.12 per thousand of mean population is slightly lower than that for 1947 (25.60).

The Death Rate.

Deaths for the year totalled 4,685, the rate per thousand of mean population being 9.10. This rate is again appreciably lower than that for the previous year (9.39) and is the lowest in the Commonwealth and New Zealand.

The natural increase for the year was 16.02 per thousand of mean population, which may be compared with the rate for the whole of Australia (13.12) and for Tasmania (16.18).

Maternal Mortality.

The maternal mortality rate during 1948 at 1.47 per thousand live births was 1.02 better than that for 1947, and the lowest that has ever been attained in Western Australia.

MATERNAL MORTALITY.

Year.	Live Births.	Deaths from							
		Puerperal Septicaemia.		Abortion.		All Other Causes of the Puerperal State.		All Causes of Puerperal State.	
		No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
1943	10,481	3	0.29	3	0.29	17	1.62	23	2.19
1944	10,870	4	0.37	5	0.46	18	1.66	27	2.48
1945	10,672	2	0.19	5	0.47	13	1.22	20	1.87
1946	12,105	3	0.25	5	0.41	18	1.49	26	2.15
1947	12,874	2	0.16	8	0.62	22	1.71	32	2.49
1948	12,931	6	0.46	1	0.08	12	0.93	19	1.47

All Rates per thousand live births.

Causes of maternal deaths are analysed hereunder:—

TABLE II.

Individual Causes of Maternal Death.

Post-partum Haemorrhage	..	..	2
Eclampsia	..	..	3
*Acute cortical necrosis of the kidneys	..	..	1
*Pulmonary Embolism	..	..	3
*Pulmonary Thrombosis	..	..	1
Anaesthesia	..	..	2
Ruptured Uterus with Hydrocephaly of foetus	..	..	1
*Acute Septicaemia	..	..	1
Acute Yellow Atrophy of Liver	..	..	1
Ectopic Gestation	..	..	1
Accidental burns	..	..	1
Criminal Abortion with septicaemia	..	..	1
Placenta Praevia with haemorrhage	..	..	1

19

* Classified by Registrar General under "Puerperal Septicaemia."

Study of these nineteen cases shows that eclampsia remains a prominent cause of death. It is hoped that it will be possible to reduce the incidence of this disease by encouraging expectant mothers to submit themselves to more thorough ante-natal care.

One death from post-partum haemorrhage followed a birth at which no trained attendant was present. It is probable that this death could have been prevented by proper obstetrical attention. The confinement of the patient, who died of acute septicaemia, also lacked professional assistance.

The two anaesthetic deaths are a reminder of the price which must be paid for the relief of pain. In many parts of Western Australia it will be inevitable that anaesthetics will be given by trained nurses. As this is so, it is very desirable that the nurses should have training and experience in giving anaesthetics under expert guidance. This problem is being discussed with the Association of Anaesthetists.

Owing to the present method of certification of death, the statistics of the Registrar-General do not show the over-all maternal mortality. The following cases should be included:—

1. One death from Incompatible (Rh factor) Blood Transfusion following Caesarian Section.
- * 2. One death from Subarachnoid haemorrhage with remittent pyrexia fourteen days post partum.
3. One death from peritonitis following artificial rupture of the membranes and Caesarian Section.
4. One death from pulmonary embolism.
5. One death from coronary occlusion three hours post partum.

Twenty-four maternal deaths would bring the maternal death rate to 1.72 per thousand births. However, as this rate has been subjected to special correction, it is not comparable to previous years, nor to the maternal death rate of other States. For purposes of comparison the Registrar General's figure (1.47) must be accepted.

Abortion.

Information obtained from notifications of abortions (Section 314 of the Health Act) upon the prescribed pro forma can be tabulated as follows:—

Abortions.	Spon- taneous.	Induced.	Total.
Married Primigravidae	80	14	94
Married Multigravidae	220	52	272
Unmarried Primigravidae	16	15	31
*Unmarried Multigravidae	9	5	14
Grand Total	325	86	411

* Includes spinsters, divorcees, widows and women "separated" from their husbands.

In all 411 cases were notified. This number must be accepted as but a small proportion of the actual State total.

Of 86 patients in whom induction was reported, 18 were induced by a second party. One of these was a therapeutic induction.

Still Births.

Still births for 1948 totalled 266 (304 in 1947). This represents a rate of 20.5 per 1,000 confinements—Metropolitan 20.4, Country 20.6. Rates for the preceding year were respectively 23, 22.6 and 22.4.

One hundred and thirty-nine notifications of still-births were received from medical practitioners and midwives under Section 314 of the Health Act, and the information so obtained is considered later in conjunction with infant mortality generally.

Towards the end of the year Parliament passed an Amendment of the Health Act providing for the compulsory notification of, and autopsy of still-births. Organisation of routine autopsy will be

undertaken next year and it is hoped and expected that much information of value in a campaign to reduce the infant death rate will be obtained.

Infant Mortality.

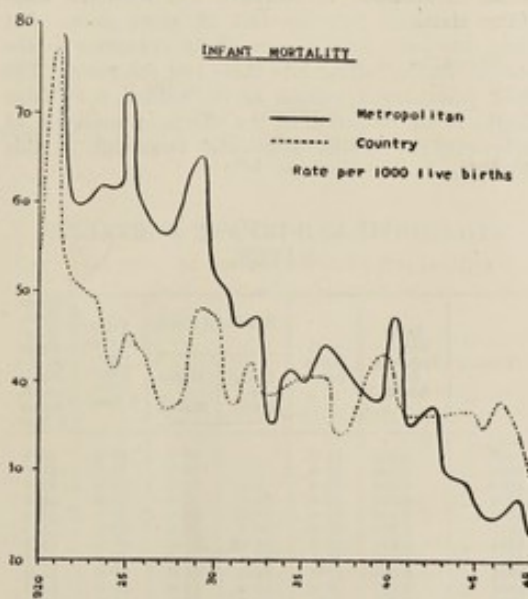
There was an appreciable reduction in the infant mortality rate during the year, the State figure being 25.60 per thousand live births compared with 30.92 for the preceding year. The Infant Mortality rate in Western Australia for 1948 is lower than that of any State in the Commonwealth except Victoria (23.93).

Neither the figures for Victoria nor New Zealand (21.93) are strictly comparable as West Australian figures include all native deaths whereas Victoria has a negligible native population and New Zealand deliberately excludes Maori deaths.

Differentiation into metropolitan (22.58) and country rates (28.70) reveals that the disparity recorded in previous years between the metropolitan and country infant mortality rate persists but is considerably less substantial than in previous years (1946: 12.83; 1947: 8.16; 1948: 6.2).

The trend of Infant Mortality rates in City and Country since 1911 is shown in the following graph.

It will be seen that speaking generally the country rate has been steady whilst the metropolitan has fallen rapidly from a much higher to a much lower level, overtaking the country figures about 1940.



A study of the causes of infant deaths discloses that those due to pre-natal and natal causes have a similar incidence in both metropolitan and country groups. The principal causes of the disparity between city and country rates is the greater number of deaths in country districts due to respiratory and bowel infections. Further reduction in the country rate, therefore, is to be sought in better facilities for prompt medical attention, improved hygiene, and the education of mothers by extended infant health clinics.

Figures for neo-natal deaths during 1948 are not yet available from the Government Statistician. The sub-joined table, however, records infant deaths due to pre-natal and obstetrical causes and includes still births.

Specific Causes of Infant Deaths.	Still-births.	Infant Deaths.	Total Deaths.
Congenital Malformations	11	63	73
Congenital Syphilis .....	.....	2	2
Haemolytic Diseases	10	17	27
Pre-Natal Death or Unspecified Still-births	167	.....	308
Prematurity .....	.....	141	
Placenta Prævia	5	.....	5
Toxaemia	15	.....	15
Accidental Haemorrhage	22	1	23
Asphyxia, Birth Fatalities and Injuries	35	40	75
Other Causes	1	2	3
Total Deaths	266	266	532

As it appears that toxæmia of pregnancy underlies many cases of stillbirth, prematurity and accidental haemorrhage, this condition is seen to be an important factor in loss of life through stillbirth and neo-natal death.

From further analysis of relevant information it appears that this condition was the main cause of death in about 135 instances in 1948.

An examination of stillbirth and neo-natal mortality statistics over the last 20 years shows that there has only been a very slight reduction in the rate of deaths falling into these two categories. The most promising approach to the reduction of these deaths is the reduction of the effects of toxæmia of pregnancy by earlier ante-natal treatment of this condition.

STILLBIRTH AND INFANT MORTALITY RATES.

Year.	Total Births, including Still Births.	Still Birth Rates.	Neo-Natal Rates.		Total Mortality Rates Under 1 Year.	Other Post-Natal Rates Over 1 Month and under 1 Year.
			Under 1 Week.	Under 1 Month.		
1926	8,534	27.4	.....	27.6	48.0	20.4
1927	8,708	26.0	.....	23.0	44.7	21.7
1928	8,981	30.9	.....	23.1	35.5	12.4
1929	9,316	28.4	18.8	25.8	54.0	28.8
1930	9,456	27.0	18.0	23.5	46.5	23.0
1931	8,777	26.0	20.1	26.6	40.5	13.9
1932	8,175	25.7	21.02	25.2	43.5	18.3
1933	8,105	29.4	18.1	22.5	35.8	13.3
1934	8,029	29.2	19.3	24.8	38.8	14.0
1935	8,377	30.8	20.6	24.8	39.0	14.2
1936	8,730	28.9	19.6	24.8	41.0	16.2
1937	8,850	27.2	16.8	21.2	36.5	15.3
1938	9,325	23.9	16.6	19.1	33.1	14.0
1939	9,249	23.0	16.5	19.7	40.0	20.3
1940	9,363	25.9	20.5	24.9	43.0	18.1
1941	10,375	24.8	15.1	18.1	34.4	15.7
1942	10,109	20.6	17.1	20.3	36.2	15.9
1943	10,759	25.8	17.1	21.0	31.8	10.8
1944	11,144	24.8	18.6	21.0	32.0	11.0
1945	10,896	20.6	18.0	20.0	28.9	8.9
1946	12,398	23.6	17.1	20.6	30.3	9.6
1947	13,178	23.0	16.9	19.4	30.2	13.2
1948	13,197	20.1	16.9	18.7	25.0	8.4

In the table above, all rates are calculated in deaths per year per 1,000 confinements. The rates given are those of stillbirths, of deaths of infants under one

week, one month and one year respectively. The last column gives the death rate of infants aged between one month and one year. It will be seen that during the past 20 years the stillbirth rate has fallen from approximately 27 to 22. The rate of infant deaths under one week is unaltered. The death rate of infants under one month has fallen from approximately 25 to 20. The death rate of infants over one month but under one year has fallen from approximately 20 to 10. Thus, while the stillbirth rate and neo-natal rate have fallen by one-sixth and one-fifth, the deaths of infants in this last group have fallen by one-half. A large part of this fall can be attributed to the reduction of the incidence of gastro-enteritis throughout the State, but especially in the metropolitan area.

Towards the close of the year Parliament amended the Health Act to provide for:—

(a) The compulsory reporting of all stillbirths and premature births and the return of prescribed clinical information for research purposes.

(b) The compulsory autopsy of stillbirths.

It is hoped closer study of these obstetric incidents thus made possible, will yield information permitting the planning of effective measures to reduce the infant wastage from these causes.

The specific causes of all infant deaths in the different statistical districts are tabulated in Appendix VIII. The causes of infant deaths are given under the heading of post-natal diseases.

In this group pneumonia accounts for more than half the deaths. The death rate from pneumonia is especially high in the South-Western district in comparison to that of the metropolitan district. The infant death rate from pneumonia is also high in all areas where there is a high native population.

The next most important causes of death are gastro-enteritis and mastoiditis. In young children these diseases are often associated and it is difficult to determine which is the primary cause of death.

It has already been shown that the reduction in infant mortality over the past 20 years has been principally due to the reduction of post-natal causes of death. Similarly the difference in infant mortality in metropolitan and country areas is due almost entirely to death from post-natal diseases. This is shown below:—

Death rates per 1,000 live births from	Metropolit Districtsan	Country Districts
Pre-natal causes	17.2	17.4
Natal and Neo-natal causes	3.1	4.3
Post-natal causes	2.2	7.1
TOTAL	22.5	28.8

It is a matter of congratulation that in the metropolitan area only 2.2 infants per 1,000 died from post-natal disease.

Ex-Nuptial Births.

One in 26 of all births was ex-nuptial—a rate per thousand live births of 37.9 compared to 36.8 in 1947.

The infant mortality amongst ex-nuptial births was 16.3 per 1,000 (metropolitan 12.6, country 19.8).

The usually anticipated excessive death rate amongst ex-nuptial infants did not eventuate, a fact which reflects the improved care now available for the ex-nuptial infant.

CONCLUSION.

Notwithstanding archaic and inco-ordinated methods of health and medical administration involving as they do dissipation of effort, frustration of endeavour and inordinate delay in execution, the health of the State as measured by vital statistics, attained during 1948, a standard never previously achieved in Western Australia, and one comparing more than favourably with the achievements of other States.

It may reasonably be expected that reorganisation by permitting a more intelligently planned and better co-ordinated assault upon disease, would effect an even more rapid and substantial reduction. If this be so delay in reorganisation must be at the cost of avoidable ill-health and death, and time devoted to considering the impact of change upon established administrative conventions must be purchased with human lives.

(Sgd.) CECIL E. COOK,
C.B.E., M.D., D.P.H., D.T.M., and H,
Commissioner of Public Health.

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APPENDIX I.

**REPORT BY THE DIRECTOR OF MEDICAL LABORATORIES
TO THE
COMMISSIONER OF PUBLIC HEALTH.**

I have the honour to submit a combined report on the working of the Public Health Laboratories from the date when I was appointed Government Pathologist and Bacteriologist, namely March 15th, 1948, until June 14th, 1948, and on the working of the combined Medical Laboratory Service from June 15th, 1948, until the end of the year.

When taking over the old Public Health Laboratories in 57 Murray Street, a group of laboratories was found which had suffered severely from wartime shortages and which had not been reconditioned owing to the probable amalgamation of the Public Health Laboratories and the pathological laboratory of the Royal Perth Hospital in the new hospital building.

I should like to express my appreciation of the very high standard of work which had been carried out by my predecessor, Dr. A. Neave Kingsbury, and his small and highly-trained staff under conditions which would have discouraged the staunchest workers.

With the question of amalgamation of the two laboratories undecided, preliminary plans were drawn up in detail for the reconditioning and modernisation of the old Public Health Laboratories, and a complete survey made of equipment and stores.

When the plans and survey had been completed, the final decision to amalgamate the laboratories was given. The plans for the old building were scrapped and new plans prepared to arrange for the combination of the work of the Public Health Laboratories and that of the Pathological Laboratory of the Royal Perth Hospital in the new laboratories in the new Royal Perth Hospital building. Plans were also prepared for the general improvement and extension of the biochemical laboratory, which remains in the old Royal Perth Hospital building until the west wings of the new Royal Perth Hospital are built. With the co-operation of Dr. T. R. Lubbe, Pathologist to the Royal Perth Hospital, arrangements were made for the merging of the work of the two laboratories. Certain items of new equipment had already been provided for the new laboratories and additional equipment was ordered.

The final transfer of staff and equipment from the two old laboratories to the new laboratories in the new Royal Perth Hospital building was carried out on the weekend preceding June 15th, 1948, without any interruption in the services of either laboratory. This was greatly facilitated by the excellent arrangements made by the Public Works Department who carried out the rapid transfer of all equipment.

During the three months from March to June the routine work of the Department was maintained with only minor alterations. The long-term investigation into the possible causes of abortion was continued. The work on the diagnosis of tuberculosis continued to expand and Lowenstein-Jensen medium was used for all tubercle culture work. Owing to staff shortage and the absence of a dark-room the fluorescent technique for the direct examination of sputum smears for *M. tuberculosis* was not taken into use. Methods for improving the collection and transport of specimens from outlying hospitals and the North-West were commenced. An additional laboratory assistant, Miss J. O'Connor, was appointed to the staff in April, 1948, and additional cleaning staff.

The Amalgamation of the Public Health Laboratories with the Pathological Laboratory of the Royal Perth Hospital.—The primary object of this amalgamation was, from the pathologist's viewpoint, the most economical way of utilising the relatively small staffs and comparatively slender equipment of the two existing laboratories to form one diagnostic laboratory which could be developed, extended and further equipped to deal with the diagnostic services of the Royal Perth Hospital, special examinations for other hospitals in Western Australia, and diagnostic work for general practitioners in Western Australia, in addition to all public health bacteriological examinations.

Laboratory Accommodation.—The new laboratories in the new Royal Perth Hospital building provided with minor improvements and additions, suitable accommodation for such a central laboratory. With the equipment ordered by my predecessor, the problem of basic equipment was met and it was possible to build up with equipment for special branches, a fully equipped central laboratory. The biochemical laboratory, still sited in the old Royal Perth Hospital building until the new hospital wings are built, was the only section in which the accommodation was restricted, but fortunately additional room space was made available by the willing co-operation of the Medical Superintendent, Royal Perth Hospital, Dr. R. R. Anderson.

Laboratory Staff.—The existing staffs of the two laboratories were inadequate in numbers and unbalanced in age-distribution and experience. All were fully extended with continuous routine work. When members were absent on leave or due to sickness it was found to be impossible to maintain a full routine laboratory service. The staff of the Public Health Laboratories contained three highly trained technicians of mature age, whereas the staff of the Royal Perth Hospital laboratory consisted

mostly of young technicians of relatively short experience, many of these working under one- or two-year agreements. It was arranged that these short-agreement members of the staff should be replaced when their agreements terminated, by technicians with longer and wider experience in large university or hospital laboratories, and that the plans for additional staff laid down by my predecessor should be pushed forward, namely the cadet training scheme and the plan for restaffing sectional laboratories.

The Cadet Trainee Scheme.—Under this scheme indentured cadets are taken for a full five years' training in laboratory technique. Cadets of good education of either sex are eligible from school-leaving age if their interests lie in the laboratory branches of medical work. During the first three years they attend courses of instruction at the Technical College in addition to their practical work in the Public Health Laboratories. These courses cover the basic sciences of mathematics, chemistry, inorganic and organic and physics with additional classes in English. During the latter two years courses in pathological, bacteriological and biochemical laboratory technique will be held to prepare them for a diploma examination, which it is intended shall be comparable to that of the Society of Laboratory Technicians of the Eastern States. When trained as technicians, these cadets agree to serve the Government of Western Australia for a period of three years if their services are required.

The object of this training scheme is to provide future staff from citizens of this State for the Public Health Laboratories in Perth and for laboratories of the smaller hospitals, which have been, or will be opened in Western Australia. Owing to the long period of indentured training this scheme is more popular among young men than among young women. There are numerous suitable applicants for training. The first cadet has been appointed and the remaining vacancies are being filled at present by young ex-servicemen under the Rehabilitation Training Scheme.

When a certain degree of training has been reached by cadet trainees in each branch of the Public Health Laboratories, it will be advisable that they should spend short instructional periods in the laboratories of the King Edward Memorial Hospital and the Princess Margaret Children's Hospital to learn special methods used in these laboratories. By using them as leave and sickness reliefs in these laboratories they would develop a responsible attitude to their work besides helping the hospitals concerned.

The Staffing of Sectional Laboratories.—This scheme put forward by my predecessor was under consideration at the end of the year. Basically, it consists of sectionalising the Public Health Laboratories into pathological, bacteriological and biochemical sections and one dealing with serology, protozoology and medico-legal investigations. Each section would work under a highly experienced and well-qualified head, who would be in a position to develop and improve and modernise the work of his or her section. The director of laboratories would remain in active charge of one section to prevent his becoming solely an administrative officer.

By increasing the staff to complete this scheme of sectionalisation, it will be possible to more fully deal with relief problems due to sickness, leave, etc., and to have sufficient staff to cope with the emergencies of epidemic disease, to develop the training of junior staff and to carry out investigational work in the special disease problems of Western Australia.

The Development of the Laboratory Service in Western Australia.—In its present state the first consideration has been the development of the central laboratories. Visits have been made to the laboratories in Wooroloo Sanatorium and at Fremantle Hospital to get to know the staff of the laboratories, the type of work carried out, and the major problems in the development of that work. Some media have been prepared for these laboratories, and special examinations carried out in addition to the routine serological work which has always been centralised in the Public Health Laboratories for all Government and other hospitals in Western Australia. It is expected that the laboratory of the King Edward Memorial Hospital will be opened early in 1949 as a constituent part of the Government laboratory service on the arrival of Mr. Lucas, a trained technician, from England.

Some improvements have been made in the collection and forwarding of specimens from distant centres to avoid delays and prevent the loss of specimens from unsatisfactory methods of packing and deterioration of specimens due to climatic conditions.

The provision of standardised specimen-containers for all types of specimens has been investigated, and enquiries are still being made from manufacturers for the necessary glassware and efficient postal boxes to hold them. With satisfactory containers, telegraphic advice of despatch of specimens by air, rapid collection from airlines on arrival and telegraphic reporting of the main results of all examinations, the difficulties of a laboratory service to distant centres can be minimised.

The relationship of the Public Health Laboratories to the Royal Perth Hospital.—It was felt that the use of the laboratories of the new Royal Perth Hospital building by the Public Health Laboratories for the combined purpose of a public laboratory service and a hospital pathological service might give rise to administrative difficulties. To avoid difficulties arising and prevent any possible friction, a Laboratory Advisory Committee was constituted, consisting of the Medical Superintendent of the Royal Perth Hospital a senior member of the Honorary Staff and the Director of Medical Laboratories. This committee was to meet to investigate complaints from either side of the organisation.

It is a matter of satisfaction to record that up to the end of 1948 it had not been found necessary to call a meeting of this committee for this purpose.

It is hoped to utilise this committee for the further development and improvement of hospital laboratory services and the planning at a later stage, of clinico-pathological research.

The development of the Public Health Laboratories in the Royal Perth Hospital. With the fusion of the two laboratory staffs into a combined staff of one laboratory, certain overlapping was immediately cut out, but the complete replanning of the work of the department was seriously hindered by an epidemic of influenza which produced such a staff shortage that staff had to work where they were most urgently needed and some curtailment or postponement of less urgent work was sometimes necessary. Some members of the staff had more than one febrile attack. The epidemic was widespread in Perth, but the very high incidence in the laboratory staff, suggested that the closed system of ventilation without full air-conditioning and air-replacement was at least a contributory factor. The progress made in improving methods and technique owing to staff shortage and sickness was considerably less than was anticipated. With a full staff and projected increases in staff, much more rapid progress will be possible in 1949.

Detailed plans for minor alterations and additions to the Public Health Laboratories and the old Biochemical Laboratories were prepared, but owing to delays in the provision of the necessary materials, the actual constructional work has not been commenced so far.

The animal house accommodation, which had been planned for a hospital laboratory before the extensive work of diagnosis for the tuberculosis clinic was considered, was soon found to be inadequate for all the requirements of the department. Alternative plans are under consideration.

Equipment. New equipment from previous orders became available. The microscope position was considerably improved by the addition of three new microscopes of standard binocular type. Three new electric incubators, one absorptiometer, one hot-air oven, two thermostatically controlled water-baths, one still, one hot-air oven, one balance and one four bucket electric centrifuge and two two-bucket electric centrifuges filled certain deficiencies in essential equipment. One special electric centrifuge for the serological department, another for the tuberculosis section, and a micro-projector with photographic attachments had not arrived at the end of the year.

Routine work. The figures for routine examinations are not comparable with any preceding records. These are therefore only shown in general outline.

ROUTINE EXAMINATIONS, JULY TO DECEMBER, 1948.

Division.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Path. and Bact. ...	4,649	3,972	3,825	3,907	4,682	4,172	25,201
Biochemistry ...	661	511	413	522	572	422	3,110
Total ...	5,310	4,483	4,238	4,429	5,254	4,594	28,311

The early drop in monthly numbers was largely due to the relegation of the simpler examinations to stem (ward) laboratories. The fall in December was associated with the closing of certain out-patient departments during the Christmas holidays.

One hundred and thirty three post-mortem examinations were carried out and 766 biopsies were examined by the pathologist, Dr. T. R. Lubbe; 8,572 blood counts and examinations were carried out by the haematology division; 4,688 blood sera were examined for syphilis, gonor-

rhea, typhoid, typhus, etc., in the serology division; 1,759 throat swabs were examined for diphtheria, 851 smears for gonorrhoea, 711 smears for leprosy; 856 water examinations and 23 milk examinations were made in the public health division. The 3,110 biochemical investigations covered the estimation of 39 chemical constituents of serum, cerebro-spinal fluid, faeces, urine, gastric contents etc.

Tuberculosis.—This branch of laboratory investigation has shown a progressive increase as the result of the development of the Perth Chest Clinic and the general progress in anti-tuberculosis work. Various problems have arisen requiring further investigation, which will be carried out when additional staff is available. These include the relative value of methods of diagnosis based on culture on different specialised media, and methods based on animal inoculation, an investigation of organisms culturally resembling *Mycobacterium tuberculosis* which are non-pathogenic to guinea pigs, and the further investigation of smear-negative culture-positive sputa in relation to non-acid fast or filterable stages of growth. The investigation of fasting gastric contents as a routine in a considerable proportion of suspected cases has increased very largely the routine work of the department.

Research.—With laboratory re-organisation and staff shortages, no research programme was formulated, but two branches of investigation were commenced as preparation for research in the coming year.

Typhus.—Plans had been made by my predecessor to investigate the animal host and the insect vector and to compare the infective agent producing this disease in Western Australia with other *Rickettsiae* isolated from similar diseases in other parts of the world.

Mr. E. P. Hodgkin, lecturer in biology at the University of Western Australia, undertook the examination of the local rats and other rodents and their ectoparasites. The infective agent was to be isolated from the blood of typhus cases in these laboratories, passaged through animals and transferred to Professor F. M. Burnet's laboratory at the Walter and Eliza Hall Institute, Melbourne, where it would be cultured and used as an antigen for complement-fixation studies in comparison with other *Rickettsial* antigens using blood from typhus cases and rats to provide specific antibodies.

By this means it would be possible to definitely identify the common animal host, the type of *Rickettsia* producing the local variety of typhus, and, by associated studies on ectoparasites and their excreta, the method of transmission of typhus from rodent to man.

Owing to the exceptionally low incidence of typhus from September onwards, no *Rickettsiae* had been isolated by the end of the year. The investigation of the local rodents and their ectoparasites commenced in September.

The Diagnosis of Early Cancer.—With a view to developing new techniques of smear diagnosis of cancer in its early stages preliminary work on staining techniques was carried out on sputa from known and suspected cases of bronchogenic carcinoma, and

a collection of slide preparations from such cases representing all stages of cytological change from irritative hyperplasia to malignant anaplasia was commenced. At a later stage it is proposed to extend this investigation to the early diagnosis of carcinoma of the uterus, stomach, etc.

Pathological Museum.—Equipment has been planned and staff has been recommended. No development has so far been possible.

Contacts with other Laboratories in Australia.—The importance for workers in a pathological laboratory, relatively isolated from other institutions carrying out similar work, of making and maintaining contact with laboratory investigators in other parts of Australia has been kept very much in view. Following two tours of laboratories in the Eastern States before taking up this appointment, which included visits to laboratories in universities, hospitals and research institutions in Adelaide, Melbourne, Canberra, Sydney and Brisbane, short visits have been made to Eastern States laboratories partly in connection with the inauguration of the Australian Association of Clinical Pathologists. The functions of this association are to advance the study of pathology in all its branches and to improve the training of pathologists and technicians in pathological laboratories. It also provides the essential contacts for the pooling of experience which only meetings can give.

The maintenance of these contacts by at least annual visits for the senior members of the staff appears to be essential for progress. At longer intervals it could be used to considerable advantage for senior technical staff.

Staff changes.—The following appointments and resignations have occurred.

Appointments.

- Dr. T. R. Lubbe, Pathologist, on 21st June, 1948.
 Miss L. Silvester, Biochemistry Technician, on 21st June, 1948.
 Miss C. Middleton, Pathology Technician, on 21st June, 1948.
 Miss J. Blomfield, Biochemistry Technician, on 21st June, 1948.
 Miss B. Hoar, Bacteriology Technician, on 21st June, 1948.

Miss A. Cuthbert, Laboratory Assistant, on 21st June, 1948.

Mr. J. Scott, Laboratory Assistant, on 21st June, 1948.

Miss G. G. Gartrell, Laboratory Assistant, on 21st June, 1948.

Miss G. Hancey, Junior Typist, on 21st June, 1948.

Mr. G. Cattermole, Cadet Trainee, on 22nd September, 1948.

Mr. G. H. Vos, Reconstruction Trainee, on 30th September, 1948.

Miss N. Hardwick, Laboratory Assistant, on 15th November, 1948.

Mr. K. Byfield, Reconstruction Trainee, on 22nd November, 1948.

Miss J. Abbott, Biochemistry Technician, on 13th December, 1948.

Resignations.

Miss G. G. Gartrell, on 1st July, 1948.

Miss A. Cuthbert, on 6th November, 1948.

It is regretted that Mr. G. Hewson, a Reconstruction Trainee, died on 1st October, 1948, after a relatively short illness.

Acknowledgements.—The fusion of two laboratories into a combined public health and hospital laboratory service and the maintenance of this service during this period despite a high sickness rate has only been made possible by the keenness, co-operation, and mutual help of all the combined laboratory staff, both technical and clerical.

I wish to express my appreciation of the understanding and help which you, the Under Secretary, the Assistant Under Secretaries and various members of the staff of the Public Health Department have given to the many problems of this new laboratory service, of the co-operation of the Medical Superintendent of the Royal Perth Hospital in hospital laboratory problems and of the willing services of the Public Works Department in the work done for us.

W. A. YOUNG,
 B.Sc., M.B., B.S., D.T.M. & H.,
 M.R.C.S., L.R.C.P.,
 Director of Medical Laboratories,
 Western Australia.

APPENDIX II.

**REPORT FROM THE DIRECTOR, TUBERCULOSIS CONTROL BRANCH
TO THE
COMMISSIONER OF PUBLIC HEALTH**

The Commissioner of Public Health.

I have the honour to submit a report on the activities of the Tuberculosis Control Branch for the Year 1948.

During the year, significant developments occurred which profoundly influenced the activities of the Branch. Among these were the opening of the new headquarters in the Perth Chest Clinic, 17 Murray Street, the passing of certain legislation in the State and Federal Parliaments, an expansion of surgical facilities with the opening of the new Royal Perth Hospital, a beginning of radiological case-finding in certain country centres, the holding of the Australasian Medical Congress in Perth during August, with tuberculosis as the subject for discussion at its Plenary Session, and the founding of the Australian Tuberculosis Association in Perth during Congress week.

Perth Chest Clinic.

As anticipated in the Report of 1947, alterations to the former Cathedral Hall in Murray Street were completed in May and the Clinic was officially opened by the Hon. Val Abbott, Minister for Health, on the 7th May, 1948. This Clinic is admirably placed, being within one minute's walk of the Public Health Department and across the road from the Royal Perth Hospital, with both of which liaison is simple and direct. The Clinic has been fitted to carry on simultaneously mass radiography, to act as a consultative clinic for private practitioners, for the review and follow-up of known cases of the disease and their contacts, for the giving of artificial pneumothorax refills and the taking of specimens of fasting gastric contents for culture and guinea pig inoculation. Its x-ray equipment is high powered and was chosen for efficiency in chest radiography. It has accommodation for medical officers, visiting nurses and administrative and clerical personnel. There is a large library, which is used as the main x-ray viewing room and which is also furnished to act for staff conferences of the full thoracic team.

Legislation.

During the year, important amendments to the Health Act were passed by Parliament. These now give the Commissioner of Public Health the power of compulsory isolation of the infectious recalcitrant patient who is a danger to the public health, the power to order compulsory radiological examination of persons suspected to be suffering from the disease and greater disciplinary measures to control those

few patients in the Sanatorium who are incapable of reasonable conduct. Western Australia is the first State in the Commonwealth to adopt such explicit and definite legislation.

The Nurses Registration Act was amended to lower the age at which nurses might commence their tuberculosis training at the Sanatorium, from 21 to 18 years.

The Federal Parliament passed its Tuberculosis Act which provides for extensive and far-reaching financial assistance to patients undergoing treatment and to the Public Health Departments of the various States, and has established a Directorate of Tuberculosis within the Commonwealth Health Department. The policy of the State Health Departments carrying out their own programmes of tuberculosis control, with Commonwealth financial assistance, co-operation and advice, is an excellent one and is greatly aided by the fortunate choice of Dr. H. Wunderly as the first Commonwealth Director of Tuberculosis.

The new Royal Perth Hospital.

The opening of the new Royal Perth Hospital in June, made available more beds for the observation of suspected cases of tuberculosis and for the increasing number of cases requiring major surgery. The progressive advances in thoracic surgery and anaesthesia have broadened the indications for thoracoplasty and have made possible new surgical techniques involving the resection of the whole or part of one lung. The State is fortunate in the possession of a surgeon and an anaesthetist (Mr. Clark and Dr. Troup), who can carry out these advanced procedures. The prolonged period of hospitalisation necessary in the treatment of pulmonary tuberculosis, combined with rising hospital costs, have placed treatment in private hospitals quite beyond the means of almost the whole of the community. The consequent denial to the thoracic surgeon and the anaesthetist of their capacity to earn in private practice has caused in other countries the adoption of the principle of payment for their services in tuberculosis cases by the authority responsible for anti-tuberculosis work. This has been agreed to by the State Government and paid positions of part-time thoracic surgeon and anaesthetist were advertised at the end of the year. It is anticipated that they will be filled early in 1949.

Medical Congress.

The 1948 Australasian Medical Congress was held in Perth during August. Tuberculosis was the subject for discussion at its Plenary Session and the writer read a paper on the "Treatment of Pul-

monary Tuberculosis." In Dr. King's report, mention is made of papers read by him. As a result of the Congress, considerable interest in tuberculosis control was aroused and maintained in the medical profession of the State.

Australian Tuberculosis Association.

During Congress Week, the presence in Perth of visitors from all States facilitated the founding of an Australian Tuberculosis Association, the object of which is to further and encourage all measures adopted to reduce the incidence of tuberculosis in the community. The Tuberculosis Association of W. A. is in the future to be regarded as a branch of the Australian Association.

Statistics.

Returns of notifications are prepared by the Department of Public Health and death statistics continue to be supplied by the Registrar General. With the present staff available, it is found impossible to prepare other statistics which are of any value. It has not been found possible to establish as yet a case register—the very basis on which is founded all attempts to supervise adequately the known cases of the disease in the community. The keeping in touch with all notified cases, the following of changes of address, the listing, indexing and periodic examinations of contacts, the determination of infectivity in the community by the periodic bacteriological examination of patients, the regional distribution of the disease, its occupational incidence, its relationship to housing and other social and economic factors—all these vital aspects of tuberculosis control cannot even be attempted with the present means and staff at our disposal. In his report, Dr. King mentions his difficulties in obtaining figures to summarise the work done by the Clinic during the year—figures which were needed to express the Clinic's activities in the barest minimum of detail. Increasing experience shows the great need of access to a trained statistical staff in the Public Health Department. It should not be overlooked that in Britain, Canada and the U.S.A. the compiling and keeping of a case register for a tuberculosis control scheme is considered to be a "major task." Without such a case register, concerted measures to control the disease are an impossibility.

Deaths and Notifications.

The following table shows figures of deaths and notifications for the past six years.

Year.	Notifications.			Deaths.	Death Rate per 100,000.	Ratio of Notifications to Deaths.
	Pulmonary.	Non Pulmonary.	Total.			
1943	273	54	327	153	31.7	2.1
1944	219	7	226	149	30.5	1.5
1945	271	14	285	163	33.2	1.7
1946	343	69	412	170	34.6	2.4
1947	352	40	392	141	28.2	2.8
1948	325	20	353	161	31.3	2.2

It will be seen that the death rate for the past six years has been approximately stationary.

The total number of cases previously notified as suffering from tuberculosis in the State, and, as far as our records go, believed to be alive and within the State are—

Male	..	..	..	1,972
Female	..	..	..	1,141
Total	..	..	..	3,113

Of these, many will have left the State, some will have died from some other cause, many will have been notified in error many years ago and some might well be discharged as "recovered" if they were accessible. As an accurate representation of the incidence of the disease in the community, this total can have little, if any, value and might even be misleading. Efforts to trace some of them have been so far unsuccessful and they should be discharged as "lost sight of." To endeavour to trace them all, to call up all who are traceable for examination and to try to obtain a reasonably accurate figure from this relic of past notifications, offers a task which is quite beyond the Branch's administrative resources. Yet there can be little doubt that many will be living and infectious, and have not approached the Department because the Department has not been able to approach them. Most will not know that they should notify the Public Health Department of their changes of address. The task of keeping a case register in proper order is difficult enough in the Metropolitan Area where there is a staff of visiting nurses; it is almost impossible in country areas where there is no departmental staff at all. The need for an efficient records staff is urgent.

The Search for the Infectious Case and its Control.

It is not possible as yet, to take chest radiographs of the whole adult population in a short period of time. It is therefore our policy to concentrate mostly on those sections of the population with the highest incidence of the disease; these include cases referred by private practitioners, all hospital patients, old miners, and contacts of known cases of the disease.

In Dr. King's report, he gives striking figures relating to cases referred to the Clinic by medical practitioners. Of 1965 cases, over 3% were found to be suffering from active pulmonary tuberculosis, and 14.5 per cent. to be suffering from other diseased conditions of the heart and lungs. This detection of non-tuberculous pathology is a most valuable function of the Chest Clinic; the reference for private practitioners of cases for examination at the onset of chest symptoms is the only means available to establish an early diagnosis of cancer of the lung, for example, in which early operation offers the only known prospect of cure. The increasing use of the Clinic as a consultative clinic by our professional colleagues in private practice is to be encouraged by every means in our power. Their co-operation is greatly appreciated and is hereby acknowledged. The general practitioner should remain as one of the first lines of defence in the fight against the disease.

All in and out-patients of the Royal Perth Hospital have chest radiographs and although figures are not available, it is known that a comparatively high percentage show active pulmonary tuberculosis.

Dr. King's figures of the result of a radiological survey of the patients of the Claremont Mental Hospital (namely 5% with radiological active tuberculosis), are arresting, but were to be expected from the results of similar surveys in other countries.

During the year, arrangements were made with the Public Service Commissioner for all entrants to the Public Service to have chest radiographs, and similarly with the Commissioner of Police for all recruits. Several cases of active disease have been thus detected.

An agreement was also reached with, firstly, the Army and subsequently the Navy and Air Force for the x-ray examination of all recruits and also personnel on discharge. The arrangements are working smoothly and efficiently.

At the request of the Commonwealth Health Department, all displaced person migrants entering the State from Europe undergo radiological examination of their chests. It is considered that although such examinations are carried out in Europe before departure, its repetition on arrival in Australia is essential. It is known that many other migrants from Europe (non-assisted) who enter the State are aware that they are suffering from pulmonary tuberculosis, and that there thus exists a loophole in our defence against importing the disease from abroad. X-ray examination is not compulsory in these cases and they are often discovered fortuitously or when in need of treatment.

Tuberculosis in the Aboriginal Population.

It is known that tuberculosis occurs in our aboriginal population. A limited Mantoux survey carried out by Dr. Musso of the Department of Native Affairs in 1943, indicated that the tuberculin sensitive rate in the aboriginals of the Kimberleys was less than in those of other parts of the North-West and that the rate in the South-West of the State was higher than in the North-West generally. The implication is that as contact with the whites increases, so does the rate of tuberculinisation of the native race. It is also known that acute pulmonary tuberculosis occurs in natives in the North-West—for example there were seven cases of acute tuberculosis in the Broome Native Hospital during the year, all of whom died. This suggests the occurrence of a new infection in a non-immunised aboriginal population and there is a risk that the history of the disease in the North American Indians, among whom it assumed devastatingly epidemic proportions, might be repeated in our own country. In October and November I made a tour of the North-West in your company and submitted a report on the position subsequently. In this report it was recommended that the branch conduct a tuberculin and radiological survey of the North-West population (white and aboriginal) during 1949. Technical difficulties are obvious and it has been decided to use aerial transport of the necessary x-ray equipment. It is planned to carry out the survey in the middle of 1949 and x-ray equipment is to be ordered immediately.

Need for More Hospital Beds.

At the end of the year the visiting nurses made an analysis of notified cases in the metropolitan area under their home supervision. Almost all of

these cases had received sanatorium treatment and many of them were well and working. The home conditions of 826 were examined. Of these 665 were, as far as is known, non-infectious and therefore not an immediate public health problem, although some will become so at a later date. Of the 161 infectious cases living in their own homes, in 81 cases the homes were classified as "good" and in 65 as "bad." In addition, 15 cases were so ill as to need nursing help in the home, which was not available. All of these 15 should be in hospital on humanitarian grounds. The 65 in "bad" home conditions should be isolated in hospital in order to protect their contacts from infection.

As the mass radiography campaign increases its scope and range and with a progressively larger number of cases referred by private practitioners for diagnosis, these numbers will be added to at a rate greater than the absorptive capacity of the Sanatorium. In other words, the position is much worse than it appears because only the known numbers have been quoted; every week reveals more previously undiagnosed and unknown infectious cases. Further, these numbers refer to the metropolitan area only. They should be multiplied by two in order to include the probable figures for the State as a whole.

The urgent need for a chest hospital in Perth and for isolation accommodation attached to country hospitals, becomes more apparent every month. The difficulties confronting the community in building programmes for any purpose are realised. The provision of hospital accommodation for infectious diseases should be one of the highest priorities in any building scheme. Many of these people need new housing in any case. The State Housing Commission has received and allowed so many applications for new homes because of the presence of tuberculosis in the household, that a system of priority in individual cases had to be devised by Dr. King and was accepted by the Commission.

The constant and growing demand on the Commission's new homes by the tuberculous would be eased considerably by providing more hospital beds for their isolation and treatment. The lack of this hospital accommodation not only makes the housing shortage more acute, it also helps to spread the disease in the community.

No apology is therefore offered for stressing once more our urgent need for a chest hospital in Perth.

Medical Staff.

Dr. F. E. Heymanson joined the clinic staff as Assistant Tuberculosis Physician on the 17th May, 1948. His wide experience of general medicine in hospital, the Army and in general practice, and his previous experience in the Wooroloo Sanatorium, has made him an excellent addition to the service. The work of the clinic is increasing rapidly. The projected North-West survey, the Mantoux survey of a cross section of the population, the anticipated use of B.C.G. vaccination in 1949, and the use of the mobile unit for country towns in the South-West are further reasons why the medical metropolitan staff of the branch needs expanding. It is necessary to make these additions in the near future so that we may be prepared for our expanding programme in 1949.

Dr. Ian Gordon has continued his work in supervising the post-operative care of our cases in the Royal Perth Hospital. During the year he was appointed Assistant Medical Superintendent to the hospital and Dr. Gibson was transferred from Wooroloo to the hospital to help him in this branch of our work.

Dr. Anderson's co-operation in our problem in the Royal Perth Hospital is invaluable. His interest and success in promoting the prevention of tuberculosis in the hospital nursing staff are outstanding. All in-patients and out-patients of the hospital have chest radiographs and all cases of the disease promptly isolated and nursed accordingly. The freedom of the nursing staff from the disease in the past two years has been remarkable and the Royal Perth Hospital must lead the rest of the Commonwealth in this respect.

The co-operation of the honorary and resident medical staff of the Royal Perth Hospital, Fremantle Hospital and Children's Hospital has been close, cordial and gratifying and must be recorded. In my trips into the country, the interest and zeal of country practitioners in all measures suggested to aid them in the diagnosis and control of the disease has been equal to that shown by the private practitioners in the metropolitan area. It has not been possible to visit towns other than Collie, Northam, Albany and Geraldton. The improvement in x-ray technique and diagnosis in these towns recently, is due largely to the co-operation of the local doctors. A large postal service of x-ray films sent to the clinic in Perth from country centres for opinion and report has developed and the branch is willing to lend all the help in its power. The policy, commenced in 1941, of sending all Junior Resident Medical Officers of the Royal Perth Hospital to spend a month or two at the Wooroloo Sanatorium is yielding excellent results. Many of these doctors have subsequently gone into private practice in town and country and all show great interest in the diagnosis and treatment of tuberculosis.

Rehabilitation and After-care.

The rehabilitation of the tuberculous patient is full of many difficulties. In his report, Dr. Elphick mentions progress that has been made in the Sanatorium. Great difficulty is experienced in the sale of goods made in the Sanatorium. The possibility of obtaining the lease of a shop in Perth has been explored but the cost was too heavy for the colony's financial resources.

The Commonwealth Department of Post-War Reconstruction has commenced to assist in the training of some ex-Sanatorium patients. Dr. King selects patients on discharge from the Sanatorium who are suitable for training in new occupations. He has regular discussions with Dr. Tomlinson of the Department of Post-War Reconstruction, who has rendered considerable assistance in training and placing ex-Sanatorium patients in jobs.

Once more it is felt that a protest must be made that the prohibition of an invalid pensioner from working part-time and earning more than an almost negligible amount, completely disregards the special

case of the person partially disabled by the disease. Personal strenuous efforts since 1941, aided by those of Dr. Darcy Cowan of Adelaide, to obtain an alteration of this fact-ignoring ordinance have been unsuccessful, despite the fact that it is agreed that it acts as a serious deterrent to rehabilitation programmes and employment in sheltered workshops.

During the year discussions have taken place between the Wooroloo Colony and the Tuberculosis Association of W.A., to devise a means of enlarging the scope and efficiency of the management of the colony, together with a broadening of its basis of public co-operation. It has been eventually agreed that an amalgamation should occur between the Association and the colony, and that the former should be responsible for its management with a Wooroloo committee to conduct Wooroloo activities under a more comprehensive scheme. It is considered that the Adelaide model of Bedford Industries might well be one to be copied and that an organisation should be built up in Perth consisting of a sheltered workshop in which would work some men and women living in their own homes and others housed in an adjacent colony or settlement. It is hoped to put this plan into operation in 1949.

Activities of Clinics.

Following this report is one by Dr. King, the Tuberculosis Physician, which summarises the work done at the Perth Chest Clinic and that at the Fremantle Hospital. Certain aspects of his report have already been commented on. The work of this clinic is expanding progressively and it is anticipated that this expansion will become accelerated during 1949. This will not be possible without the further additions to the staff which have already been referred to. These additions are necessary if the high standard of the clinic's work is to continue.

Princess Margaret Hospital for Children—Perth.

Weekly visits were paid by me throughout the year. Dr. King often deputised while I was out of Perth. The policy of reducing the number of chest radiographs in children was continued because of the relative rarity of pulmonary disease under the age of 15 years in our community. As indicated in my report for 1947, chest radiographs have been restricted to cases when—

- (a) The child has a positive Mantoux reaction and is a contact of a known case of the disease.
- (b) When there are clinical indications that pulmonary tuberculosis is a possibility in diagnosis.

During the year there were 744 attendances at the Clinic and 192 radiographs were taken.

Cases of the disease in the wards of the hospital were seen in consultation with the Honorary Staff and x-ray films of the chests of the nursing staff examined in consultation with Dr. Edmonds. Sick nurses in whom tuberculosis was a possibility in diagnosis, were also seen with Dr. Edmonds, to whom the hospital has much to be grateful for in his interest in the disease.

Kalgoorlie Clinic.

Dr. Webster reports as follows:—

Total new cases attending Clinic.	
(a) Contacts	71
(b) Suspects not proven	82
(c) New cases (notified)	15
<hr/>	
Total	168
Total number attendances at Clinic ..	634
Number artificial pneumothorax refills given	104
Number films reported by Dr. Outhred	215

As in former years, Dr. Outhred of the Commonwealth Health Laboratory was of the utmost assistance.

Bunbury Clinic.

Dr. Lawson Smith reports as follows:—

Total number of attendances ..	567
Total number of new cases ..	366
Total number of new contacts ..	63
Number of new cases found to be suffering from pulmonary tuberculosis	3
Number of fluoroscopic screenings ..	524
Number of artificial pneumothorax refills	62
Number of radiographs taken ..	146

Northam

I have paid monthly visits to the Northam Hospital and seen with Drs. Chester, Hodby and Robinson, cases of x-ray films of the chest. All persons attending the hospital with chest or suspicious symptoms have chest radiographs. A large amount of pulmonary and cardiac pathology is thereby diagnosed and the enthusiasm and ability of these doctors in chest disease, demonstrate that a high level of work can be sustained in a country area. Tribute should also be paid to Matron Reid and to the uniformly good standard of radiograph technique shown by Sister Snow. During the year 423 chest radiographs were taken.

Visiting Nurses.

The staff of visiting nurses consists of seven sisters. Their duties are to attend at the various Clinics, to take specimens of gastric contents both in the Clinic and at the Royal Perth Hospital, and to visit and supervise the care of the patients in their homes.

In the course of the year, they also commenced to pay monthly visits to the Sanatorium to interview patients in their own areas and to advise on domestic and other difficulties, a service which is much appreciated by the patients.

It is difficult to express the value of their work in figures, but in the course of the year, they paid 3,500 visits to patients in their homes.

Treatment.

During the year the policy of frequent staff conferences to decide on the necessity for surgical treatment in individual cases has been extended. Apart from the weekly conferences held at

Wooroloo and attended by Dr. King, or both of us, monthly conferences at the Perth Chest Clinic are attended by the Wooroloo and Clinic staffs, the thoracic surgical unit of the Royal Perth Hospital, by the staff of the Chest Wing, Hollywood (Repatriation) Hospital and by many interested physicians, surgeons and private practitioners. These Saturday afternoon conferences, which have become a feature of medical life in Perth, are always well attended and vivid and mutually beneficial views of cases are held. Our tuberculous patients owe a debt of gratitude to all our colleagues who participate. No case undergoes a major surgical procedure without the most exhaustive presentation of many points of view.

Viewing the year in retrospect, the facts which merge are the continued practice of prolonged bed rest, a more rigid delineation and selection of cases for artificial pneumothorax, and increased use of thoracoplasty, concurrent with an anticipated widening of the indications for apicectomy and plombage with "Lucite" balls and an increasing clarification of the indications for excision (pneumonectomy and lobectomy).

The increased use of major surgery is partly governed by the very high standard of surgery and anaesthesia supplied by Mr. F. J. Clark and Dr. G. R. Troup, which is available to the team.

The opening of the new Royal Perth Hospital has made more beds available for the treatment of the disease in hospital. Reference has been made to the co-operation of the Hospital Board of Management, of the Medical Superintendent, Dr. Anderson, and of the Honorary Medical Staff.

The shortage of beds generally has led to the growth of a long waiting list. All new cases diagnosed are reviewed by Drs. King, Heymanson and myself with a view to determining firstly, whether hospital or sanatorium treatment is necessary, and secondly, to establish a priority of admission, taking into account both the individual needs of the patient and the public health. Many cases must inevitably be kept waiting for prolonged periods before they can be admitted for treatment and some patients cannot be admitted at all. As mentioned already, there are hundreds of infectious cases living in the community for whom no adequate isolation is possible and the risk to the public health is grave.

It is considered that during 1948 solid foundations were laid and that 1949 should see good progress in the building of a properly organised structure, provided that adequate staff is made available.

Acknowledgments are due to you for your understanding and advice, to the staff of the Branch and of the Sanatorium for their enthusiastic co-operation and to other officers of the Public Health Department.

(Sgd.) LINLEY HENZELL
M.D. London, D.P.H., B.Sc.
Director, Tuberculosis Branch.

REPORT OF TUBERCULOSIS PHYSICIAN
FOR YEAR ENDED 31st DECEMBER, 1948.

The Director of Tuberculosis Control.

I have the honour to submit a report of my activities for the year ended 31st December, 1948.

PERTH CENTRE.

Outpatient Clinic.

This clinic was conducted at the Royal Perth Hospital until May 19, when it was transferred to the Perth Chest Clinic.

The comparative figures of the attendances at the Royal Perth Hospital from January 1 to May 19, and the Perth Chest Clinic from May 19 to December 31, demonstrates the great increase in the number of cases handled since the opening of the clinic.

At the Royal Perth Hospital outpatient clinics were held on Wednesday and Saturday mornings and artificial pneumothorax clinics were held on the same morning with the addition of a further clinic on Thursday morning for ex-nursing staff.

Royal Perth Hospital.

January 1 to May 19.

Outpatient clinic attendances	1,600
Average per clinic	42

Artificial Pneumothorax Clinic—

X-ray screening and refill total attendances	624
Average attendance of main refill clinics	18
17in. x 14in. x-ray films taken total including:	610
Clinic cases	420
Nurses, metropolitan and country	139
Contacts	51

Perth Chest Clinic.

May 19 to December 31.

Outpatient clinics were held on Wednesday and Saturday mornings. Refill clinics were held on Tuesday and Friday mornings with supplementary clinics for ex-staff on Thursday mornings and a special refill clinic for workers at 5.15 p.m. on Friday.

Outpatient clinic attendances	3,128
Attendances apart from main clinics	1,505
Average per clinic	50

Total attendances 4,733

Total number of 17in. x 14in. films	3,137
Cases referred from general practitioners	1,760
Micro re-takes (see mass radiography)	695
Mining Industry—applications and re-admissions	173
Nurses—metropolitan and country	151

The remaining films were required for applicants for staff at Wooroloo, ordinary clinic patients, migrants, etc.

Artificial Pneumothorax Clinic—

X-ray screening, and refill attendances	1,227
Average attendance at main clinic	16.5
Ex-staff clinic	5
Workers' clinic	3

Patients with artificial pneumothorax as at 31/12/48—

Uni-lateral—Male	8
Female	49
Total	57
Bi-lateral—Male	2
Female	6
Total	8
Total	65

Cases referred by medical practitioners (17in. x 14in. and 35mm. films)	1,965
Normal x-rays	1,473
Total number of abnormalities of all sorts diagnosed	521

Cases of pulmonary tuberculosis diagnosed and admitted to hospital (Royal Perth Hospital, Wooroloo Sanatorium, Hollywood, and Edward Millen Home)	102
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The latter figure includes cases diagnosed previously to their attending the clinic.

Cases recommended further x-ray examination and observation	134
Other conditions diagnosed by association of x-ray appearance and clinical findings, in some cases by x-ray follow-up	285

Including chronic bronchitis and emphysema	40
Cardiac abnormalities	27
Bronchiectasis	24
Silicosis	24
Pulmonary fibrosis of unknown etiology	20
Pneumonic process (non-tuberculous)	18
Marked bony abnormalities, scoliosis, etc.	13
Pleural shadowing	14
Carcinoma of the lung including secondary carcinoma (1)	10
Other pulmonary tumours	1
Bronchial asthma	6
Spontaneous pneumothorax	5
Lung abscess	3
Cystic disease of the lung	2
Aneurysm of the aorta	2
Pneumonitis (non-tuberculous)	32
Old empyema	2
Atelectasis (unexplained)	1
Calcification of the pleura	1

Over 3 per cent. of all cases referred to the clinic by doctors with symptoms referable to their chest, were found to be suffering from active pulmonary tuberculosis. This figure compares with others, e.g., Toussaint and Pritchard, *Post-Graduate Medical Journal*, London, May, 1944.

Other patients attending clinic—

Silicosis	28
Bronchiectasis	12
Chronic bronchitis and emphysema ..	8
Empyema	4
Bronchial asthma	3

All non-tuberculous cases, except those suffering from silicosis, are referred to the Medical Out-patients' Department of the Royal Perth Hospital, but some continue to attend. It is considered justifiable to continue to supervise cases of silicosis at our clinic. These are x-rayed at 12-monthly intervals or more frequently if silico-tuberculosis is suspected when bacteriological investigation is also carried out.

The appointment of Dr. Frank Heymansson as Assistant Tuberculosis Physician on May 10 has greatly assisted the work of the outpatient clinic.

The assistance of the Director during the heavier periods of the clinic is much appreciated.

The help of the Public Health Registrars during a proportion of the clinic mornings is acknowledged.

Mass Radiography (35mm.).

Perth Chest Clinic.

This has been in steady use since 24th May, 1948, a total of 8,410 exposures having been made. A leeway of 1,100 contact x-rays was first made up. Important groups then surveyed included:—

Public Service	1,400
Migrants	855
University students	702
Australian Military Forces personnel ..	569
Minor groups included—	
Dental Hospital	85
Police recruits	50

A number of the general public availed themselves of this service, approximately 3,000, but this unit has not been widely publicised as it would have unduly overloaded the staff and record system, apart from detracting from the priority group system of mass radiography as mentioned in your annual report of 1947.

Result of Surveys.

Perth Chest Clinic.

Number examined	8410
Number of 17 x 14 re-taken	695
Number of cases of pulmonary tuberculosis discovered	19
Number of cases recommended further x-ray observation	80

Other conditions diagnosed by x-ray appearances in association with clinical examination:—

Silicosis	23
Pulmonary fibrosis of unknown etiology	19
Chronic bronchitis and emphysema ..	10
Cardiac abnormalities	9

Bronchiectasis	9
Pleural shadowing	6
Bony abnormality (minor degree such as cervical rib, bifid rib, not reported on)	6
Old empyema	2
Cystic disease of lung	2
Lung abscess	1
Tumour of lung (? dermoid cyst) ..	1

The percentage diagnosis of pulmonary tuberculosis is .23 per cent. slightly over two per 1,000.

This is in accordance with other known figures, but cannot be taken as an exact indication of the amount of pulmonary tuberculosis in the community because of the inclusion of 1100 contacts and 855 migrants amongst those surveyed (it has not been possible to dissect these figures). The high number of silicosis picked up, namely 23, is due to casual attendance of ex-miners who have a habit of attending for x-ray examination.

It is to be noted that the percentage of 17 x 14 re-takes, namely 12 per cent., is high. This can be accounted for by the fact that we have been standardising our micro pictures (by means of a gradiculer from the Commonwealth X-ray and Radium Laboratory) as well as training medical officers of the Department, the Assistant Tuberculosis Physician, and the successive Public Health Registrars in the interpretation of chest x-rays.

Mobile Caravan Unit.

The mobile unit has as yet been used for two surveys totalling 2983 exposures:—

Claremont Mental Hospital and Heathcote staff and patients	1821
Waterside workers	1162

Claremont Mental Hospital Patients:—

Males:—

No. of patients examined	720
No. of 17 x 14 re-takes	50
Pulmonary tuberculosis—active—	
Bilateral disease	21
Unilateral disease	29
Inactive calcified lesions	19
Suspect tuberculosis	8
Pneumothorax	1
Chronic inflammatory conditions (bronchitis, bronchiectasis) ..	
.. .. .	3
Abnormality of the heart and aorta	6
? Pulmonary congestion	1
? Pulmonary neoplasm	3

Females:—

No. of females examined	570
No. of 17 x 14 re-takes	66
Pulmonary tuberculosis—active—	
Bilateral disease	11
Unilateral disease	8
Inactive calcified lesions	16
Suspect tuberculosis	9
Abnormality of the heart and aorta	8
Chronic inflammatory conditions (bronchitis, bronchiectasis, etc.) ..	
.. .. .	5
? Pulmonary or mediastinal neoplasm	3
Pleural shadowing	2
Artificial Pneumothorax	1
Inter-lobar pleurisy	1

As distinct from the usual custom of the Perth Chest Clinic which is not to attempt the diagnosis of active or inactive disease on the radiological appearance alone, in this case, owing to the particular nature of the survey, the diagnosis of active disease has been made on the radiological appearance alone. This was helped in so far a large number of the cases diagnosed active had definite signs of cavitation present.

The value of this survey lies in the fact that the active cases of pulmonary tuberculosis can be isolated and the danger to the nurses and orderly staff minimised.

The percentage of cases of pulmonary tuberculosis discovered, 7 per cent. males and 3 per cent. females, giving an average percentage of 5 per cent., is in accordance with surveys in mental institutions in other countries, Ref. The Tuberculosis Problem in Mental Hospitals, Herman Hilleboe, Journal American Hospital Association 1940.

Survey of Waterside Workers:—

No. surveyed	1162
No. of 17 x 14 films	70

Results to date:—

Pulmonary tuberculosis	2
Requiring further observation	11
Silicosis	6
Chronic bronchitis and emphysema	4
Cardiac abnormalities	4
Aneurysm of aorta	1
Old empyema	2
Pleural shadowing	1
Osteoarthritis (advanced of the spine)	1
Cases remaining to be checked (not reported for 17 x 14 films)	20

These results are not quite complete as the micro-survey was finished only in December.

Royal Perth Hospital.

Outpatients.

As from 15/6/48 Dr. R. R. Anderson, the Medical Superintendent, commenced a programme of Mass Radiography of all outpatients.

This is a profitable field of investigation to discover cases of active pulmonary tuberculosis.

Dr. F. Heymansson, the Assistant Tuberculosis Physician, is handling the follow-up cases referred to the Chest Clinic. He reports as follows:—

No. referred to 31/12/48	203
No. contacted (to date)	36
Cases diagnosed pulmonary tuberculosis	5
Cases for further observation	16
Normal	16
Other pathology	10

Inpatients.

The allocation of six beds in Ward 11 to me by the Director during the year is much appreciated.

Fremantle Centre.

Outpatient Clinic.

This clinic is conducted once a week on Thursday afternoons.

Total attendance during the year	970
Average attending per clinic	19
Attendances of known cases of pulmonary tuberculosis	398

Contact x-rays	222
Cases referred by general practitioners and casual attendances at the clinic	350
New cases of pulmonary tuberculosis referred, diagnosed through clinic	22
Artificial Pneumothorax Clinic.	
Cases attending for refills	14
Average number of attendances per week	5

Inpatients:—

The small three-bed female ward has again proved invaluable in view of the general shortage of beds for female patients. These beds are used mainly for new cases awaiting a bed at Wooroloo, or convalescent cases from Wooroloo who are transferred to thus make a bed available.

Wooroloo Sanatorium.

Weekly visits are made when possible on Tuesday afternoons, to assist in the review of cases.

Repatriation General Hospital, Hollywood.

The Repatriation Department have now built up a fine team of Tuberculosis Medical Officers and are to be commended for the facilities available for immediate investigation of any suspected cases of tuberculosis in ex-service personnel, and for the hospitalisation of any case necessary.

As anticipated, in last year's Report, with the increased work in the Chest Clinic and the ability of the Repatriation Medical Officers to cope with the work, my visits to Hollywood have been gradually reduced, from four half-days to three half-days as from May 1st and from three half-days to two half-days from the 17th October.

Visits are now made on Tuesday mornings and Friday afternoons for operative and consultant work only.

Outpatients:—

This clinic has now more or less stabilised at approximately 500 (200 1914-18 and 293 1939-45 wars) and includes 458 notified cases of pulmonary tuberculosis, a result of complete check of records of those receiving pensions for pulmonary tuberculosis. All cases are called up at appropriate intervals by an appointment system, and Dr. W. P. Harris is to be commended on the work of this clinic, which could well be taken as a model for any outpatient clinic.

A Public Health visiting nurse attends this clinic to afford liaison and follow-up of patients.

There are 76 cases of artificial pneumothorax attending this clinic, necessitating over 2,000 x-ray screenings and refills during the year.

Inpatients:—

As at the 31st December, 1948, there were 90 known cases of pulmonary tuberculosis in the wards. Fourteen cases were receiving artificial pneumothorax.

Civilian Patients:—

The provision of eight beds for female civilian patients, with the approval of the Minister for Repatriation has been much appreciated and has done a lot to ease the strain of the provision of accommodation for female sufferers of tuberculosis.

Pleuroscopy and Adhesion Section:—

These totalled 14 operations, six of pleuroscopy only, eight of adhesions section on six patients (2) two stage operations.

Cases referred to the Repatriation Department (from Perth Chest Clinic):—

Pulmonary Tuberculosis	31
Pulmonary Tuberculosis admitted to Hospital	31
Discovered by medium of practitioner	20
Discovered by medium of mass survey	11
Suspect cases of pulmonary tuberculosis admitted to hospital for D and R chest	14
By medium of practitioner	3
By medium of mass survey	11

Miscellaneous.

Mantoux survey of University students.

This was carried out by the Assistant Tuberculosis Physician in September. He reports:—

No. tested	685
Positive reaction (to 1st or 2nd strength)	436
Negative (to 1st or 2nd strength) ..	244
Percentage of positive reactions ..	62%

This percentage is average for an age group 19-25. It is important to be placed on record for future reference for epidemiological purposes in this State.

The concurrent mass x-ray of 720 university students did not disclose any active cases of pulmonary tuberculosis (see mass radiography).

Australian Medical Congress—August.

As Honorary Secretary of the Section of Public Health, Tuberculosis and Tropical Medicine, considerable time was necessarily expended before and during the Congress on the duties of this position.

A paper on the "Control of Pulmonary Tuberculosis" was read as part of the discussion on this subject at the Plenary Session of Congress. A paper on "Tomography as an Aid in the Diagnosis and Treatment of Pulmonary Tuberculosis" was prepared and read at a combined meeting of the Section of Radiology and Section of Public Health Tuberculosis and Tropical Medicine.

A paper on "The Use of Physiotherapy in the Operation Thoracoplasty" was prepared and read at a combined session of the Section of Surgery and the Section of Public Health Tuberculosis and Tropical Medicine.

Conclusions.

1. The Outpatient Clinic with its increased turnover since the opening of the Chest Clinic has amply fulfilled its functions in the diagnosis of cases of Pulmonary Tuberculosis from patients with symptoms suggestive of pulmonary disease, referred to the Clinic by medical practitioners.

2. The Mass Radiography Unit at the Chest Clinic in the initial period of its operation has fully justified its functions in the detection of unsuspected cases of pulmonary tuberculosis and other respiratory and cardiac conditions.

3. The Mobile Mass Radiography Unit has been of value so far in special surveys, and has proved its adaptability for future surveys.

4. The main figures dealing with the activities of the Outpatient Clinic and the Mass Radiography Unit have been arrived at by the perusal—with the assistance of the Assistant Tuberculosis Physician—of over 4,000 files.

This was of necessity performed outside normal duty hours.

With the increasing activities of the Clinic and parallel growth of files, it would be an impossibility in the future to arrive at any figures by this means. Also this method cannot be regarded as statistically correct.

5. At the same time a check of the existing Tuberculosis Register shows several discrepancies as at 31/12/48.

Total number of cases of tuberculosis on Register, city and country	2,573
Total number of cases of pulmonary tuberculosis on Perth Chest Clinic files	430
Total number of cases of pulmonary tuberculosis on Repatriation Department files (city and country)	458
Total number of metropolitan cases (civilian and Repatriation) checked in their homes by visiting nurse	83
Patients in hospital	287

Even allowing for country cases, it appears that we have lost track of a number of individuals. This may be partly explained by failure of transfer of records of patients from the Royal Perth Hospital Outpatient Department to the Chest Clinic.

6. I do not see any means of the establishment of an efficient Case Register with the existing staff and I would urge the appointment of a medical statistician solely for this purpose, which is an integral part of tuberculosis control.

I would like to express my appreciation to the Director for his encouragement to me in my work, to the Assistant Tuberculosis Physician (Dr. F. Heymanson) for his able assistance, and to the visiting nurses for their ever-ready co-operation in our daily problems.

ALAN KING,
Tuberculosis Physician,
Department of Public Health.

28th February, 1949.

ANNUAL REPORT FOR WOOROLOO SANATORIUM.

The Director of Tuberculosis,
Perth Chest Clinic,
17 Murray Street, Perth.

I have the honour to submit hereunder a report on the activities of Wooroloo Sanatorium during the year ended December 31, 1948.

ACCOMMODATION.

Patients.

During the latter part of the year work was commenced on the renovation of the wards, the electric wiring in each ward being renewed, and an overhead light installed over each bed in addition to ceiling lights, and the wards being painted completely, both inside and out. In addition duplicate wiring is being installed for the wireless headphone system. The improvement in the appearance of the wards as a result of the interior decoration is most pleasing.

As yet it has been impossible to provide further amenities for the patients in the form of study and sitting-rooms and a library. Although steps have been taken towards the transfer and re-erection of the Northam Red Cross hut, as yet no satisfactory arrangements have been made, and because of the shortage of accommodation occasioned by the renovation of wards, it has been impracticable even to consider converting any of the male wards into a sitting-room or study for male patients. When the Red Cross Handcraft Centre is moved, it is intended to use half as a Handcraft Centre and Occupational Therapy Department, and half as a sitting-room and library for male patients.

Staff.

At the beginning of the year, rebuilding of the four huts obtained from the Commonwealth Disposals Commission was completed and they have provided accommodation for married members of the male staff. Comprising in all eight flats, they have helped materially to alleviate the problem of accommodation for male staff and their families. There are, however, still a number of members of the staff whose families are forced to remain in the metropolitan area, or at long distances from the Sanatorium, because of a residual lack of accommodation, and it is hoped that the six workers' cottages which have been approved may be built as soon as possible. Provision of accommodation for the wives and families of our staff will obviate the loss of valuable members, which repeatedly occurs.

During the year a large area was enclosed on the top block to provide a common sitting-room for male and female members of the staff, and this provided a most welcome addition to the accommodation for all members.

The Public Works Department proceeded with plans for the erection of quarters for sick staff, but as yet work has not commenced on the building of these quarters.

STAFF.

Resident.

Dr. Letham resumed duty on the medical staff at the beginning of July, after 12 months' sick leave, and his assistance, both in general ward work and in the pathology laboratory, since his resumption, has been most welcome.

Dr. Greer has rendered valuable assistance throughout the year, both in the wards and also in charge of the x-ray department.

In January Dr. Fisher was transferred from the North-West service to the Sanatorium, and throughout the year has worked conscientiously and shown a keen desire to increase his knowledge in the various aspects of tuberculosis.

Dr. Gibson joined the staff in May, and after three months' excellent work was transferred to Perth Hospital to continue in the tuberculosis service. He was at all times most enthusiastic and conscientious, and I take this opportunity of thanking him for his assistance and offering him best wishes in his further study of tuberculosis.

Throughout the year a Resident Medical Officer from Perth Hospital has been in residence during each month. The work and interest of these residents has been consistently good, and it is felt that the month spent at Wooroloo Sanatorium should be of considerable value to them, and also, from a long term point of view, to the Tuberculosis Service generally, as it increases their knowledge and "awareness" of tuberculosis and the difficulties associated with its early diagnosis, to the benefit of their patients, on their entry into private practice.

Consultant.

Throughout the year the regular visits to Wooroloo of Dr. King and yourself have been anticipated keenly by all members of the resident staff. The weekly discussions have included all aspects of the tuberculosis problem, and the benefit obtained from them has been considerable. The broader outlook which is gained by debate on controversial subjects with more experienced tuberculosis physicians, is of inestimable value to those of us who must of necessity tend to become narrow in our views, particularly because of our isolated position. I would take this opportunity of sincerely thanking you and Dr. King for your ready advice and sympathy in all matters concerning the Sanatorium.

With the opening of the Perth Chest Clinic, the usual monthly meeting of the chest surgical team at Wooroloo ceased and these meetings have been held instead at the clinic. Apart from the fact that under these conditions it is impossible for the surgeon, anaesthetist and physician to visualise their patients before transfer to Perth for operation, it is felt that the transfer of the meetings to Perth has been an improvement, as more time can be devoted to the actual discussion of each case.

The consistent interest shown by the surgical team has been an active stimulus to our work at Wooroloo throughout the year. Mr. F. J. Clarke has made a number of visits to the Sanatorium to observe the post-operative course of the patients who have been subjected to his extremely skilful treatment at Perth Hospital and his continued interest and advice have been appreciated.

During the year we received visits from Dr. W. H. Wunderley, Dr. A. R. Pennington and members of the Australian Medical Congress which was held in Perth in August. An extremely interesting day was held on the Sunday preceding Congress week, when a visit was made by Drs. Wunderley, Darcy, Cowan, Cotter Harvey, deLambert, Godby and Officer Brown in addition to members of the consultant staff, and, following a general inspection of the institution, a most stimulating review of surgical and problematical cases was held.

We are grateful to Dr. A. N. Kingsbury for his continued interest in the pathological side of the work at the Sanatorium, and all members of the medical staff would extend to him their best wishes on his retirement.

Professor W. A. Young, who succeeded Dr. Kingsbury as Government Pathologist, has also been of considerable assistance on many occasions with ready advice and constructive criticism, and has in addition made available for our use, any culture media which have been required by the laboratory.

Nursing.

The early part of the year was marked by an acute shortage of nurses, particularly female probationers. Indeed the position was such, at the beginning of April, that it appeared almost impossible to keep the entire female side of the hospital open. Assistance was given however, by the Salvation Army Women's Service Guild, which provided six voluntary workers each day to help with general ward work and cleaning. These voluntary helpers were transported from Perth each morning and returned at night in a bus which was kindly lent for the purpose by the Australian Red Cross Society. In addition Red Cross Volunteers offered their services on Sundays, the Red Cross Society providing their transport. With this assistance and the additional help given by a number of women who joined the staff temporarily, it was possible to keep the Sanatorium open, and all female beds occupied, until the beginning of June, when the situation was considerably eased by the arrival of forty displaced persons from Bonegilla, 20 joining the nursing staff and 20 the domestic staff. It is difficult to express the appreciation felt for the splendid service rendered by the Salvation Army and the Red Cross during this period of extreme urgency; and grateful recognition is also recorded of the services of Sister Michell and the nursing assistants who also answered our call for assistance.

Throughout the year, several more displaced persons commenced work, but there has been a considerable rate of resignation amongst them. In addition there has been a considerable diminution in the numerical strength of the male nursing staff, and as a result the staff situation has again deteriorated, until now the numerical strength is as low as it has ever previously been.

Of the displaced persons who have joined the staff, many have absconded or been allowed to resign, several remain as domestics, and twenty-five remain on the nursing staff. Of these the majority are industrious workers, and at the State Educational Examination held in December, eight succeeded in qualifying to commence their Tuberculosis Training. It is felt that these probationers will form the nucleus of a very valuable body of nurses. To date the shortage of staff, however, has prevented their transfer to the Preliminary School at Northam.

Consideration of the state of the trained staff during the year reveals an exceedingly high casualty rate, the reason for which is not difficult to find. In June there were 14 sisters on the staff, and in spite of the fact that during the year ten other trained nurses joined the staff, there remain at present only nine, and three more have expressed their intention of leaving in six weeks. Fear of tuberculosis is one factor responsible for the high rate of loss, but a considerably more important factor is the scarcity of amenities. Isolated as the Sanatorium is, the nursing staff must rely on their own resources entirely for entertainment in their off duty time, and it is understandable why they rapidly tire of their segregation and seek employment in centres where conditions are more attractive. It is considered that if amenities could be improved, less difficulty would be met in obtaining and keeping adequate nursing staff, both trained and untrained.

In spite of the lack of numbers and often trying conditions however, the entire nursing staff, under Matron Lochhead's able and conscientious guidance, has worked nobly, and I am sincerely grateful to all members for their loyal and wholehearted support.

Secretarial.

The Secretarial side of the Sanatorium, under Mr. Stansfield, has run efficiently and smoothly throughout the year. Mr. P. Brailey resigned his position as male clerk in February, being replaced by Mr. R. G. Pead. Miss P. Elfverson was transferred to the Chest Clinic in January, and her place as senior typist was taken by Miss M. Parker.

Laboratory.

Throughout the year the laboratory has continued to work efficiently with Miss Bothwell as senior technician. Dr. Letham rejoined the staff and resumed his position as Resident Pathologist, in July. Miss V. Gillam, who assisted with haematology, left the Sanatorium in April, but during the latter part of the year Miss C. Visseher has assisted Miss Bothwell both with bacteriology and haematology.

In addition to a large series of cultures, guinea pig inoculations have continued during the year, forty-one pigs being inoculated in all. A summary of work done in the laboratory is as follows:—

		Per cent. possible for T.B.
Sputum examinations (direct smear)	638	78
Sputum examinations (concentration)	400	32
Sputum examinations (culture)	1079	18
Gastric contents (culture)	91	13
Pleural fluid examinations (concentration)	69	20
Pleural fluid examinations (culture)	49	33
Urine examinations (culture)	28	15
Guinea pigs inoculated (sputum and gastric contents)	41	26
Urine examinations (Micro and Biochemical)	140	—
Other bacteriological examinations	50	—
Blood counts	120	—
Sedimentation rates	90	—

Mention has already been made of our indebtedness to Drs. Kingsbury and Young, who throughout the year have offered valuable suggestions and advice regarding pathological technique, and reported on pathological specimens.

Approval has been obtained for the purchase of a microtome and a small paraffin oven, and it is hoped, as soon as these are available, to commence histological work in connection with the pathology museum being instituted at the Sanatorium. This, it is felt, will add considerably to the interest and educational facilities, particularly when used in conjunction with the x-ray museum.

X-ray.

Under the control of Dr. Greer, the x-ray department has rendered valuable service. Mr. J. Park, who served efficiently as radiological technician at the beginning of the year, in Dr. Greer's absence, returned to the Chest Clinic in April. Details of x-ray screening examinations are as follows:—

Screenings	2,852
Radiographs	2,525

Engineering.

Mr. C. Roberts, after a long period of service, resigned his position as chief engineer, in September. His place was taken by Mr. H. Staekhouse, who has since his appointment shown keenness and ability in handling all matters concerned with the engineering side of the institution.

During the year a census of the electrical load on the existing power revealed a very small reserve, and as a result authority has been granted for the acquisition of a new 60 H.P. generating engine. Approval has also been obtained for the installation of a new telephone system, which it is hoped will be a considerable improvement on the obsolete system at present in action.

Ground Staff.

Under Mr. E. Dowell as head groundsman, the ground staff have worked consistently throughout the year, and the programme of improvements to the Sanatorium grounds has been continued. Further lawns and shrubs have been planted between the male blocks, and in addition a nursery was erected, which will undoubtedly serve a very useful purpose.

Kitchen.

In spite of the fact that no dietician could be obtained during the year, the kitchen staff worked conscientiously, and a number of improvements were made in the actual preparation and serving of meals. Four new electrically heated food trollies, obtained from the Northam Military Hospital, were employed, and food was served from these at the door of each ward on the male blocks. In this way the patients were able to receive their food hotter and in a more appetising state than previously. In addition fly-wire enclosures were erected just outside the main kitchen, to prevent the contamination of food by flies during the loading of the trollies, and in an effort to diminish the number of flies entering the kitchen. In this way the blowfly menace was kept largely under control during the early summer months. The number of special diets ordered for patients increased considerably, and the appointment of a special diet cook is considered justifiable.

Treatment.

The number of admissions, discharges and deaths, compared closely with those of previous years.

	Admissions.	Discharges.	Deaths.
1944	231	206	55
1945	230	166	57
1946	214	167	46
1947	232	194	32
1948	219	189	45

Collapse therapy has been employed in all cases where possible, primary thoracoplasty again being used in preference to artificial pneumothorax in a considerable number. A review of all cases by the full resident staff, in consultation with Drs. Hensell and King, has been carried out prior to the institution of any active treatment, and all candidates for major surgery have been viewed by the full surgical team in consultation with the chest teams of Royal Perth Hospital and Repatriation General Hospital, Hollywood.

In addition to collapse therapy, resection was performed on nine cases, including seven pneumonectomies, and two lobectomies.

The exact figures for active treatment during the year are as follows:—

	Females	Males
Artificial Pneumothorax		
Inductions, or attempted inductions	19	12
Satisfactory A.P.	12 (63%)	5 (42%)
Unsuccessful attempts	2	—
Unsatisfactory A.P., but abandoned without complications	4	6
Complications	1	1
Thoracoscopies .. .. .	..	29
Pneumolysis complete in .. .. .	..	13
Refills .. .. .	..	1,385
Aspirations (pleural) .. .. .	..	73
Phrenic Crushes .. .. .	..	2
Pneumoperitoneum .. .. .	..	2
Thoracoplasties .. .. .	..	16
		(40 stages)
Pneumonectomies .. .. .	..	7
Lobectomies .. .. .	..	2
Bronchoscopies .. .. .	..	33

Streptomycin.

Streptomycin was used on selected cases throughout the year, and proved of inestimable value in the control of laryngeal and tracheo-bronchial disease, wide-spread broncho-pneumonia and acute exudative disease, and pre- and post-operatively in conjunction with resection, or with thoracoplasty in cases with proven bronchial disease.

Leprosarium.

There is one patient only in the leprosarium. During the latter part of the year sulphatone was used in the control of this patient's florid cutaneous and laryngeal lesions, with considerable improvement in his appearance and his general condition.

Rehabilitation.

Miss M. Mort continued her conscientious service as Occupational Therapist, being concerned mainly with the inauguration and management of a "sheltered workshop." This workshop has provided employment of a light, part-time nature for many patients throughout the year, and a considerable amount of excellent work has been done. The main difficulty concerned with the workshop is the marketing of lines manufactured, and the search for articles for which there is a ready sale has occupied much of Miss Mort's time and thought during the year. With the solution of this problem, it is felt that this project, together with other aspects of the colony, will provide a most valuable medium of rehabilitation, particularly for chronic long-term cases in the Sanatorium.

During the year Mr. W. Skipworth, a patient of the institution and an ex-State school head teacher, was appointed Rehabilitation and Vocational Guidance Officer, and he has shown extreme enthusiasm in his new position. All patients are at present being reviewed with regard to the possibility of re-education and re-employment, and it is felt that under Mr. Skipworth's guidance the majority of patients fit for discharge will be able to enter new and suitable employment, satisfactorily equipped for it.

Miss J. Chapple, as Red Cross Handicraft Worker, has fulfilled a most useful purpose in providing material for and assisting patients with, diversional handicraft, such as leather work and the manufacture of gloves and felt toys.

Social Welfare.

Enquiry into the domestic and social worries of patients has been largely the responsibility of the visiting nurses of the tuberculosis service during the year. This arrangement has been entirely satisfactory, particularly in view of the fact that the visiting nurses are in contact with the patients before their admission to the institution and with their families subsequently. Many problems inevitably arise during a patient's stay in hospital, and a review of these problems by the medical officer, the rehabilitation officer and the visiting nurse is often successful in overcoming the difficulties.

Entertainment.

During the winter months a series of lectures and recitals of "Everyman's Music" were arranged by the Adult Education Board and provided consider-

able enjoyment for both patients and staff. We are grateful to the Adult Education Board for the work involved in the preparation of the programme, and also again to the Red Cross Society which provided transport for the lecturers and artists, and also funds to defray half the expenses incurred.

In addition plays were presented by the Repertory Club and Baden Players, and a variety evening by the Wundowie Social Club, and these, together with pictures twice weekly, contributed to the patients' amusement and entertainment during the year, and are gratefully acknowledged.

We are further indebted to the Red Cross Society for the gift of a new amplifier and microphone for the headphone system. Mention has already been made of their assistance in regard to staff during the period of acute shortage in April and May.

The Lotteries Commission have generously donated money for the purchase and installation of a new motor alternator for the talking picture apparatus, and for acoustic bricks with which to line the patients' recreation hall.

Colony.

The outstanding event concerning the Colony during the year was the Hospital Queen Contest by which the Colony raised over £15,000. The competition was organised for the Colony by Mr. H. Dunn, and the committee is extremely grateful to him and to the many queens and their committees and voluntary supporters, whose enthusiastic efforts were largely responsible for the success of the appeal. As part of the programme organised in aid of the Sanatorium Queen, a fete was held at the Sanatorium in September, and proved most successful, largely due to the untiring efforts of the Woorloo Queen Committee and their voluntary helpers, both on the staff and among the patients.

It is pleasing to report that during the year ex-patients were employed as full-time managers of the tin-smithy, orchard, and garden, and all members working for the Colony have shown considerable enthusiasm in the various aspects of Colony work with which they are concerned.

It is regrettable that to date no building has been erected by the Colony, but it is hoped shortly to commence work on a house for the secretary. In addition consideration is being given to a scheme to erect a hostel for male patients who are working for the Colony and who are fit for discharge from the actual wards, but whose disease necessitates continued observation and work under sheltered conditions. It is hoped to provide accommodation in this hostel for 20 to 30 workers, which will considerably increase the available accommodation for male patients in the actual Sanatorium.

Dairy Farm.

Further losses in the herd were sustained in February after a follow-up tuberculin survey. Nevertheless a considerably larger quantity of milk has been delivered to the Sanatorium throughout this year than in previous years, thanks to the untiring efforts of the manager, Mr. W. Wallace, who has worked consistently under most difficult conditions throughout the major part of the year. Shortage of accommodation on the farm and the attraction of the nearby Wundowie iron works, have contributed to a serious loss of staff, and the manager

has frequently been extremely short-handed. It is therefore with sincere appreciation that I commend him for his continued efforts to maintain an adequate supply of milk for the patients and staff of the institution.

Poultry Farm.

A considerable increase in the yield of eggs was again a feature of the poultry farm records, and Mr. S. Roberts, manager, has continued to render sterling service. In addition to the poultry, he has continued his care of the guinea pig herd, and a large herd has now been established. Adequate housing was provided for the guinea pigs during the year, and losses through extremes of temperature have been less as a result.

Conclusion.

In conclusion, I repeat my appreciation of your help throughout the year, and express my gratitude to the Commissioner of Public Health, Dr. C. E. Cook, the Under Secretary, Mr. H. T. Stitfold, the Assistant Under Secretaries, Messrs. H. Thurkle and J. Devereux, and to other members of the staff of the Chest Clinic and Public Health Department for their ready advice and assistance throughout the year. I also desire sincerely to thank all the members of my staff, and especially Matron Lochhead and her nursing staff for their loyal support during the year.

H. R. ELPHICK, M.B.B.S.,
Medical Superintendent.

APPENDIX III

THE REPORT OF THE MEDICAL SUPERVISOR OF INFANT HEALTH.

The number of individual babies who attended centres throughout the State was 17,488 as against 15,392 for the previous year. These babies made a total attendance at the centres of 165,689 visits.

In addition, the Correspondence Nurse had on her roll 1,058 individual mothers and 246 expectant mothers in constant communication with her.

The total number of attendances at the centres and visits of sisters to infants' homes was 184,209 for the year and compares with 169,247 such visits the previous year.

A number of centres now have telephones installed. Advice was given by telephone or letter in 3,928 instances, not including the work of the Correspondence Nurse.

During the year, the full benefit was felt of the travelling infant health centres which have been established throughout the country districts in order to cater for the needs of scattered country mothers. This may be one of the factors which has reduced the infant mortality rate this year.

Eight infants under the age of one year were affected by poliomyelitis during the epidemic which was at its peak during the period under review.

The infant health work has continued to develop and expand. The following new country travelling centres were established on a full-time basis:—

Three Springs travelling centre, serving Carnamah, Coorow, Mullewa, Mingenew, Morawa, Perenjori, Mendel, etc.

Mundaring travelling centre, serving Toodyay, Clackline, Baker's Hill, Werribee, Wooroloo, Chidlow, Mount Helena, Sawyer's Valley, Mundaring Weir, Stoneville, Parkerville, Zamia, Glen Forrest, Darlington, Greenmount.

In addition to these two big travelling centres, the following sub-centres were established:—

Northcliffe by the Manjimup Centre.

South Bunbury by the Bunbury Centre.

Holyoake-Dwellingup by the Waroona Centre.

Ardath-Bilbarin by the Corrigin Centre.

Hurlingham by the South Perth Centre.

Jarrahdale, Serpentine, Mundijong, Mardella by the Armadale Centre.

Kendrup by the Albany Centre.

Buckingham by the Collic Centre.

There are now 38 full-time centres and 177 sub-centres. There is a sister in charge of each full-time centre. The sub-centres are controlled from the main centre; therefore an infant health centre is available in 215 towns and districts. Furthermore, the work of these centres, together with that of the Correspondence Nurse, covers the infant health of the whole State. No mother need be without the

advice of a qualified infant health sister and this fact is stressed in a small booklet which is distributed by the Rationing Commission to every expectant mother. In this booklet she is invited to visit the sister nearest her home town. A complete list of all our centres, together with the days and hours that each centre is open is clearly set forth in the booklet.

There has been great activity throughout the state in connection with infant health buildings. Many centres have obtained permits to build and are now either raising the money or making arrangements for the letting of contracts.

Kulin Centre erected and opened a new building, which is a credit to this small town and to those responsible. They bought a dis-used building, transported it to the site, and re-modelled it suitable for use as an infant health centre. It is the first post-war infant health centre building to be completed and opened.

Arrangements have been made and permission has been obtained for the division of some of the large metropolitan centres as soon as extra nurses are available. This will be a step in the right direction as some of these centres are too unwieldy both for the nurses and mothers, as many of the latter have to wait a long time before their babies can receive attention. Sufficient time must be made available to the nurse for home-visiting, which is one of the most necessary parts of the work.

The North-West.

The Correspondence Sister visited the North-West ports and stations circuit from Wyndham to Hall's Creek. She also visited Marble Bar and Wittenoom Gorge. All these visits were made entirely by air.

During these visits the sister examined as many pre-school children as possible as well as all the babies in the area.

These visits have now been established as routine and an Infant Health Sister, usually the Correspondence Sister, visits twice a year, viz., in May and November. The trips take from three to four weeks each.

Mothercraft Lectures.

For most of the year these lectures had to be suspended as the nurse in charge became ill and resigned. However, another nurse was appointed, but she cannot take up duty yet. When she starts her duties the work will be resumed and enlarged.

Pre-School Children.

Many Infant Health Sisters are making efforts to contact the toddlers in their district. Centres are gradually becoming equipped with special toddlers'

scales for both weighing and measuring. Mothers appreciate this section of the work and are co-operating well. Special cards are being obtained to keep detailed records of the progress of these children.

Scales.

The position in regard to infant scales is still unsatisfactory, the reason being that under the terms of the local Weights and Measures Act scales used in other parts of the world, and in infant health centres throughout the Eastern States, do not comply with the terms of the local Act and consequently it is impossible to import these scales. Those scales made in Perth which conform to the precise standards, are far too delicate for satisfactory weighing. The normal healthy babe will not sit still and it is very difficult to get an accurate weight with such delicate scales. It is to be hoped that "babies" scales can be specifically excluded from the local Weights and Measures Act. If this were done the position would fall into line with other places and would solve this problem.

Infant Health Committees.

Infant Health Committees are responsible for the provision, furnishing and cleaning of the centres, and also for the supply of a car if one is necessary for the work of the centre. A large amount of money needs to be raised for these purposes and this involves a great deal of hard work on the part of honorary committee members. Our grateful thanks are therefore given to all those who work so conscientiously in the interests of the mothers and babies in their districts.

Nurses.

The Infant Health Service is fortunate in having an excellent and loyal team of nurses who have worked well and faithfully over many years. The State owes them a debt of gratitude for the consistent interest and hard work which they have given so unstintingly over and above that for which they were paid.

Our thanks are also due to many of our ex-Infant Health Sisters who, although married and having their own home duties, have frequently returned to duty to enable a centre to keep open.

In view of the fact that many of our sisters are of an age where sick leave must be expected, it has been arranged for extra relief sisters to be put on our staff so that they will be available when needed for sick leave, etc. Only in this way can closure of centres be avoided.

The Lotteries Commission.

The Lotteries Commission have continued their substantial contributions to nurses' salaries and to the other expenses involved in the maintenance of centres. They have also, as usual, been generous in the provision of scales for new centres. The financial assistance from this source is gratefully acknowledged.

To sum up, the past year has seen further development in infant health work throughout the State, and whilst we have not had as many nurses as we could wish for nevertheless it has been possible to keep almost all the centres open and operating fully and efficiently.

(Sgd.) E. M. STANG,
Medical Supervisor of Infant Health.

APPENDIX IV

REPORT OF THE SENIOR MEDICAL OFFICER OF SCHOOLS.

This year, there were two doctors working full-time and one part-time on school medical examinations, and four nurses.

The Departmental medical officers examined 23,237 children, of which 13,272 were in the metropolitan area and 9,965 in country districts. The number of boys examined exceeded the number of girls by 100.

Of the 23,237 children examined, 5,029 were referred for medical attention and 7,589 for dental attention. 3,112 children were referred for medical attention because of tonsillar or nasal defects, and of this number 2,268 were in the metropolitan area and only 844 in the country districts. Of the 659 children referred for medical attention owing to defects of the eyes, the number was more equally divided between town and country, as 359 children were in the metropolitan area and 300 in the country districts.

The average child's index of nutrition of the total number of children examined, 16,721, were normal and only 3,525 were below standard. The rest were above the normal. This does not mean that those who were below standard were grossly so—probably in many cases they were only slightly lower than the normal. These figures show a distinct improvement on previous years.

The greatest improvement would appear to be in the metropolitan area where of the 13,272 children examined only 1,888 were under the recognised normal, whereas in the country out of 9,965 children examined, 1,637 were in this category.

Efforts were made by the Department to have children in remote country districts examined by the local doctors. This was not a general success, except in the North-West where the doctors are Departmental Officers. In general, doctors in private practice dislike making school medical examinations because they feel that the parents think that they are trying to get more work for themselves when they recommend certain children for medical

attention. Various doctors have been approached by the Department, at the request in many instances of the Parents and Citizens' Association or the local road boards, to carry out a regular annual medical examination of the school children, but it has been found that the full and consistent co-operation of the local doctor is not obtainable. Therefore whilst in theory this method may appear to be good, in practice it does not work out thus.

It is necessary that more doctors be appointed for the school medical service to ensure that more regular and frequent medical examinations can be made of all children throughout the State. Also it is equally necessary that more nurses be appointed to the school medical staff to enable "follow up" work to be done in the homes. This home-visiting is a very important section of the work, and without it a great part of the value of medical examination is lost.

Our nurses have done excellent work and it is due to their persistence that I am able to report that the percentage of pediculosis is this year the lowest on record. For the State Schools it is 1.4 per cent and for Convents 2.8 per cent, making an average total for the year 1.7 per cent. This low figure—and it is one of the lowest in the whole of Australia—represents consistently hard and zealous work on the part of our school nursing staff.

Eight hundred and fifty-seven home-visits were made, of which 724 were in relation to medical attention. Two hundred and fifty of these children had already received medical attention by the time the nurse visited the home, and a further 251 promised to seek it in the near future. Of the rest, some parents were disinterested; others were out, but they will eventually be visited again and urged to get treatment for their children. It is for this work, which is so necessary, that more school nurses are so urgently needed.

(Sgd.) E. M. STANG,
Senior Medical Officer of Schools.

APPENDIX V.

TO THE COMMISSIONER OF PUBLIC HEALTH.

Following is my report on the work of the Dental Staff for the year 1948.

It has been recognised for a long while that we had not enough school dentists to cope with the work asked of us, so following your request in April for four additional school dentists together with trailers to be used as mobile surgeries and cars to draw them, our Minister and then the Deputy Premier who has always been sympathetic, approved of the idea and Cabinet then agreed to it. The intention is to station the new men in country towns so that they will be responsible for regularly visiting all schools within a radius of from 100 to 200 miles; the mobile equipment will enable them to get out to the very small schools and operate on the spot.

Now in regard to the projected appointments:—

Advertisements in Australia brought no response from suitable men so applications were then invited in Great Britain. Towards the end of the year we received from the Agent General's Office a number of applications (with testimonials and qualifications attached) together with accounts of personal interviews which the Secretary had had with the applicants. Acting on this information acceptance of four was recommended and it is to be hoped that we shall be able to get the men out from Great Britain without undue delay.

In regard to equipment.

This also has been difficult to obtain, but by the end of the year I had got together enough small gear to be able to start men at work as soon as they are able to join us. It has not been easy to get the trailers on the way, but after thoroughly going into the question of plans and specifications with the Public Works Department, orders have now been placed. If the men arrive before the vehicles come to hand, their activities would have to be confined to the larger schools along railway lines, but I hope that that phase would soon pass and that before long the small out-back schools would receive regular visits from our staff of dentists.

Present Staff.

During the course of the year the three members of the staff besides myself have worked continuously amongst school children. Most of my own operational work however, has been done in Government Institutions which were finding it practically impossible to obtain private dental attention for their charges. The remainder of my time has been fully occupied in administrative work and in giving some assistance to Professor Radden and Mr. C. Terry who

have been conducting research work in relation to Poliomyelitis and Rubella respectively, in so far as it concerned school children and their teeth. I have also given evening talks to various public bodies.

I would like to mention here that the article which you asked me to write for the Local Authorities Journal and which was entitled "Teeth—with special reference to children" was afterwards printed in leaflet form and has proved popular with Parents and Citizens' Associations and Infant Health Centres.

Facts in regard to school work.

Number of country schools visited—45.
 Number of metropolitan schools visited—16.
 Number of children examined—2957.
 Number of children treated (with parents' consent)—1792.
 Number of children who needed no attention—505.
 Number of children who were being attended privately—166.
 Number of children whose parents did not desire treatment—494.

Operations performed were as follows:—

Silver Amalgam fillings	1269
Copper Amalgam fillings	2531
Cement fillings	1538
Porecelain fillings	114
Silver Nitrate treatments	1276
Other treatments	1282
Extractions	2806
Prophylaxis	215

In 16 cases work was done under general anaesthetic administered by a District Medical Officer.

During school vacations orphanages were visited, since children were still available there.

For several months during the year our work was interfered with to some extent by the Poliomyelitis epidemic. In trying to find some factor which may have been present in particular cases it was thought that open sockets in the gums following extractions could possibly be a mode of entry for the virus. From May to August therefore, practically no extractions at all were done. Later on it was contended that the chance of a child contracting Poliomyelitis soon after having teeth extracted was no greater than at any other time, so normal work went on again. As a matter of interest I kept a list of all children who had teeth taken out from September to the end of the year and in no case did any of those children become a Poliomyelitis case. When it is realised that only for a period of about two weeks after extractions had been done could it

be possibly argued that the virus could enter the system in direct consequence of the extraction, then it will be seen that so far as we know at present, extracting decayed teeth will not have a detrimental effect upon children. On the other hand, they are more likely to suffer ill health if badly decayed and abscessed teeth are retained in the mouth.

Facts about the Institutions.

During the course of the year I have made regular visits to Wooroloo Sanatorium, Claremont Mental Hospital and Fremantle Prison; while I have gone, when requested, to do emergency treatment at Heathcote and Sunset. I also made my annual visits to the Native Settlements at Carrolup, Moore River and New Norcia. Following are figures in regard to the large Institutions:—

Wooroloo.

Number of visits by patients to dental surgery	600
Extractions	192
Fillings	82
Prophylaxis	41
New dentures made	16
Repairs to dentures	18

In two cases extractions were done under general anaesthetics administered by the Medical Superintendent.

Quite a number of the visits by patients were in connection with old work, while it should be pointed out that in regard to new dentures it is necessary for the people concerned to present themselves about five times.

Claremont Mental Hospital.

Patients seen	701
Extractions	813
Prophylaxis	8
New dentures	41
Repairs to dentures	44

In 13 cases extractions were done under general anaesthetics administered by the resident medical officers.

Fremantle Prison.

Patients seen	279
Extractions	165
Fillings	65
Prophylaxis	19
New dentures	13
Repairs	16

In two cases extractions were done under general.

All work done for inmates of the prison was paid for by the men concerned at full Dental Hospital rates of fees. Money for dentures was paid to the Dental Hospital and money for other types of work to the Public Health Department.

Denture work at all the Institutions was done in conjunction with the Dental Hospital.

Research.

I have been interested for many years in the numerous theories which have been advanced in regard to cause and prevention of tooth decay. Apart from heredity which must play an important part, these theories can be divided into two main categories:—

A. Those which state that whatever the composition of the teeth when they erupt, they can be kept free from decay according to the food which is eaten by the child, particularly in its early years.

B. Those which state that if the pre-natal diet of the mother is correct and then also that of the child before its teeth have all erupted, then those teeth will come through composed of such perfect ingredients that they will never decay whatever type of food is eaten later on.

In regard to Class A. the best known and most widely accepted theory from 1900 until the present time is that of the eminent scientist Sim Wallace, M.D., D.S.C., L.D.S., F.A.C.D. In effect he says that dental decay is caused through too many carbohydrates such as cake, lollies, biscuits and sugar being eaten. This food lodges round the teeth and is there fermented by bacteria, thus causing an acid which dissolves the enamel of the teeth. For healthy teeth to be preserved he therefore advocated plenty of coarse fibrous foods and the limiting of easily fermentable carbohydrates. A variant of this theory as proposed by Edward Hatton, D.D.S., of Chicago is that the fermentation of the carbohydrates must take place in the presence of mouth yeasts. Another variant is that of Cecil Hearman of Melbourne University; he says that for decay to be produced the fermentation must take place when the diet is deficient in Vitamin B. More recently lead from water pipes has been blamed for tooth decay and phosphorus deficiency is another theory advanced.

In opposition to the above theories the following men have published statements:—

Charles Bodecker, D.D.S., of Columbia University, Dr. Evelyn Sprawson of the London Hospital Dental School and Charles Dillon, D.D.S. My own experiments with Wallace's theory leaves me no option but to state that I feel very guilty when I consider how I deprived my own children of biscuits, lollies, etc., when they were young, since their teeth could have been no worse if they had been allowed all they wanted of those tasty items.

Now in regard to Class B:—

(1) Mr. and Mrs. Mellanby, English research workers, proclaimed after several years' experiments that sound teeth, resistant to decay, could be produced by an early diet containing a good proportion of Vitamin D; the principal foods so used were milk, butter, cheese, liver, egg yolk, suet and cod liver oil. Charles Dillon agrees with this vitamin theory but it is opposed by Sim Wallace, Edward Hatton, Evelyn Sprawson and Sir Frank Colyer (author of text books). My own experiments, added to remarks I have heard from other local dentists, make me state that this vitamin theory seems, at present, to offer little of value.

(2) Dr. Sprawson, who disagreed with the acid and vitamin theories, advocated a daily ration of milk from babyhood to the age of 14 as an absolute preventive of dental decay. I must state in regard to this that the percentage of school children with perfect teeth is very low, yet many of them have had a daily bottle of milk for a number of years.

(3) Charles Dillon advises the use of calcium to all patients and finds its use beneficial. On the other hand Drs. Ockerse and Malan of the South African Department of Public Health fed dicalcium phos-

phate and calcium carbonate to a group of 80 children over a period of 3 years; using a similar number as controls they were able to show that the extra calcium given to the first group did not add to their weight or height nor did it lessen their number of decayed teeth.

(4) In recent years fluorine has gained favour. Dr. Arnold of the U.S. Public Health Service informed us that in a certain Texas town which had a comparatively large amount of fluorine in its drinking water, it was noticed as a remarkable fact that the teeth of the people showed no sign of decay. On the strength of this report, experimenters are convinced that if one part per million of fluorine be added to fluorine-free drinking water, it would do much to prevent tooth decay in large centres of population; and New York City is actually carrying out an experiment along these lines. On the other hand a contributor to a dental magazine some time later refuted Dr. Arnold's theory by saying that in another Texas town with an equally high concentration of fluorine in its drinking water tooth decay existed; evidently some other factor was at work at Dr. Arnold's town.

(5) A variant of theories 3 and 4 is that propounded by Dr. Harvotian of Massachusetts; he says that a flour made by grinding beef bones to powder and fed to people in medicinal quantities will prevent dental decay. Shades of the old witches and their brews! Beef bones contain a mixture of calcium, fluorine and phosphorus.

Other Class B theories which have recently been advanced are as follows:—

(6) Ammonia in small quantities confers immunity.

(7) Penicillin in tooth paste prevents decay.

(8) Silver Nitrate plus sulphathiazole painted on the teeth prevents decay.

(9) Sodium fluoride painted on children's teeth will make those teeth immune to decay.

(10) Dr. L. Fosdick, Atlantic City, believes that tooth decay could be banished by adding glycerol aldehyde to all sugar at refineries.

Now a few notes by Mr. K. G. Drea of Ireland may be of interest. He wrote in 1940 as follows:—

"In my earlier trusting years I believed what I was told about supplying the expectant mother with calcium plus appropriate vitamins for the preservation of her own teeth and the development of sound teeth in her offspring. I now see those so treated practically toothless and their children often heading for the same condition. As against that I have seen farm labourers' wives rear a houseful of ill-fed children who have well nigh perfect dentitions. So much for balanced diet, calcium intake, etc. Twenty years of clinical experience have convinced me that the tendency to tooth decay runs in the family like most other pathological conditions; you can fight against it, but you can no more compel an unwilling body to produce sound teeth than you can add to a man's stature."

And L. W. Morrey, D.D.S., Chicago wrote in 1942:—

"Interested and sincere research workers, eager to solve this problem, working from different angles have built up an amazing array of scientific and sometimes unscientific data pertaining to the question. For instance we learn from one source that defects of the deciduous teeth are entirely due to pre-natal influence; from an equally well informed source, we learn that pre-natal diet or care has little or no effect on the deciduous teeth and it certainly has no effect on the permanent teeth.

"Between the period of 1900 to 1925 mouth cleanliness was quite thoroughly advocated as a preventive for diseased mouth conditions. So thoroughly was this idea exploited that serious controversies between the exponents of various toothbrush techniques waged fast and furious. Millions of dollars have been spent in developing and advertising different types of toothbrushes and toothpastes. The public have tried all more or less diligently, and certainly with indifferent success as dental disorders are not on the wane, to say the least. Now we are advised that the mere brushing of teeth has little, if any, effect on the progress of decay. In fact several authorities have been known to state that the use of toothbrushes has done more harm than good.

"Thus, the mass of evidence pro and con develops, with our diminishing faith in the efficacy of toothbrushes, we have turned, in the last few years, to diet as the solution of our problem. Calcium and potassium metabolism, vitamins, alkaline and acid intake influenced and regulated by the ductless glands are at the present time more or less popularly supposed to govern the progress of decay.

"Diet and ductless glands, vitamins and vittles have absorbed our fancy, and teeth are continuing to decay. This is not meant to be construed as an effort to belittle the work of the handful of earnest and conscientious research workers who are endeavouring to solve the problem. There is no doubt that the effort which these men are putting forth, together with similar efforts by their successors, will enable someone to put his finger on the cause of decay."

From the foregoing notes it will be seen that a number of the experimenters claimed their own discoveries as practically specific against dental decay; yet some of these theories were totally different in conception and most of the people concerned were emphatic in refuting the other man's idea.

Quite recently what seems to me to be a most reasonable theory, has been advanced by Clive Sandy D.D.S.C. (Melb.). He states that there are several regions in the world where sound teeth are still the usual and not the unusual thing. They are as follows:—

Hunza Valley, N.W. India where the diet is whole wheat bread, milk, fruit, fresh vegetables, meat.

Tristan D'Achuna—Fish, potatoes, sea birds, eggs, milk (plenty), a little of vegetables.

Certain Chinese peasant groups—similar food to that of the Hunza Valley except that rice is used instead of wheat.

Esquimaux, Iceland, Faroes—Carnivorous diet, almost entirely from the sea.

To the above he could have easily added our own Australian natives (wild state) whose diet is meat, roots and nuts or fish.

Now the common factor to those groups is the fact that they consume "whole" foods. i.e.

- (a) All edible parts are consumed.
- (b) Foods are grown in soil to which all possible wastes have been returned.
- (c) They are all natural, unprocessed foods.
- (d) Diet starts with the mother before birth of children.

Therefore if the descendants of each race individually kept to the original foods of their forefathers or similar foods which were indigenous to the country in which they lived and which fulfilled the above conditions, then these people should be assured of sound teeth.

Now in the light of the foregoing, remembering that it has been variously claimed that biscuits etc., have a deleterious effect; that milk, fruit, salads, etc., are good; and that heredity has a big influence I want to get back closer to home.

In an endeavour to trace some common factor in the diet or personal history of children who have been found during the course of our routine examinations to have good teeth, I commenced, three years ago, to send out questionnaires to the parents of the children concerned. When I state that out of approximately 9,000 children examined less than 200 were found to have perfect mouths (roughly 2%) it will be realised that a long while would elapse before a sufficient number of replies could be gathered to allow of anything concrete being established. However, as a matter of interest I have collated the information so far obtained. Not every question was answered in all cases but the total average number in each case is 170.

Questions asked and replies given are as follows:—

1. Q. Does the child eat many biscuits, lollies and cakes?
A. Yes—40. No—131.
2. Q. Does he eat much fruit and green salads?
A. Yes—159. No—14.
3. Q. Does he drink much milk?
A. Yes—132. No—42.
4. Q. Does he clean his teeth regularly?
A. Yes—129. No—46.
5. Q. Was he taken regularly to an Infant Health Clinic?
A. Yes—59. No—27 (only 86 replies).

6. Q. Have your other children good teeth?
A. Yes—128. No—13 (no other children—35).
7. Q. Do good teeth run in the father's or mother's family? (Are they hereditary?)
A. (a) Good teeth on both parents' sides—88.
(b) Good teeth on only one side, bad on other—53.
(c) Fair teeth on both sides—13.
(d) Bad teeth on both sides—16.
8. Q. Country of birth of parents?
A. (a) Both parents born in Australia—101.
(b) One in Australia, one in Great Britain—40.
(c) One in Australia, one foreign—10.
(d) Both in Great Britain—12.
(e) Both foreign—10.
(f) One in Great Britain, one foreign—2.
9. Question asked was, "Is there any other information which you think might help us?"

There were many interesting replies to this, mainly in regard to pre-natal diet and the types of foods to which the children were particularly partial. A summary is as follows:—

Twenty mothers stated that they took the following in concentrated quantities pre-natally:—

Calcium—15; Vitamins—1; Calcium and vitamins—3; very many oranges—1.

In regard to the children's diet the following articles of food were mentioned as having been consumed in comparatively large quantities:—

Milk—14; Concentrated Calcium—4; limewater—3; vitamins—2; codliver oil—7; fruit—5; apples (specifically mentioned)—23; fruit juices—5; greens—3; raw vegetables—6; carrots—4; cheese—6; eggs—4; wholemeal—2; some were mentioned in combination.

Twelve stated that their children were given as much cake, biscuits etc., as they wanted and in addition never cleaned their teeth!

The number of people so far questioned does not warrant us drawing any definite conclusions but it certainly seems as if a combination of many of the theories advanced should, if practicable, produce and maintain sound teeth.

I hope therefore that the day will come when the greatest part of every dentist's time will be spent in preventing decayed teeth and not in repairing and removing them.

(Sgd.) A. G. McKENNA,
Senior Dental Officer.

APPENDIX VI.
MEAT INSPECTION FOR YEAR ENDING 31st DECEMBER, 1948.

No. of Animals Slaughtered.	CARCASSES CONDEMNED.												PART CARCASSES CONDEMNED.												ORGANS CONDEMNED.																
	CARCASSES CONDEMNED.												PART CARCASSES CONDEMNED.												ORGANS CONDEMNED.																
	Emaciation.	Icterus.	Immaturity.	Mortboud.	Propharosis.	Umarkeable.	Pyrexia.	Gangrene.	Pneumo.	Pneumonia.	Sepsis.	Traumatism.	Tuberculosis.	Cysticercus Ovis.	Aethomycosis.	Carcous Lymphoid.	Tuberculosis.	Arthritis.	Umarkeable.	Traumatism.	TOTALS.	Abscess.	Aethomycosis.	Angiomatosis.	Chirosis.	Fatty Induration.	Hydrothorax.	Hydatids.	Melanosis.	Necrosis.	Pericarditis.	Pneumo.	Tuberculosis.	Umarkeable.	Parasita.	TOTALS.					
FREMANTLE DISTRICT (including Watson's Bacon Factory.)																																									
Cattle	22	4	4	14	75	1	6	71	420	1,373	699	151	20	177	58	426	20	59	314	230	285	316	10	113	2	150	35	128	60	1,268*											
Calves	69	5	14	8	1	8	1	1	128	61	136	128	6	1	61	45	30	30	136	136	2	2	6	134	3,240	3,240	3,551	3,551	3,551	3,551	3,551	3,551	3,551	3,551	3,551	3,551	3,551				
Sheep	68,117																																								
Pigs																																									
MIDLAND JUNCTION DISTRICT (including Foggett Jones Bacon Factory.)																																									
Cattle	109	1	2	1	7	550	2	1	694	4	355	426	1	2	1	426	20	811	216	538	297	60	230	41	14	2	111	16	1,085	138	2,747										
Calves	44,307																																								
Sheep	418,927																																								
Pigs	40,840																																								
* Malignancy 2.																																									
† C.L.A. 137.																																									
KALGOORLIE DISTRICT.																																									
Cattle	5,138																																								
Calves	99																																								
Sheep	40,501																																								
Pigs	2,372																																								
FREMANTLE MEAT MARKETS.																																									
Cattle	50																																								
Calves	847																																								
Sheep	61																																								
Pigs	77																																								
COUNTRY DISTRICTS.—Albany, Busselton, Collie, Bunbury, Geraldton, Narrogin, Wagin, York, Merredin, Rockingham, Preston, Northam and Katanning.																																									
Cattle	13,656																																								
Calves	1,983																																								
Sheep	99,020																																								
Pigs	5,047																																								
PEETH CITY MARKETS.																																									
Cattle	339																																								
Calves	14,595																																								
Sheep	54																																								
Pigs	220																																								

400 lb. Boneless Beef Putrefaction.

Total Animals Slaughtered and Inspected in Country Districts where Meat Inspection is carried out.

District.	Cattle.	Calves.	Sheep.	Pigs.	Total.
Albany	1,795	349	17,958	838	20,940
Busselton	990	52	4,593	340	5,975
Bunbury	2,035	694	13,298	1,072	17,099
Collie	1,671	64	9,347	322	11,404
Geraldton	1,467	249	14,514	714	16,944
Narrogin	1,052	54	7,021	365	8,492
Wagin	361	8	2,851	37	3,257
Northam	1,390	201	10,441	821	12,853
York	571	98	3,743	238	4,650
Merredin	632	55	5,417	214	6,318
Rockingham	437	63	2,994	58	3,552
Preston	437	18	2,682	88	3,225
Katanning	818	78	4,761	44	5,701
	13,656	1,983	99,620	5,047	120,410

APPENDIX VII.

Incidence and Mortality of Notifiable Infectious Diseases, 1948.

Disease Notifiable.	Cases Reported.	Deaths (a).
Amoebiasis	25	.....
Amoebic Dysentery	9	.....
Ankylostomiasis	101	.....
Bacillary Dysentery	17	.....
C.S.M.	16	4
Diphtheria	255	7
EP. Cat. Hepatitis .....	.....	.....
Infective Hepatitis	7	.....
Leprosy	49	1
Malaria	118	.....
Poliomyelitis	311	24
P.T.B.	325	157
Other T.B.	28	9
Puerperal Fever	5	6
Purulent Ophthalmia	4	.....
Rubella	50	.....
Scarlet Fever	268	.....
Tetanus	7	} 5
Tetanus Neonatorum	1	
Typhoid Fever	24	1
Typhus Fever	87	4
Undulant Fever	5	.....
Virus Encephalitis	4	1

(a) Excluding full blood aboriginals.

One death recorded from "other and unspecified dysentery."

One death recorded from "other diseases due to spirochaetes" including infective hepatitis.

APPENDIX VIII.
 Table showing the Incidence of Infectious Diseases in each Statistical District for the Year ended 31st December, 1948.

Statistical District.	Amoebiasis.	Amoebic Dysentery.	Ankylostomiasis.	Bacillary Dysentery.	G.S.M.	Dengue Fever.	Diphtheria.	Ep. Cat. Hepatitis.	Infective Hepatitis.	Leprosy.	Malaria.	Polymyelitis.	P.T.B.	Other T.B.	Puerperal Fever.	Parent Ophthalmia.	Rubella.	Scarlet Fever.	Tetanus.	Tetanus Neonatorum.	Typhoid Fever.	Typhus Fever.	Undulant Fever.	Virus Knecephalitis.	
Albany																									
Armadale-Kelmscott																									
Ashburton																									
Balingup																									
Bassendean																									
Bayswater																									
Belmont																									
Beverley																									
Boulder																									
Bridgetown																									
Brookton																									
Broome																									
Bruce Rock																									
Bunbury Municipal Council																									
Bunbury Road Board																									
Buseilton																									
Canning																									
Capel																									
Carnamah																									
Chittering																									
Claremont																									
Collie Municipal Council																									
Collie Road Board																									
Coolgardie																									
Corrigin																									
Cottesloe																									
Cuballing																									
Cue																									
Cunderdin																									
Dalwallinu																									
Dardanup																									
Darling Range																									
Denmark																									
Drakesbrook																									
Dumbleyung																									
Dundas																									
Fremantle, East																									
Fremantle City Council																									
Fremantle Road Board																									
Geraldton Mun. Council																									
Geraldton Road Board																									
Goomalling																									
Goswells																									
Guildford																									
Harvey																									
Irwin																									
Kalgoorlie Municipal Council																									
Kalgoorlie Road Board																									
Katanning																									
Kellerberrin																									

APPENDIX IX.
Western Australia.
 DIPHTHERIA, 1922-1948.

	Population (1,000's).	Cases of Diphtheria.	Cases per 100,000 Population.	Case Mortality. %
1922	339	577	170	3.6
1923	353	504	142	3.5
1924	364	511	140	2.7
1925	377	354	93	1.7
1926	385	256	66	4.3
1927	399	273	68	2.9
1928	414	639	154	2.0
1929	426	539	126	6.0
1930	431	1,045	242	4.1
1931	433	452	104	4.2
1932	436	664	152	3.0
1933	440	848	192	2.4
Mass Immunisation commenced:				
1934	442	974	220	3.7
1935	447	1,308	293	2.6
1936	451	792	175	4.54
1937	457	1,166	255	3.34
1938	462	921	199	4.44
1939	468	610	130	4.40
1940	472	583	123	3.75
1941	474	674	142	3.00
1942	479	748	156	5.48
1943	482	755	156	5.03
1944	488	491	100	4.80
1945	490	425	86	4.70
1946	494	380	77	2.89
1947	502	339	67	2.36
1948	515	255	49.5	2.74

APPENDIX X.
TUBERCULOSIS.

TUBERCULOSIS OF RESPIRATORY SYSTEM.					OTHER FORMS OF TUBERCULOSIS.			
Year.	Cases Notified.	Deaths.	Deaths per 1,000 of Population. (a)	Percentage of Total Deaths.	Cases Notified.	Deaths.	Deaths per 1,000 of Population. (a)	Percentage of Total Deaths.
1938	247	177	0.38	4.18	.....	12	0.026	0.28
1939	202	179	0.38	4.13	3	14	0.030	0.32
1940	231	181	0.38	4.03	.....	15	0.032	0.33
1941	154	185	0.39	3.88	2	22	0.046	0.46
1942	113	175	0.37	3.45	17	17	0.036	0.33
1943	273	144	0.30	3.14	54	9	0.019	0.20
1944	219	134	0.28	2.99	7	15	0.031	0.33
1945	271	149	0.31	3.16	14	14	0.029	0.30
1946	343	163	0.33	3.43	69	7	0.014	0.15
1947	372	128	0.25	2.71	40	13	0.026	0.28
1948	325	157	0.30	3.35	28	9	0.017	0.19

(a) Revised in accordance with final results of the 1947 Census.

APPENDIX X.
AGE IN YEARS.

Month.	1-2.		2-3.		3-4.		4-5.		15-19.		20-24.		25-29.		30-34.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
1. January	1	1	.....	1	1	.....
2. February	1	.....	3	3	2	1	2	2
3. March	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	1
4. April	1	1	.....	.....	.....	.....	.....	3	.....	2	3	.....	2	.....	.....
5. May	1	1	2	1	5	3	1
6. June	1	.....	1	.....	1	2	.....	1	.....	1
7. July	1	1	3	1	2	1
8. August	1	.....	2	.....	2	2	.....	.....
9. September	1	1	1	1	.....	3	1	1
10. October	1	1	1	1	1	.....	.....
11. November	5	.....	1	1	2	1	3
12. December	1	.....	2	.....	4	1	4	.....
Down Totals	1	1	1	.....	.....	1	.....	8	8	14	16	14	20	15	10

AGE IN YEARS—continued.

Month.	35-39.		40-44.		45-49.		50 and Over.		Total Male.	Total Female.	Grand Total.
	M.	F.	M.	F.	M.	F.	M.	F.			
1. January	1	1	1	1	2	.....	10	.....	16	4	20
2. February	.....	.....	1	1	2	1	9	.....	20	8	28
3. March	4	1	.....	.....	3	1	10	4	19	8	27
4. April	2	2	2	1	5	.....	15	1	29	12	40
5. May	2	2	4	.....	2	.....	14	1	27	12	39
6. June	1	2	1	2	1	2	7	2	13	12	25
7. July	1	.....	2	2	5	.....	10	.....	23	5	28
8. August	.....	2	2	1	1	.....	3	1	11	6	17
9. September	2	.....	2	2	1	.....	6	2	14	10	24
10. October	1	1	.....	.....	1	10	1	.....	13	6	19
11. November	.....	.....	1	1	1	1	9	4	13	17	30
12. December	1	1	4	1	2	.....	7	.....	25	3	28
Down Totals	15	12	20	12	25	6	110	16	223	102	325

APPENDIX XI.

ANALYSIS OF INFANT HEALTH CENTRE ATTENDANCES.

INFANT HEALTH REPORTS. Year ending 31st December, 1948.	Country.																			
	Albany.	Beverly.	Boulder.	* Bridgetown.	Bunbury.	Busselton.	Corrigin.	Geraldton.	Kalgoorlie.	Katanning.	Kellerberrin.	Manjimup.	Moora.	Narrogin.	Norseman.	Northam.	Port Hedland.	Three Springs.	Wagin.	Warona.
Births Reported to Clinics	256	134	254	—	239	305	214	289	490	220	160	188	175	223	125	134	9	90	345	238
Total Individual No. of Babies Attended Centre	415	194	247	—	286	455	379	315	554	263	337	310	275	301	265	249	137	185	468	507
Total Attendance Babies at Centre	4,427	2,241	3,781	—	1,285	4,296	2,916	2,917	5,367	2,529	3,703	2,925	2,298	2,719	2,176	1,949	137	1,853	4,452	4,350
No. of Individual Expectant Mothers Advised	42	20	17	—	19	39	18	4	39	6	19	18	16	11	—	14	27	22	5	54
Total No. of Visits to Homes	599	249	571	—	694	336	22	364	964	258	327	244	130	390	224	344	—	109	532	215
No. referred to Doctors and Hospitals—																				
(a) Babies	99	17	27	—	34	37	75	21	87	35	64	54	48	19	25	8	6	12	98	24
(b) Mothers	50	2	—	—	5	12	25	2	39	6	2	2	7	5	2	5	—	4	19	3
No. of Babies on B/I ¹ under Nine Months	198	93	75	—	118	287	227	89	146	73	137	169	143	413	129	70	109	95	188	247
(a) Breast Fed	74	41	29	—	55	79	71	46	54	31	56	74	54	157	20	22	17	28	69	110
(b) Comp. Feeding	10	11	11	—	7	16	68	3	6	8	19	15	16	55	25	11	5	10	16	31
No. of such Babies Artificially Fed—																				
(c) Fresh Milk	80	25	3	—	4	61	39	2	9	7	18	41	23	85	9	10	—	13	22	37
(d) Dried Milk	34	14	32	—	50	49	51	36	44	27	64	33	50	90	64	24	26	44	77	69
(e) Condensed Milk	—	—	—	—	2	—	5	1	—	—	—	2	—	9	10	3	—	—	3	—
(f) Patent Foods	—	1	—	—	—	—	—	—	—	—	—	—	—	14	—	—	—	—	1	—
(g) Mixed Foods	—	1	—	—	—	77	—	—	33	—	—	—	—	3	1	—	61	—	—	—

* Temporarily closed.

Metropolitan.

INFANT HEALTH REPORTS. Year ending 31st December, 1948.	Metropolitan.																			Total for Previous Year.
	Armadale.	Bicton.	Claremont.	Cottesloe.	East Fremantle.	East Victoria Park.	Fremantle.	Inglewood.	Kalamunda.	Leederville.	Midland Junction.	Mundaring.	Nedlands.	North Perth.	Perth.	South Perth.	Subiaco.	Victoria Park.	TOTAL.	
Births Reported to Clinics	183	305	263	391	221	195	515	526	224	528	397	106	194	541	694	280	381	333	10,365	9,347
Total Individual No. of Babies Attended Centre	319	729	640	535	402	374	888	873	418	768	526	211	425	625	1,451	775	730	657	17,488	15,392
Total Attendance Babies at Centre	4,027	7,140	6,764	5,650	4,528	4,081	7,952	9,352	3,323	8,062	5,189	2,588	4,994	6,307	9,282	7,335	7,265	5,529	165,689	154,158
No. of Individual Expectant Mothers Advised	1	42	50	14	22	23	52	54	9	44	8	65	12	20	47	79	67	14	1,013	700
Total No. of Visits to Homes	745	622	1,256	765	253	365	592	261	994	889	500	241	415	588	1,144	612	362	331	17,507	14,389
No. referred to Doctors and Hospitals—																				
(a) Babies	22	46	114	27	72	14	83	122	39	46	146	26	59	80	99	16	12	50	1,854	1,484
(b) Mothers	1	18	62	7	8	15	14	26	7	22	24	1	12	12	15	8	87	13	542	466
No. of Babies on B/I ¹ under Nine Months	174	323	259	344	215	171	510	244	236	720	320	118	212	195	1,010	461	553	375	9,466	8,032
(a) Breast Fed	34	124	165	155	75	113	247	114	67	345	122	42	88	83	524	243	345	159	4,132	3,570
(b) Comp. Feeding	9	20	11	58	13	2	31	17	19	50	18	13	27	21	115	10	89	22	888	643
No. of such Babies Artificially Fed—																				
(c) Fresh Milk	42	25	28	47	31	17	48	34	26	83	41	15	44	8	121	78	55	54	1,276	987
(d) Dried Milk	26	60	44	81	90	38	152	67	53	107	135	34	51	37	215	99	33	113	2,313	1,911
(e) Condensed Milk	1	8	11	3	4	—	32	7	7	20	4	2	3	35	19	17	27	—	339	191
(f) Patent Foods	—	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	111	88
(g) Mixed Foods	60	73	—	—	2	—	—	—	64	93	—	—	—	39	—	—	—	—	507	642

APPENDIX XII.

SCHOOL MEDICAL SERVICE.

Examination of Metropolitan and Country School Children, 1948.

—	No. Examined.	No. Notified.	No. referred for Medical Attention.	No. for Home Attention and Observation.	No. requiring Dental Attention.	Recalls.	Specials.	Skin Complaints.		Nutrition.			Eyes Medical Attention.	Tonsils Medical Attention.
								No.	%	3.	Under 3.	Over 3.		
METROPOLITAN SCHOOLS.														
Boys ...	6,708	4,656	1,897	2,287	2,556	1,332	353	...	...	5,419	1,078	211	...	...
Girls ...	6,564	4,624	1,880	2,392	2,560	1,329	381	...	...	5,231	810	523	...	...
Total ...	13,272	9,280	3,777	4,679	5,116	2,661	734	1,125	8.4	10,650	1,888	734	359	2,268
COUNTRY SCHOOLS.														
Boys ...	4,962	2,309	623	1,158	1,196	89	...	...	...	3,037	1,202	663	...	...
Girls ...	5,003	2,240	629	1,165	1,277	102	...	...	...	3,034	435	1,490	...	...
Total ...	9,965	4,549	1,252	2,323	2,473	191	...	266	2.6	6,071	1,637	2,153	300	844
STATE TOTALS.														
Boys ...	11,670	6,965	2,520	3,445	3,752	1,421	...	...	...	8,456	2,280	874	...	...
Girls ...	11,567	6,864	2,509	3,557	3,837	1,431	...	...	...	8,265	1,245	2,013	...	...
Total ...	23,237	13,829	5,029	7,002	7,589	2,852	734	1,391	5.9	16,721	3,525	2,887	659	3,112

APPENDIX XIII.
VITAL STATISTICS.
Western Australia.

	1946. (a)	1947. (a)	1948.
Mean Population—			
Males	253,019	258,377	264,319
Females	239,752	244,601	250,524
Total	492,771	502,978	514,843
Births—			
Males	6,285	6,580	6,664
Females	5,820	6,294	6,267
Total	12,105	12,874	12,931
Birth Rate—			
Rate per 1,000 of mean Population	24.57	25.60	25.12
Deaths—			
Males	2,791	2,778	2,797
Females	1,962	1,945	1,888
Total	4,753	4,723	4,685
Death Rate—			
Rate per 1,000 of mean Population	9.65	9.39	9.10
Natural Increase—			
Rate per 1,000 of mean Population	14.92	16.21	16.02
Infant Mortality per 1,000 births—*			
Metropolitan Area	25.01	27.00	22.58
Rest of State	37.84	35.16	28.78
Whole State	31.06	30.92	25.60
Stillbirths—			
Metropolitan Area	175	156	136
Whole State	293	304	266

(a) Revised in accordance with the final results of the 1947 Census. * Excluding stillbirths.

UNIVERSAL VITAL STATISTICS.

A comparison between different countries showing:—Infant Mortality Rates per 1,000 live births; Crude Birth Rate per 1,000 population; Crude Death Rate per 1,000 population.

	For Year 1946.					For Year 1948.		
	Egypt.	Italy.	France.	England and Wales.	U.S.A.	Western Australia.	Australia (Whole).	Western Australia.
Infant Mortality	185.0	84.0	73.0	43.0	38.8	31.0	27.76	25.6
Crude Birth Rate	42.5	22.2	20.8	20.1	24.6	24.5	23.08	25.1
Crude Death Rate	31.2	12.0	13.4	11.5	10.1	9.6	9.96	9.1
Natural Increase of Population	11.3	10.2	7.4	8.6	14.5	14.9	13.12	16.0

The preceding statistics taken in conjunction with each other show the community in Western Australia to have a high claim to be considered amongst the healthiest in the world, and with Tasmania (16.8 per 1,000 of population) to have the highest rate of natural increase in 1948, in Australia and compares favourably with statistics throughout the world.

Comparison of Infant Mortality and General Death Rate.

	Infant Mortality			General Death Rate.		
	1946.	1947.	1948.	1946.	1947.	1948.
New Zealand (a)	26.10	25.04	21.93	9.70	9.38	9.13
Western Australia	31.06	30.92	25.60	9.65	9.39	9.10
New South Wales	30.22	29.81	30.30	9.77	9.53	10.04
Victoria	27.16	26.28	23.93	10.60	10.44	10.44
Queensland	29.27	30.82	27.96	9.75	9.15	9.31
Tasmania	30.23	27.31	27.65	10.14	9.17	9.55
South Australia	27.07	24.27	29.68	10.15	9.61	10.25

(a) Non Maori.

INFANT MORTALITY—WESTERN AUSTRALIA, 1948.

APPENDIX XIV.

CLASSIFICATION OF THE CAUSES OF INFANT DEATHS FOR THE YEAR 1948 VIDE OFFICIAL NOTIFICATIONS FROM REGISTRAR GENERAL.

Classification.	Metro- politan.	Northern Agri- cultural.	South- Western.	Eastern Goldfields.	Northern Goldfields.	North- Western.	Northern.	TOTAL.
PRE-NATAL DISEASES—								
Congenital Malformations :								
Congenital Hydrocephalus	1	—	1	1	—	—	—	3
Spina Bifida and Meningocele	5	—	1	—	—	—	—	6
Congenital Malformation of Heart	18	3	10	3	2	1	1	38
Monstrosities (including Anencephaly)	2	1	1	—	—	—	—	4
Congenital Pyloric Stenosis	—	—	—	—	—	—	—	—
Cleft Palate and Hare Lip	1	—	—	—	—	—	—	1
Malformations of Alimentary Tract	5	1	1	—	—	—	—	7
Cystic Disease of Kidney	1	1	—	—	—	—	—	2
Other Congenital Malformations	1	—	—	1	—	—	—	2
Congenital Diseases :								
Congenital Syphilis	1	—	—	1	—	—	—	2
Haemolytic Disease	8	3	4	2	—	—	—	17
Premature Birth and Congenital Debility	71	19	35	10	4	1	1	141
Totals, Pre-Natal Deaths	114	28	53	18	6	2	2	223
NATAL AND NEO-NATAL DISEASES—								
Injury at Birth	6	—	4	3	2	—	2	17
Other Diseases peculiar to the First Year of Life :								
Asphyxia during or after Birth (Atelectasis)	10	3	5	3	—	1	—	22
Intoxication due to Maternal Toxaemia	1	—	1	—	1	—	—	4
Infections of the Umbilicus	1	—	—	—	—	—	—	1
Pemphigus and other Infections of the New-born	2	—	—	—	—	—	—	2
Melena Neonatorum	1	1	—	—	—	—	—	2
Others	—	—	—	—	—	—	—	—
Totals, Natal and Neo-Natal Deaths	21	4	10	6	3	2	2	48
POST-NATAL DISEASES—								
Pneumonia	7	2	16	5	—	3	3	36
Meningitis :								
Meningococcal	—	—	—	—	—	—	1	1
Tuberculosis	—	1	—	—	—	—	—	1
Enteritis	2	2	3	2	—	—	—	9
Mastoiditis	5	1	1	—	—	—	—	7
Intussusception	—	—	—	1	—	—	—	1
Marasmus	—	1	—	—	—	—	—	1
Accidents	—	—	2	—	—	—	—	2
Others	1	—	—	—	—	1	—	2
Total, Post-Natal Deaths	15	7	22	8	—	4	4	60
GRAND TOTAL OF STATISTICAL DISTRICTS	150	39	85	32	9	8	8	331
LIVE BIRTHS—								
Live Births in Statistical Districts	6,642	1,925	4,025	900	180	60	99	12,931
Rates per 1,000 of Live Births into Statistical Districts :								
Pre-Natal Deaths	17.2	27.3	13.2	29.0	33.3	33.3	20.0	17.4
Natal and Neo-Natal Deaths	3.16	3.9	2.5	6.6	16.7	33.3	20.0	3.6
Post-Natal Deaths	2.2	6.8	5.4	8.9	—	66.6	40.0	4.6
TOTAL INFANT MORTALITY (Vide Place of Death)	22.5	38.0	21.1	35.5	50.0	133.2	80.0	25.6
TOTAL INFANT MORTALITY RATE (Vide Government Statistician of Place of Residence of Mother)	22.5	35.1	25.6	30.1	38.9	66.6	30.0	25.6

REPORT ON THE EPIDEMIC OF POLIOMYELITIS WESTERN AUSTRALIA, 1948

Poliomyelitis, as a *disease*, seems to have been recognised from very early times; but its occurrence in *epidemic* form, does not appear to have been reported until a little more than a hundred years ago.

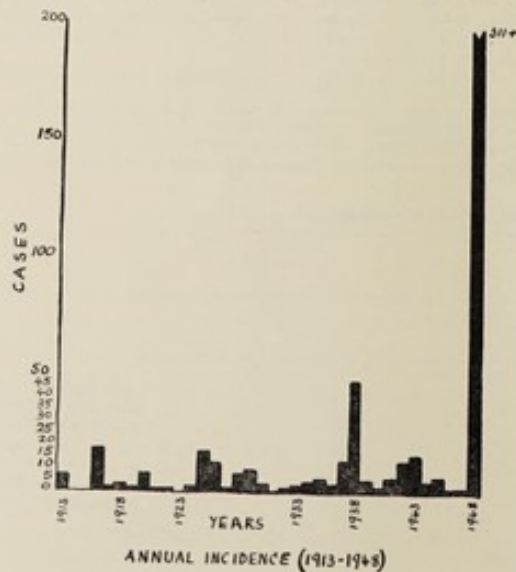
In 1834, a small outbreak was described in England, and, a few years later, another was reported in America. During the latter half of the nineteenth century, however, larger and increasingly frequent epidemics occurred in several countries, including Norway, Sweden, Germany, France, Italy, England and America.

In Australia, the first outbreak was probably encountered in 1895, when 18 cases occurred at Port Lincoln in South Australia. In 1905 there was an outbreak of 25 cases in Sydney, while 34 occurred at Stanmore, and 108 in Brisbane. In 1908 an epidemic involving 155 cases was recorded from Victoria; and several other epidemics have since been reported from one or other State. It would appear that, since the early twentieth century, the disease has been more or less endemic in Australia, and has, at intervals of a few years, attained epidemic proportions.

In New Zealand, it is said that the first epidemic occurred in 1895, and since then that country has had at least four major epidemics (1916, 1925, 1937, and 1947: i.e., at approximately ten-year intervals).

Previous incidence in Western Australia.

Records of the incidence of acute anterior poliomyelitis in Western Australia are available for the last 36 years. From 1913 to 1947 (inclusive), the average number of cases reported per annum was seven. The only year in which an appreciable outbreak occurred was 1938, when 47 cases were notified (44 of these during the first five months of the year).



The 1938 outbreak was described in the Annual Report for that year, and the following extracts from it, are relevant:—

“on Christmas Eve, 1937, a case occurred with extensive paralysis of the respiratory muscles which simulated the type so prevalent in the East as to suggest that the epidemic was approaching . . . this case was the forerunner of some 48 cases which occurred between that date and May, 1938, when the cases ceased suddenly with the onset of colder and wet weather.”

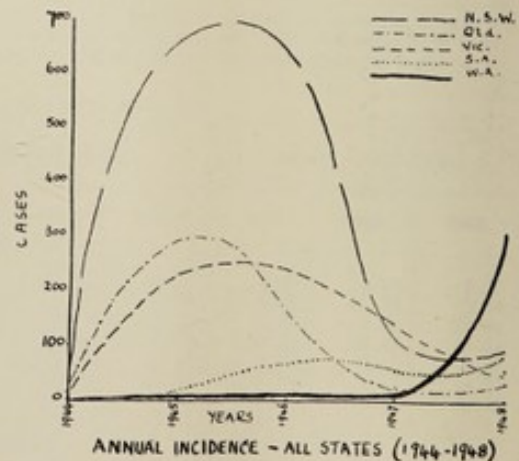
“. . . What cases did occur here, although abnormal in number, were so widely scattered in incidence and so unassociated one with the other as to suggest only a sporadic incidence rather than a spreading epidemic. Single cases occurred a hundred or more miles apart with no local secondary cases.”

Incidence in Australian States in recent years.

The annual incidence from 1944 to 1947 (inclusive) in the various States is tabulated below. It will be seen that 1944 was a non-epidemic year. In 1945, however, several hundreds of cases occurred in New South Wales, Victoria and Queensland. These numbers recurred in 1946, when the incidence in South Australia was also very high. In 1947, although the incidence had greatly diminished, it was still high in all States except Western Australia:—

	1944	1945	1946	1947	1948
N.S.W.	14	668	656	96	96
Vic.	9	238	247	126	56
Qld.	7	299	149	25	37
S.A.	2	9	62	54	89
W.A.	4	5	2	2	311
Tas.	4	4	98	2	7

(Courtesy of Director General, Commonwealth Department Health, Canberra.)

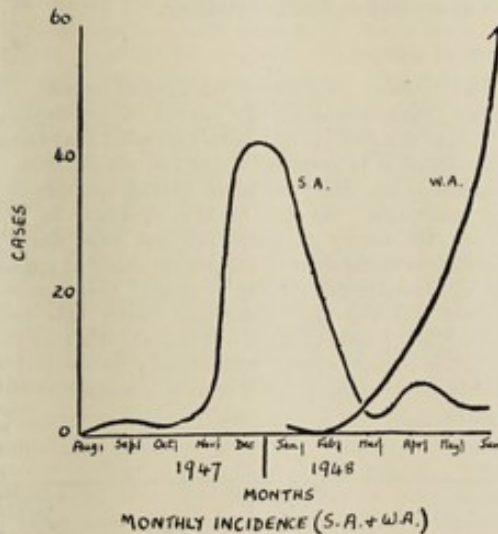


It will be seen that in 1945 and 1946 there were large numbers of cases in all these Eastern States. A raised incidence in South Australia began in 1946; and in this State in 1947 a relatively high incidence was maintained while the incidence in the Eastern States had fallen appreciably. Throughout that period (1944 to 1947) Western Australia had been spared.

Incidence in Australian States in preceding months.

During the months preceding the development of the epidemic in Western Australia, the only State with an unusually high incidence was South Australia, where in December, 1947, there were 43 cases; 39 in January, 1948, and 20 in February.

(Figures obtained through the courtesy Central Board Health, South Australia.)



Incidence in other Countries in 1947.

It will be remembered that, in 1947, one of the worst epidemics on record, occurred in the United Kingdom (nearly ten thousand notifications being received).

In New Zealand, an epidemic involving over three hundred cases began in October-November, 1947, and mainly affected the Auckland area.

In the United States of America, the incidence of poliomyelitis in 1947 was the lowest for five years.

Genesis of the Epidemic.

In 1947, two cases of Acute Anterior Poliomyelitis were reported to the Department of Public Health. The first was notified in March, and concerned a boy of 16 at Greenbushes. The second was notified on the 19th December and related to a boy of 14 at Karlgarin in the Kondinin District.

The first case in 1948 was notified on the 19th of January. The patient was a young farmer (aged 22) living with his parents 12 miles South of Wyalathem. The source of infection could not be traced.

The second case was notified on the 4th of March. He was a boy, aged two years and nine months, and had been ill with indefinite signs for about 10 days. His parents lived at Reedy in the Cue-Day Dawn District, and about 10 days prior to the presumed onset of the disease the mother and child came to

Perth and stayed at Victoria Park. At the time the boy took ill, two playmates in Victoria Park were also unwell, but in this case also, no definite evidence could be obtained to indicate the probable source of infection.

The third case was a pregnant woman of 19, living at Maylands. She took ill with fever and muscle weakness on the 17th of March and was admitted to hospital three days later. She had had no previous contact either with a case of suspicious illness, or with any recent arrivals from other States or countries; but about a week prior to the onset of her illness she had attended a cinema show, and about two weeks before that, some relatives from Bruce Rock had visited her for a short time. She was in her ninth month of pregnancy and was spontaneously delivered of a baby girl on the eighth day of the disease. The case was an unduly severe one, necessitating the use of a respirator for three weeks, and at the present time she has extensive residual paralysis. The baby weighed 5 lbs. at birth, and could not be breast fed, but has remained quite healthy.

The fourth case was a girl of 15 from Cannington. It was notified on the 24th of March, but the girl had been vaguely ill for about three weeks. The only suspicious contact she had had was with a friend who had returned from Melbourne early in February. It is noteworthy that a second Cannington case was notified some three weeks later.

The fifth case was notified on the 31st of March. He was a boy of 11 from Victoria Park. He had been attending a local State School where there were several new pupils from outside Western Australia. Two of these had recently arrived, one from the United Kingdom, and the other from India; while a third, from India, had disembarked at Brisbane on the 3rd January and had come to Perth via Sydney and Melbourne (13th and 14th respectively): His home lay one block west of the house from which the second case had been reported.

The sixth case was a member of the Young Australia League. He had spent five days in Adelaide where, at that time, the incidence of poliomyelitis was unusually high, and returned to Cottesloe at the end of January. He went to Rottneet on the 26th of March for a five-day holiday, returned to school on the 30th, and was notified on the 2nd of April. He was 14 years old.

The seventh case, an infant at Leederville, was reported on the 6th of April, and six days later, her mother developed the disease.

Thereafter, a spate of cases followed in quick succession (at intervals of one and two days), a total of 14 cases being reported in April. It then became clear that a major epidemic had begun, and it had not been possible to establish its origin.

The outbreak rapidly gathered momentum; cases being reported at progressively diminishing intervals and in steadily increasing numbers, from scattered points all over the metropolitan area and outer suburbs, so that, by the end of July, the peak was reached, no less than 60 cases being notified in that one month alone. In all, from the beginning of the year 154 cases had then been recorded.

By that time, a very large pool of potentially infective individuals must have been created, and the attempt at identification of successive links in the chain of infection became even more futile.

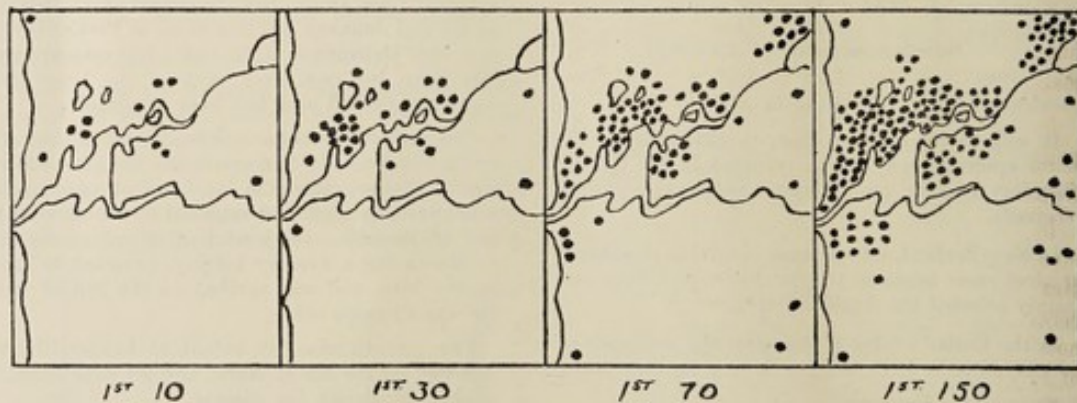
The relative proportion of cases on the one hand, to abortives, sub-clinical cases, and symptomless carriers on the other, has been variously estimated. Thompson (1948), reporting on the latest New Zealand epidemic, gives a ratio of about 300 "suspect illnesses" to each definite case of poliomyelitis. It is not difficult to see how these alarming figures can come about; infections must proceed in geometric progression, modified only by the limits of the period of infectivity, by the movements of the infective individual, and by the receptivity of those exposed.

During the subsequent course of the epidemic, the occurrence of multiple cases within circumscribed areas or "islands" attracted attention from time to time, but, as has been the usual experience elsewhere, continuity between these groups could not be recognised and the path of spread could not be followed.

Probable Origin of the Epidemic.

In view of the inability to determine the source of infection in the first few cases, any opinion concerning the probable origin of this epidemic must be purely of a speculative nature. The possibilities include:—

- (1) Development from some indigenous pre-existing focus (pre-supposing the acquirement of invasive properties by an endemic strain).
- (2) Introduction of an epidemic strain by:
 - (a) Returning servicemen.
 - (b) Travellers and holiday-makers from Eastern States.
 - (c) Immigrants from the United Kingdom.



The rising tide of an epidemic in Western Australia was not discernible until March-April, 1948 (five and 14 cases respectively), and during the preceding months, the incidence in New Zealand and the Eastern States is significant. In New Zealand there was an epidemic between November, 1947, and March, 1948. During 1947 the incidence of the disease was relatively high in New South Wales (96 cases), Victoria (126 cases), and South Australia (54 cases), but during the few months immediately preceding the Western Australian epidemic only South Australia showed unusually high figures, (December, 1947, and January-February, 1948.)

Circumstantial evidence therefore suggests that the epidemic was an extension from the Eastern

States; and it is interesting to note that the outbreak in Western Australia in 1938 (47 cases) was similarly regarded as being probably due to spread from the East (Everitt Atkinson, Ann. Rep., 1938). No more precise opinion can, however, be offered.

Evolution and Decline of the Epidemic.

Scrutiny of the accompanying serial spot-maps which indicate the loci of individual cases in the metropolitan area will reveal that the direction of spread was general rather than specific, and that the concentration of cases appears to be related to the density of the local population.

The monthly incidence rose sharply from April (14 cases) to July (60 cases); the latter month representing the peak; it then declined rapidly until November (17 cases) but rose again in December (28 cases) before finally subsiding.

Mode of Spread.

The relative importance of droplet spread and faecal contamination in the spread of poliomyelitis is still undecided. It has been suggested that faecal contamination is responsible for the maintenance of sporadic cases, while air-borne spread operates during epidemics. So far as this epidemic is concerned laboratory facilities did not exist for the scientific investigation of the precise mode of spread, but epidemiological inquiry suggested that personal contact was the most important factor (the term contact being used in its broad sense). Whether this person-to-person spread was literally by contact or merely by proximity must remain a matter of conjecture.

Groups of related cases.

Whereas, in general, it was not possible to identify consecutive links in the chain of infection, there occurred during the course of the epidemic a few groups or crops of cases in circumscribed localities. Presumptive evidence indicated a relationship between the individual members of each of these groups. Similar "islands in a sea of infection" have been noted in other poliomyelitis epidemics, and reveal useful information about mode of spread and incubation period.

One example of such a group developed in a rural area (B). A Perth child, aged eight (case 58) had spent a fortnight in a small country town. Within

ten days of her return to the city she complained of a painful leg, and, on examination, was found to have a "dropped foot." While in the country she had repeatedly accompanied the local baker on his rounds and had played with many of the children in the locality. Within a month a country boy of 15 (case 118) developed the disease in this area. He had been in the habit of collecting mail from the local Post Office and delivering it to various residents. Twelve days later a girl of 14 (case 144) was notified. She worked in the Post Office. About the same time a young pregnant woman (case 140) showed paralytic signs. She had received mail from case 118.

The evidence of person-to-person spread in this small group of cases is clear.

A country family entertained a metropolitan one for three weeks. Nine days after the latter's departure, a child of 11 (case 77) in the country household developed the disease. The following month two members of a family from the same rural locality visited the metropolitan area. Eleven and 14 days prior to their return, two cases (122 and 129) had been notified from houses nearby in the street where they had lived while in Perth. Thirteen days after their return, a third member of the family, a girl of 18 (case 162) developed poliomyelitis. Ten days later, two other local girls (cases 178 and 179) contracted the disease in a relatively mild form. During the ensuing month six further cases occurred in the area, and in three of these evidence suggestive of person-to-person spread was obtained.

In June two boys (cases 46 and 61) were notified 18 and 28 days after returning from a three-week-holiday on their father's farm (in an area A). About a fortnight after the second case a commercial traveller (case 106) who had visited A, contracted the disease and died; while a woman of 31 (case 109) who lived at A also developed poliomyelitis. A local agent aged 41 (case 131) who visited A periodically also became infected. About a month later two shearers (cases 165 and 166) were notified from the same locality and one died.

In a certain street (L) in the metropolitan area a child of five developed poliomyelitis (case 12). About a month later a boy aged 12 (case 22) living close by contracted the disease; three days later his sister aged eight developed a suspect illness and was notified, but the diagnosis was subsequently altered to gastro-enteritis; and five days after this a boy of six (case 31) living in the next street contracted the disease and died. A fifth case (case 36) occurred in the same local health area four days later, and no further cases were reported for six weeks.

The Goldfields provided an example during the latter part of the epidemic of the results of importation of infection into a previously unaffected area. The first case there occurred in early September; it was the forerunner of 19 others. The details are as follows:—

The first case was a child of four and was notified on the 3rd of September. Early in August this child (case 196) came to Perth with her mother. They stayed for six days at a certain house in the metropolitan area and returned to Kalgoorlie on the 16th of August; eight days after their return,

the child complained of a headache, became feverish, and, within a week, developed a typical patchy paresis.

Investigations were pursued with a view to determining the probable source of infection and the following information was obtained:—

The mother and child had lived in Perth with a family called X. About 10 weeks earlier a case had been reported from the house opposite, and about the same time, a fatal case had occurred next door. Subsequent to these two notifications, a child from X family had suffered from a suspect illness and had been confined to bed for some time, but clinical evidence was apparently insufficient to warrant a diagnosis of poliomyelitis. It is thus clear that the Kalgoorlie child had been exposed for several days in an environment where the disease had recently been prevalent, and it is not unreasonable to conclude that she became infected there.

The second Kalgoorlie case (case 197) was notified on the same day, a woman aged 40 who had been residing in a part of the metropolitan area previously affected. She arrived in Kalgoorlie on the 28th of August, and was notified six days later.

Following upon the introduction of the virus into the Goldfields by these two cases, there were no further notifications for over a month, and then 11 cases occurred within three weeks.

Altogether, 20 cases were notified (two in September, 11 in October, four in November and three in December).

Duplicate cases.

There were 15 instances of duplicate cases reported from the same household, i.e., 30 cases.

The relationship between these cases was as follows:—

Father and son	2
Mother and daughter	1
Siblings	6
Aunt and niece	1
Classmates/schoolmates	2
Fellow-boarders	1
Employer-employee	2
	—
Total	15
	—

In two instances duplicate cases were notified simultaneously. In the other 13, the intervals were as follows:—

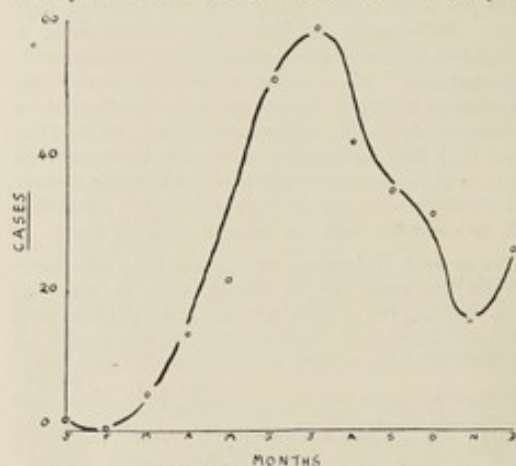
1 day	1
2 days	1
5 days	1
6 days	2
7 days	1
8 days	1
10 days	1
12 days	1
15 days	2
19 days	1
34 days	1
	—
Total	13
	—

The average interval between duplicate cases in these 13 instances was 10.7 days.

Monthly incidence.

The curve depicting the monthly incidence shows a steep rise beginning in March (5 cases) and reaching a peak in July (60 cases). It is followed by an equally steep fall, which begins to level out in September, while during December there is a sharp lift in incidence again.

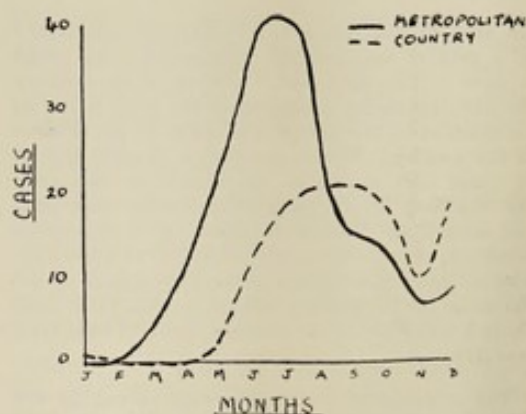
The phase of maximal incidence is June-July-August, which together contributed 155 or almost exactly half the total number of cases for the year.



The seasonal behaviour of the epidemic as revealed in this curve, although not exceptional when compared with that in other parts of Australia, is certainly unusual in that the full force of the epidemic was felt during the coolest months of the year.

Insofar as peak months are concerned, New South Wales had its worst month in 1946 in May, in 1945 in June; in Western Australia in 1948, it was July, and in the Melbourne epidemic in 1937 it was August. Other epidemics, however, have revealed peak months in February, December and so on.

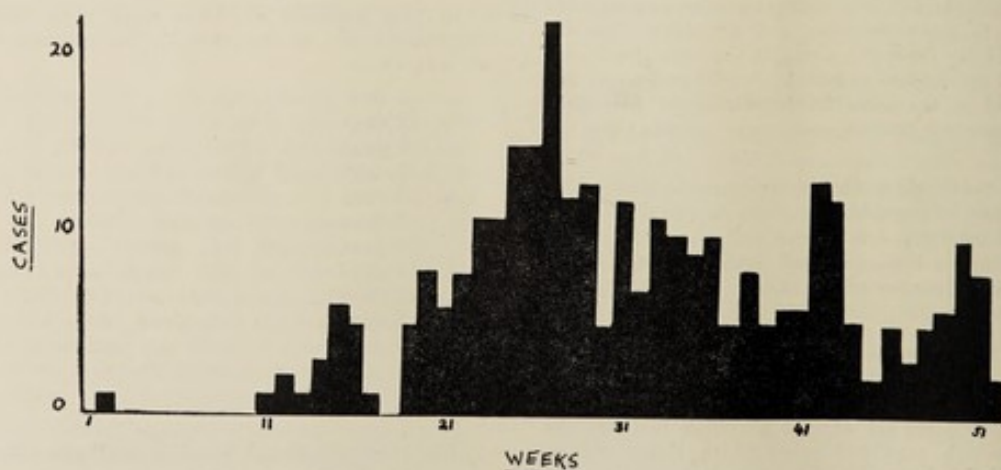
When the monthly incidence for metropolitan (181 cases) and country (130 cases) areas are plotted separately, several differences are revealed.

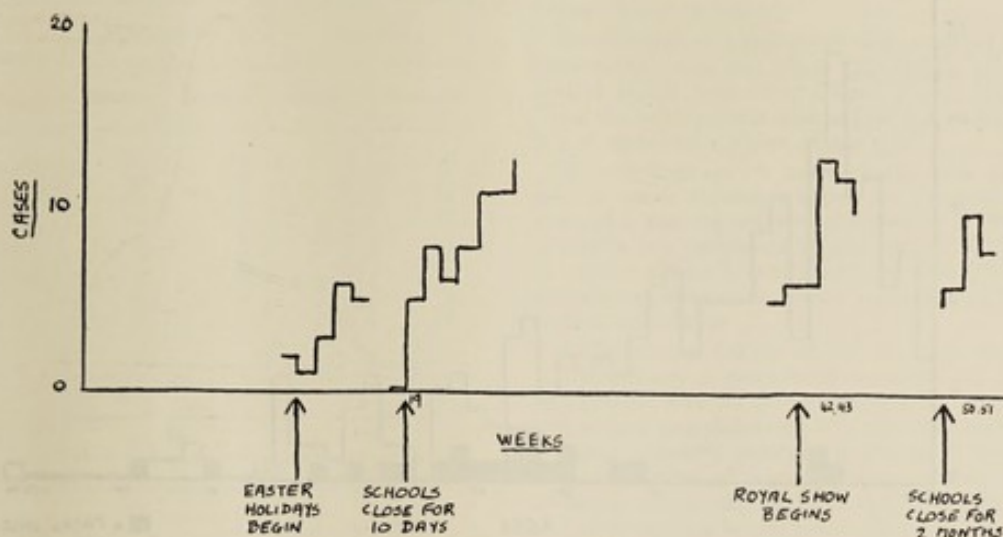


In the first place the Country Curve does not begin to rise until about two months after the Metropolitan (March and May respectively). In the second place, the Metropolitan peak was attained in June-July (40 and 41 cases respectively), while the Country peak was only reached in August-September (21 and 21); there is thus a "shift to the right" representing an interval of about two months. Thirdly, the two curves are somewhat different in form, the Country one being lower and broader and dome-shaped suggesting that the cases were spread out over several months and that the explosive nature of the metropolitan experience was modified. Fourthly, the "Christmas lift" in the combined curve is seen to be due mainly to country cases, suggesting that the influx of country folk into the metropolitan area, or the dispersal of city people on holiday may have been responsible for several infections.

Weekly incidence.

The weekly incidence is mainly of interest in relation to holidays, assemblies, or periods of unusual exposure to infection.



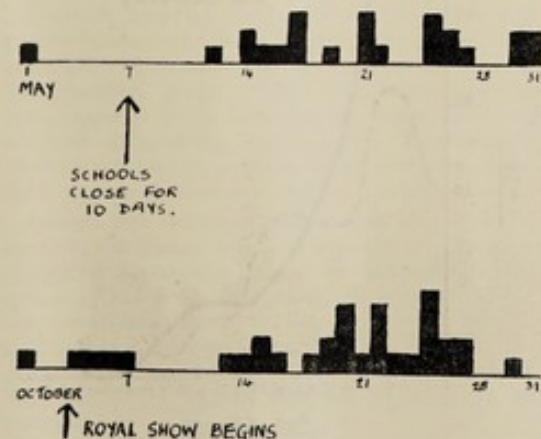


The upward trend is pronounced from the 19th week onwards. After rapid rises in the 23rd and 25th weeks, the peak was reached in the 27th week of the year (22 cases). In general, the trend, both up and down is regular except in the 42nd-43rd weeks and the 50th-51st weeks when well marked independent rises are noted.

The upward trend from the 19th coincided with the closing of schools for the May holidays. The rise in the 42nd-43rd weeks can be related to the Royal Agricultural Show, and the belated "secondary" rise in the 50th-51st weeks was connected with the Christmas season.

Daily incidence.

Similarly, the daily incidence is essentially of significance in revealing the influence of dispersal of school children and the congregation of people. Crops of cases followed school closure, holiday periods, and the Royal Show; the intervals between commencement of holidays and commencement of increased incidence being about 7-10 days. Thus schools closed on the 7th May and a crop began



on the 14th; the Royal Show commenced on the 4th October and cases began to increase on the 13th; several schools closed on the 2nd December, while many adults started their Christmas holidays about that time, and a week later the incidence began to rise.

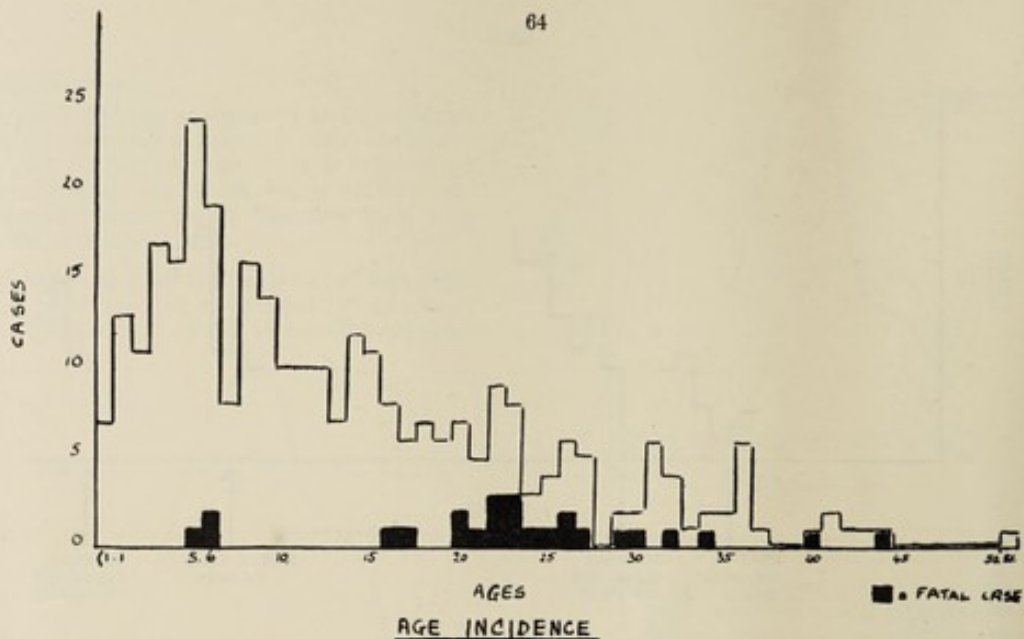
These observations are of course not new insofar as assemblies of people and excessive mingling are concerned, but they shed a new light on the problem of whether schools should or should not be closed. In this particular epidemic, it would appear that the dispersal of children led to more cases—so that, rather than consider closing the schools, it might have been advantageous to keep them open throughout holidays.

Age incidence.

In this epidemic the largest number of cases occurred in the 5-9 age group (81 or 26%), and in the 0-4 age group (64 or 20%); these two groups thus accounted for nearly half of the entire total. Insofar as individual years are concerned, incidence was maximal in the fifth and sixth years (24 and 19 cases respectively).

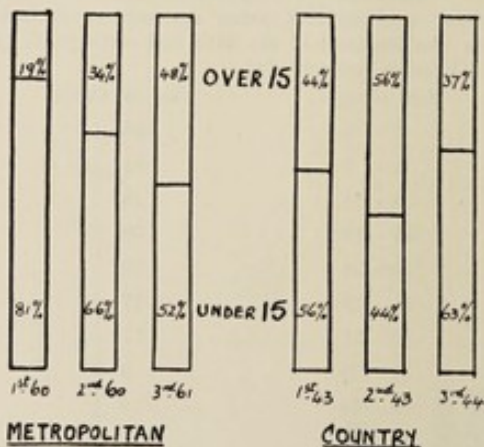
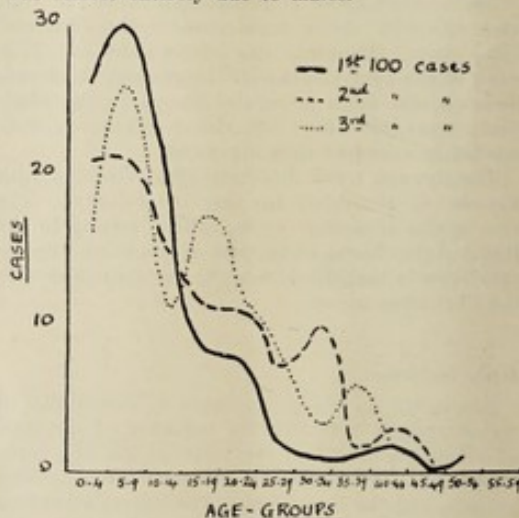
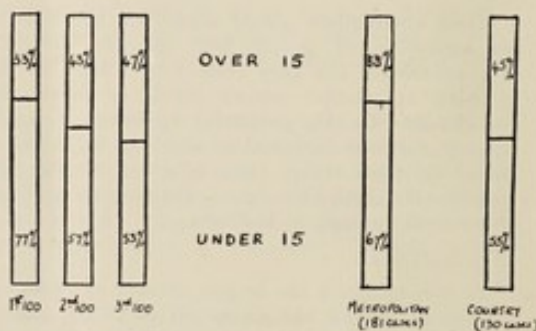
Age Group.	No. of Cases.
0 - 4	64
5 - 9	81
10 - 14	48
15 - 19	38
20 - 24	32
25 - 29	17
30 - 34	15
35 - 39	9
40 - 44	6
45 - 49	0
50 - 54	1
Total	311

The youngest case was four months old, and the oldest 51 years.

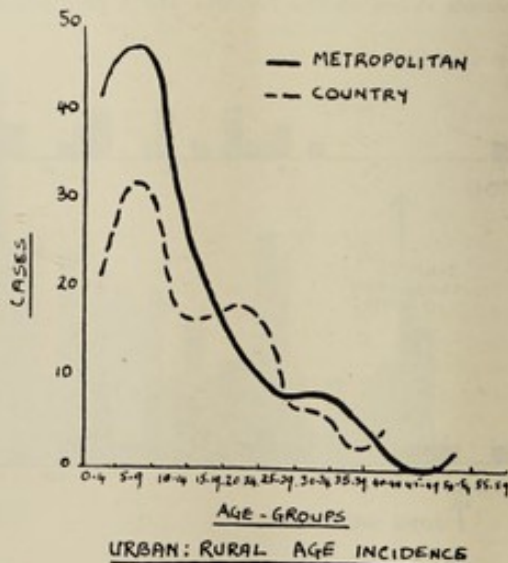


As the epidemic advanced there was a steady "shift to the right" in age incidence. Whereas among the first 100 cases only 33 per cent. were over 15, in the second 100 there were 43 per cent., and in the third 100 the figure was 47 per cent. The preponderance of cases in the 5-9 age group, however, was maintained throughout.

of 20 and 29 there was actually a larger number of country cases. The difference in this age group was almost entirely due to males.

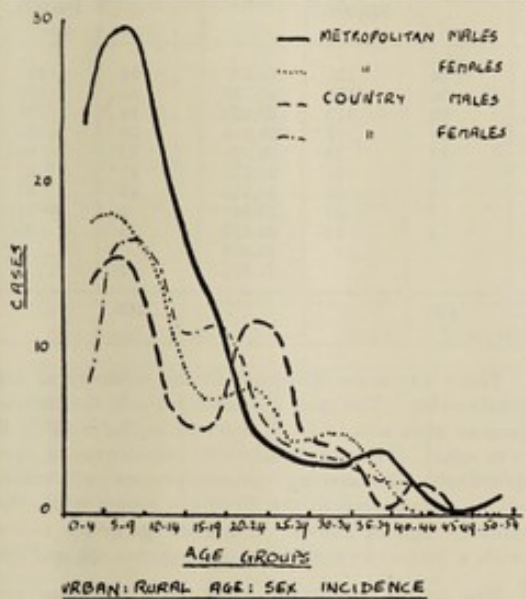


AGE INCIDENCE SHIFTED AS EPIDEMIC ADVANCED



In the metropolitan area only 33 per cent. of cases were over 15, whereas in the country the figure was 45 per cent. Comparison of the metropolitan and country age-incidence curves showed some difference; there was a relatively higher country incidence in the 15-34 group, and between the ages

Age Group.	Metropolitan.		Country.	
	Males.	Females.	Males.	Females.
0-4	24	18	14	8
5-9	30	18	16	17
10-14	20	11	6	11
15-19	14	7	5	12
20-24	5	8	12	7
25-29	4	4	5	4
30-34	3	5	4	3
35-39	4	3	---	2
40-44	2	---	2	2
45-49	---	---	---	---
50-54	1	---	---	---
	107	74	64	66
	181		130	
	311			



It is now widely recognised that the term "Infantile Paralysis" has become almost a misnomer, for acute anterior poliomyelitis is no longer a disease essentially of infants. The increasing number of attacks in the "over-five" age groups began to attract attention many years ago, and the changing incidence has been studied and reported upon by several well-known authorities.

In order to examine the age incidence, susceptible individuals may be divided into three main age groups—pre-school (0-4), school-child (5-14) and adult (15 and over). Whereas in previous decades the pre-school group suffered most, nowadays the brunt appears to be borne by the school-child—at any rate in Australia, and America. In relatively recent epidemics in certain other countries, however, pre-school incidence still predominates.

Fancoini and Zellweger suggested in 1942 that the changing incidence was attributable to changing standards of hygiene, implying that reduced exposure of the pre-school group was responsible for increased susceptibility in the school-going group; and Burnet (1945) indicated that the changing incidence was particularly noticeable in civilised countries where, indeed improved hygiene can be assumed.

Urban: Rural Incidence.

One hundred and eighty-one cases occurred in the metropolitan area and 130 in the country (the respective attack rates being 66 and 54 per 100,000). Thus, the metropolitan area had both a larger number of cases and a higher attack rate.

These findings are not in accord with other reports, most of which indicate a higher rural incidence. It is possible that the lower rural incidence in Western Australia was influenced by the unusual scattering of rural settlements, which must be greater than is encountered elsewhere. Hence opportunities for infection were fewer.

An interesting feature of the sex ratio was that in the country it was practically equal (64 males; 66 females), whereas in the metropolitan area there was a clear preponderance of males (107 males; 74 females). Another observation worthy of comment was the number of country males attacked in the 20-24 age group; the figure is small (12), but it is out of proportion to the general trend of age-incidence and contrasts with the related metropolitan figure; and it is also noteworthy that five out of these 12 died.

In so far as age selection is concerned, there were relatively more "over fifteens" in the country than in the metropolitan area (45% as opposed to 33%).

It has been said that a higher age incidence is to be expected in rural areas because less frequent exposure to early infections is responsible for lower immunity in older age groups. Horstmann (1948) states "A difference in age distribution between urban and rural groups has long been recognised, the patients in rural groups tending to be older than those in urban, but in both groups the trend has been towards older and older patients." During the Melbourne epidemic of 1937-38, 17.5 per cent, of "extra-metropolitan" cases were over-fifteen, as opposed to only six per cent, in city cases.

Investigation of the chronological sequence of cases in 1948 reveals that the first case was a country one and was notified on the 19th of January. This case had no apparent connection with the genesis of the epidemic. The second case was a country child who became ill 10 days after a visit to the metropolitan area; it is difficult to say whether this child imported the infection into the metropolitan area or became infected after arrival; the latter would appear to be the more likely. Be that as it may, the next 35 consecutive cases were all metropolitan ones, and it was not until the 27th of May, that the next country case was reported; he was a man aged 29, and succumbed to the disease.

The lag between the monthly incidence curve for the country on the one hand, and the metropolitan area on the other has already been indicated and, regardless of where the epidemic actually originated, dissemination of infection throughout country areas is clearly secondary to the metropolitan outbreak.

The mortality was higher in the country (10%) than in the city (6.6%), and attention has already been drawn to the sinister prognosis in country males in the third decade.

Attack Rates.

Attack rates in various communities and epidemics have differed widely and must obviously be modified by the number of minimal infections diagnosed, by the previous experience of the community,

and several other factors. In this epidemic no evidence of a decline could be appreciated until an attack rate of 30 per 100,000 had been attained. This is about one-half of the ultimate rate. It is not possible to indicate the ratio of sub-clinical cases and temporary carriers to each notified case, but if Thompson's suggested New Zealand figures, which are probably conservative, are accepted (300) it would appear that over 90,000 or one-sixth of the population of Western Australia must have been involved.

	Population.	No. of Cases.	Attack Rate per 100,000.
Entire State	515,302	311	60
Metropolitan	272,528	181	66
Country	242,774	130	54
Males	*264,576	171	65
Females	*250,726	140	55

* Calculated for 1948 from 1947 Census.

Age Group (Years).	ATTACK RATE.								
	Males.			Females.			Total.		
	Population.	Cases.	Attack Rate per 100,000.	Population.	Cases.	Attack Rate per 100,000.	Population.	Cases.	Attack Rate per 100,000.
0-4	20,530	38	184	19,767	26	131	40,297	64	158
5-9	20,781	46	221	20,812	35	174	40,793	81	198
10-14	19,935	26	130	19,323	22	113	39,258	48	122
15-19	20,389	19	93	19,524	19	97	39,913	38	95
20-24	20,873	17	81	19,056	15	79	39,929	32	80
25-29	22,261	9	40	17,510	8	45	39,771	17	42
30-34	20,345	7	34	15,388	8	52	35,733	15	42
35-39	15,293	4	26	13,547	5	37	28,840	9	31
40-44	14,113	4	28	12,563	2	15	26,676	6	22
45-49	12,823	.....	.....	11,046	.....	.....	23,869	.....	.....
50-54	11,895	1	.....	9,932	.....	.....	21,827	1	.....
		171	.....		140	.....		311	.....

Sex Incidence.

The over-all ratio of male (171) to female (140) cases was 1.2 : 1.

When the sex incidence was analysed in age groups it was seen that in the youngest group, male preponderance was of the order 1.46 : 1, but this preponderance progressively diminished so that at puberty and thereafter females provided an exactly equal number of cases. The relevant figures are as follows:—

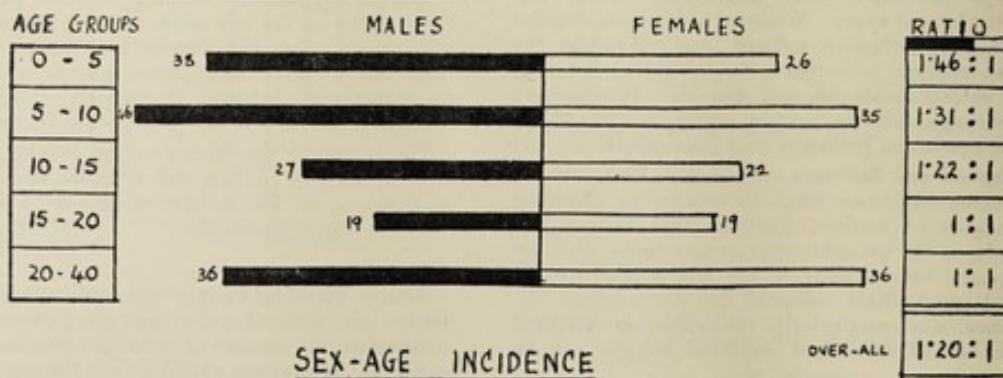
Age Group.	Males.	Females.	Ratio.
0-5	38	26	1.46 : 1
5-10	46	35	1.31 : 1
10-15	27	22	1.22 : 1
15-20	19	19	1 : 1
20-40	36	36	1 : 1
Total	171	140	1.20 : 1

There was some difference in the urban-rural sex relationship. The male : female ratio in the metropolitan area was 1.44 : 1, whereas in the country it was equal. The metropolitan figures showed a progressively diminishing preponderance of males which disappeared in the 20-30 age group, while the country figures showed irregular age-group ratios with a preponderance of males between 20 and 30.

The essential features of the sex incidence are similar to those of other epidemics elsewhere.

The International Committee on Poliomyelitis in 1932 analysed 36,000 reported cases and found a male : female ratio of 1.3 : 1. The ratio in the epidemic in the United Kingdom in 1947 was 1.23 : 1 (about 10,000 cases).

The over-all Attack Rate in males (65 per 100,000) was higher than that in females (55), the difference being almost entirely due to the high male attack rate in the 0-9 age group.



Mortality.

	Cases.	Deaths.	Mortality.
Overall	311	25	8.0
Metropolitan	181	12	6.6
Country	130	13	10.0
Males	171	17	9.9
Females	140	8	5.7
Non-Pregnant Women (15-44)	54	3	5.5
Pregnant Women	9	5	55.5

Age Gps.	Males.			Females.			Total.		
	Cases.	Deaths.	Mortality.	Cases.	Deaths.	Mortality.	Cases.	Deaths.	Mortality.
0-4	28	—	—	26	—	—	64	—	—
5-9	46	2	4.3	35	1	2.8	81	3	3.7
10-14	26	—	—	22	—	—	48	—	—
15-19	19	1	5.2	19	1	5.2	38	2	5.2
20-24	17	7	41.1	15	3	20.0	32	10	31.2
25-29	9	4	44.4	8	1	12.5	17	5	29.4
30-34	7	1	14.2	8	2	25.0	15	3	20.0
35-39	4	—	—	5	—	—	9	—	—
40-44	4	2	50.0	2	—	—	6	2	33.3
45-49	—	—	—	—	—	—	—	—	—
50-54	1	—	—	—	—	—	1	—	—
0-54	171	17	9.9	140	8	5.7	311	25	8.0

Age Group.	No. of Cases.	Deaths.	Percentage.
0-9	145	3	2.0
10-19	86	2	2.3
20-29	49	15	30.6
30-39	24	3	12.5
40 and over	7	2	28.5

Pregnant : Non-pregnant (15-44).

Pregnant.			Non-Pregnant.		
No. of Cases.	Deaths.	%	No. of Cases.	Deaths.	%
9	5	55.5	54	3	5.5

Several features in the mortality analysis are of interest.

The over-all mortality of eight per cent. is not an unusual figure and is similar to that recorded in the United Kingdom epidemic of 1947. In the New Zealand epidemic of 1947-48 the mortality was six per cent.

The males show a slightly greater mortality (9.9%) than the females (5.7%).

Country cases show a greater mortality (10%) than the metropolitan area (6.6%).

Insofar as age groups are concerned, all cases under 19 show a relatively low mortality, but one of the most striking features is the very high mortality (30.6%) in the 20-29 age group. Further analysis in this age group shows:—

Male.	Females.
Metropolitan: 9 cases (3 deaths).	12 cases (no deaths).
Country: 17 cases (8 deaths).	11 cases (4 deaths).

The figures may be small but there is a clear indication that the mortality was extremely high (47%) in the country male between 20 and 29.

The other noteworthy feature is the mortality in pregnant women. Five out of the nine cases died. In three of these, death occurred in the acute phase of the disease; in one, death occurred suddenly during early convalescence from an unknown cause suspected to be pulmonary embolism; and in the fifth, a particularly severe case, death occurred some time after the acute phase apparently from cardio-circulatory failure.

Of 22 non-pregnant cases in the same age group (19-31), only two died, and in a total of 54 non-pregnant cases in the child-bearing age group (15-44) only three died.

A curious feature in the pregnancy group was that all the fatal cases except one were carrying male fetuses (the sex in the one exception not being recorded), whereas three out of the four cases that survived carried female fetuses. The significance, if any, of this observation is not known.

The pre-purbetal predominance of males is of additional interest in this connection.

The mortality in other States in recent years of high incidence is tabulated below for comparison:—

State.	Year.	Cases.	Deaths.	Mortality.
N.S.W.	1945	668	50	7.5
	1946	657	57	8.7
Victoria	1945	238	9	3.8
	1946	247	16	6.4
Queensland	1945	299	14	4.7
	1946	149	18	12.0
W.A.	1948	311	25	8.0

(From figures obtained through the courtesy of the Director General, Commonwealth Department Health, Canberra).

Poliomyelitis and Pregnancy.

The association between pregnancy and poliomyelitis has attracted increasing attention during recent years and an appreciable literature is developing around this subject.

Reports have endeavoured to answer three main questions:—

- (1) Is the pregnant woman unduly susceptible?
- (2) Is the mortality in pregnancy unduly high?
- (3) Is there any relation between the stage of pregnancy on the one hand with susceptibility and mortality on the other?

In general, the majority of reports indicate that pregnant women are more susceptible to the disease than other women in the child-bearing age group (15-44); the ratio being of the order 3 : 1 or thereabouts. Further, the over-all mortality in pregnancy is high, and the prognosis appears to worsen as pregnancy advances.

No satisfactory explanation has so far been adduced for these curious tendencies, but recent suggestions incriminate the endocrine changes which accompany pregnancy, e.g., it has been mentioned that the pharyngeal mucosa (altering under endo-

érine influence) is rendered unduly "permeable" to the virus of poliomyelitis. Supporting experiments on monkeys have indicated a relationship between the sex hormones and susceptibility to the disease, but much further work requires to be done before any useful conclusions can be drawn.

The facts relevant to poliomyelitis and pregnancy in the Western Australian epidemic are tabulated below:—

COMPARATIVE INCIDENCE AND MORTALITY IN PREGNANT AND NON-PREGNANT WOMEN.

No. of women of child-bearing age (15-44) in W.A.	110,276
No. of non-pregnant cases (15-44)	54
ATTACK RATE	49 (per 100,000)
No. of deaths in this group	3
MORTALITY	5.5%
No. of pregnant women in W.A. (calculated from No. of births including stillbirths in 1948)	13,245
No. of pregnant cases	9
ATTACK RATE	68
No. of deaths in this group	5
MORTALITY	55%

The youngest case was 19, the oldest 31.

Note.—All pregnant cases were between 19 and 31.

No. of non-pregnant cases 19-31, 22; Deaths, 2; Mortality 9.9 per cent.

CASES OF POLIOMYELITIS IN PREGNANCY (W.A. 1948).

Serial No.	Case No.	Age.	Duration of Pregnancy. (in mths).	Sex of Foetus	Severity and Outcome.
1	140	25	3	Female	Severe. Marked residual paralysis one lower limb.
2	306	22	4	Male	Died.
3	18	23	5	Male	Moderately severe. Very slight residual weakness one lower limb.
4	228	26	5	Male	Died.
5	129	30	8	Not known	Died.
6	47	23	8	Male	Died.
7	183	25	8	Female	Severe. Marked residual paralysis both lower limbs. (Some in abdominal muscles and back.)
8	173	31	9	Male	Died.
9	3	19	9	Female	Severe. Marked residual paralysis both upper and one lower limb.

The attack rate in pregnant women is higher than in other women (68 : 49), and the mortality in pregnancy is sinister (55% : 5.5%). These figures are sufficient comment in themselves.

Poliomyelitis and Foetal Malformation.

Case report prepared from information supplied by Dr. A. Evan Williams.

On the 30th of March, 1949, the stillbirth of a male child with complete "webbing" of both hands and feet was reported by Dr. A. Evan Williams from a town in the South-West of the State; the mother being a farmer's wife aged 35.

During the 8th week of the pregnancy, one of her ten children (a boy aged 9) had developed paralysis. He had been examined by Dr. Williams on the 1st of August, 1948, and notified as a case of acute anterior poliomyelitis. At the same time one of his sisters (aged 13) had developed a "suspect illness" (headache, pyrexia, and some neck stiffness) but apparently recovered completely in a few days.

The ten children varied in age from 1 to 16, and apart from these, the woman gave a history of one stillbirth and two miscarriages.

She had attended regularly for ante-natal examinations and had not complained of any symptoms attributable to poliomyelitis. Her urine was free from albumin and her blood pressure was 155/80. The doctor considered that she had a chronic hydramnios.

Labour supervened at term. The membranes apparently ruptured prematurely, but labour was otherwise normal.

The cause of the stillbirth was uncertain.

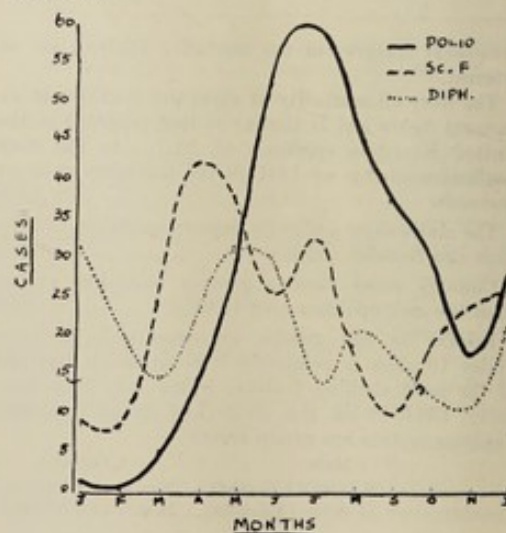
In the light of the known pregnancy-Rubella relationship, the case is of interest in that the mother (although not herself developing the disease), was exposed to the virus of poliomyelitis, during a stage of pregnancy when the foetus is known to be especially vulnerable, and when the fingers and toes are in the process of separation, and that the child was ultimately born with deformities of the hands and feet.

Poliomyelitis and other Infectious Diseases.

An attempt was made to compare the monthly incidence of poliomyelitis with that of other infectious diseases in which the mode of spread is known. Only two diseases (Diphtheria and Scarlet Fever), however, provided a sufficient number of cases for useful comparison.

Scrutiny of the accompanying chart reveals that (1) the incidence of all three diseases is relatively high in April, May and June; (2) the secondary peak in the Scarlet Fever curve coincides with the poliomyelitis peak; (3) an increased incidence in all three diseases occurs in the month of December.

These observations could suggest a similar mode of spread.



Meteorological Factors.

That outbreaks of acute anterior poliomyelitis appear to bear some relation to season is no new observation. It has long been recognised that it is predominantly an aestivo-autumnal disease. Thus, the majority of European outbreaks have developed in the summer and autumn; in America, summer has been, in the main, the epidemic season, and, in Australia, the warmest months have usually shown the highest incidence of cases.

In general, it has been noted that epidemics tend to subside with the advent of cold weather; but there have, however, been a few examples of epidemics persisting into and throughout the winter. Epidemics actually beginning in the winter have been extremely rare.

Occasionally it has been reported that the season either preceding or accompanying some epidemic has been unusual. Thus, over forty years ago Litchfield (1904) observed that a small summer outbreak in Sydney accompanied a particularly wet and cool summer; while Stephens (1908) commented as follows upon an epidemic of 135 cases in Victoria: "The outbreak supervened after an excessively dry warm summer, with a dearth of water in the catchment area such as had not been experienced for many years." This epidemic occurred during the months of April, May and June. Dick (1925), in reviewing several aspects of the disease in Australia, said: "... warm weather if not a predisposing cause of the disease, is its usual concomitant . . . It should be noted, however, that outbreaks of epidemic proportions have occurred in cold countries like Norway and Sweden in the winter season."

Gard (1938) studied certain Swedish outbreaks, and found that the small peak waves during an epidemic were preceded by rain two to three weeks earlier. Tolentino (1940) reported that temperature and precipitation were both high at the onset of an epidemic in Italy. Finally, the great English epidemic of 1947 is said to have coincided with an early, long and unusually warm summer.

Burnet (1940) remarked: "... it seems likely that close investigation of the influence of climate and other environmental factors on the course of epidemics might suggest practical measures of individual protection;" and Rhodes (1947) in the course of his most comprehensive review, says: "Further information on the possible effect of meteorological conditions on the incidence of poliomyelitis would be of interest. For example, the study of saturation deficiency might throw some light on the importance of droplet infection." Recently, Sargent (1948), reported a relationship between barometric pressure and the incidence of upper respiratory tract infections in America; examination of bio-meteorograms revealing that increased incidence frequently followed a certain pressure sequence (major pressure wave preceding minor pressure wave by about five days).

Thus, it would seem clear that there is a definite need for additional information in regard to the relationship between the incidence of acute anterior poliomyelitis on the one hand, and seasonal, climatic and meteorological factors on the other.

The Western Australian Epidemic.

The Western Australian epidemic (which involved 310 cases from March to December, 1948) may be said to have developed in late summer (March and

April), to have attained its peak in mid-winter (July), and to have subsided with the advent of warm weather; the decline, however, was interrupted by a relatively small secondary rise in December.

At the outset of this epidemic it was decided to examine the possibility of a relationship between incidence and meteorological conditions. Accordingly, records of temperature, humidity, rainfall and other meteorological factors were laboriously maintained; and compared with the day to day and with the weekly incidence of the disease. No relationship, however, seemed obvious.

Towards the end of the epidemic, conditions were considered in retrospect, and it was decided to re-examine the question. The simplest method of investigation appeared to be to plot, for comparison, curves representing incidence and individual meteorological factors. After several unsuccessful attempts at obtaining curves of comparable dimensions, it was discovered that, by selecting monthly figures, and by inverting the temperature curve, it was possible to demonstrate a striking temperature-humidity-incidence relationship. In fact, the three curves were so similar, that one could be substituted for the other without gross error. The humidity-incidence was even closer than the temperature-incidence relationship; incidence seemed to follow humidity like a shadow. The combination of rising humidity and falling temperature appeared to be significant.

In view of these encouraging observations the investigation was pursued, and, after consultation with Officers of the Meteorological Bureau, it was decided:—

(1) To substitute "Saturation Deficit" for Relative Humidity.

(2) To examine the relationship in 1938 (when 47 cases occurred between January and June).

(3) To calculate and compare annual deviations from normal as far back as records were available (omitting 1948).

(4) To examine conditions in some extra-metropolitan centre with a sufficient number of cases.

Investigations were accordingly made along these lines and the following results obtained:—

(1) The "Saturation Deficit" curve bore the same striking relationship to the incidence curve, as relative humidity had done previously.

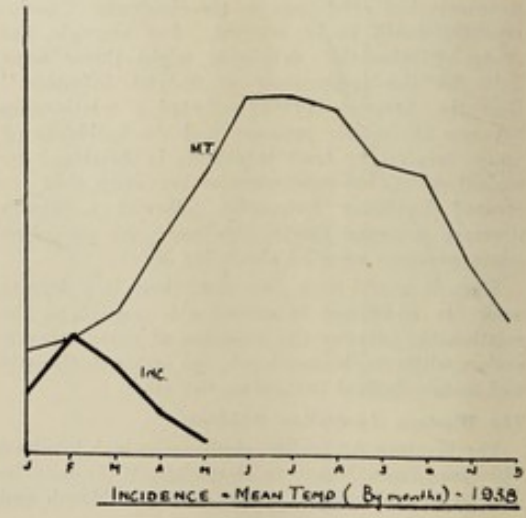
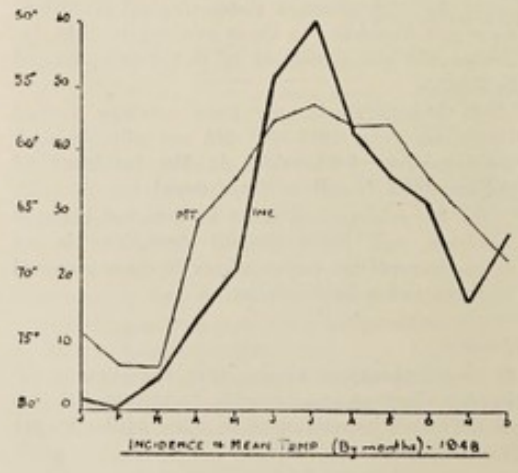
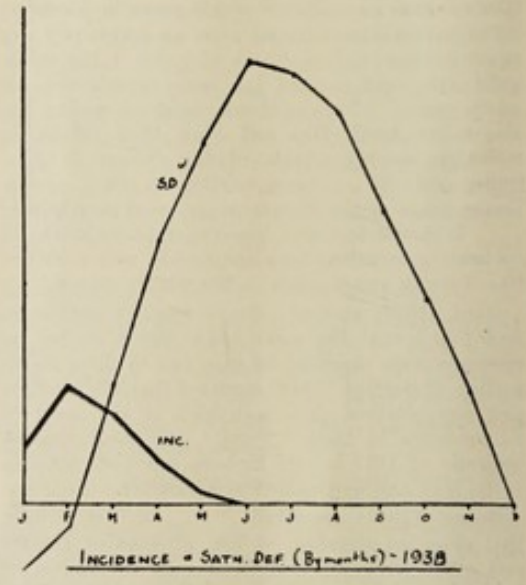
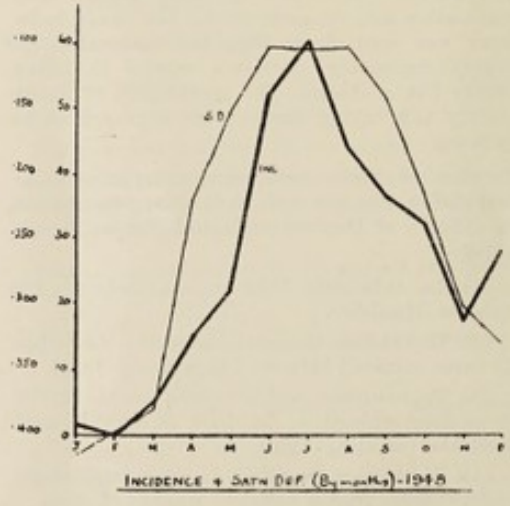
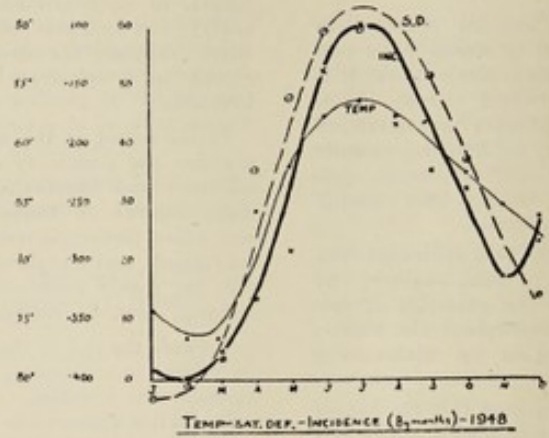
(2) In 1938, although meteorological conditions were not dissimilar to those existing in 1948, incidence did not appear to be significantly related to them.

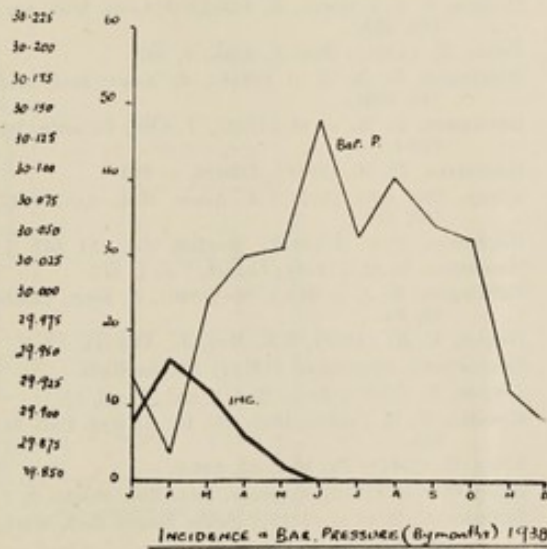
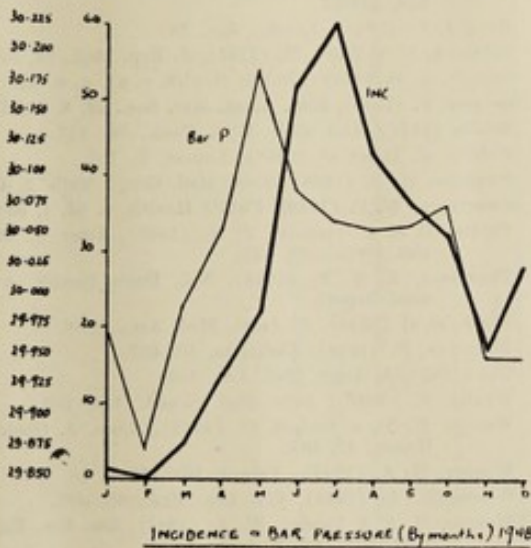
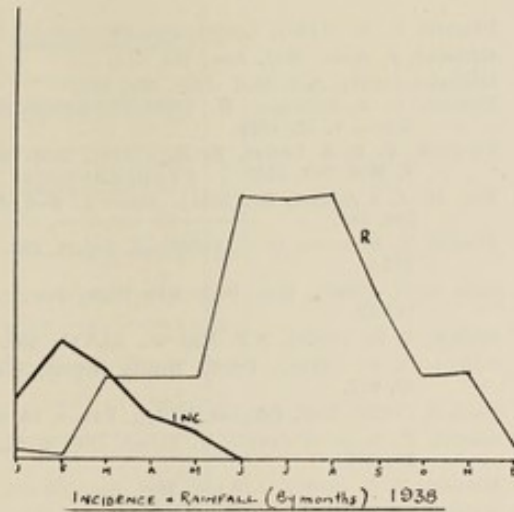
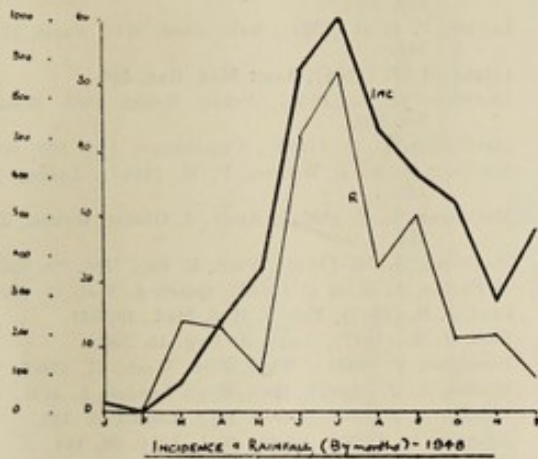
(3) Annual deviations from average normal conditions from 1913-1947 did not coincide with corresponding fluctuations in the incidence of poliomyelitis (small as these were).

(4) No relationship could be detected between incidence and meteorological conditions in an extra-metropolitan centre where 20 cases occurred in three and a half months.

Inference.

It would therefore appear that the climatic relationship observed was probably fortuitous. Nevertheless, further investigations in other epidemics are not unwarranted.





Acknowledgments.

This report would not have been possible without the facts supplied by members of the medical profession, hospital staffs, health inspectors and local authorities. Nor would it have been possible without the records enthusiastically maintained by Mr. C. A. Bennett. Officers of the Meteorological Bureau gave valuable assistance and advice, the Government Statistician readily provided useful data, and Miss M. B. Bryan (the B.M.A. Librarian) was un-failing in her courtesy and co-operation; while Mr. A. C. Waldon reduced many of the diagrams to manageable proportions, and Miss M. Tully grappled with the manuscripts.

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APPENDIX XVI.
WESTERN AUSTRALIA.
Derby Leprosarium.—Admissions and Discharges for the year 1948, compiled from Monthly Returns of the Superintendent.

Months of Year, 1948.	ADMISSIONS.						DISCHARGES.						Inmates remaining in Leprosarium.					
	MALE.			FEMALE.			MALE.			FEMALE.			Male.	Female.				
	Admitted.	Re-admitted.	Total Male.	Admitted.	Re-admitted.	Total Female.	Discharged, Cured.	Deceased.	Ab-sconded.	Discharged, Non-infectious.	Discharged, Males Discharged.	Discharged, Cured.	Deceased.	Ab-sconded.	Discharged, Non-infectious.	Total Discharged.	Total Remaining.	
January	1	1	2	1	1	2	...	...	...	...	...	...	...	...	...	2	138
February	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	138
March	3	1	4	1	1	2	...	1	...	...	...	...	...	...	...	2	137
April	1	1	2	1	1	2	...	2	...	...	...	...	...	...	...	4	135
May	4	5	9	5	5	10	...	...	...	...	...	...	...	...	...	7	135
June	4	1	5	7	2	9	...	...	...	...	...	...	...	...	...	9	145
July	5	5	10	7	2	9	...	1	...	...	...	...	...	...	...	7	145
August	4	4	8	2	2	4	...	...	...	...	...	...	...	...	...	4	135
September	7	...	7	3	3	6	...	1	...	...	...	...	...	...	...	4	138
October	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	141
November	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	139
December	2	146
Total	27	2	29	20	20	40	9	6	1	1	17	11	6	...	...	34	146

* Re-check of Register by Superintendent.

APPENDIX XVII.

NOTES BY DR. HERZ, DISTRICT MEDICAL OFFICER, DERBY, ON SULPHONE-THERAPY FOR LEPROSY.

The scheme of treatment makes blood counts (red and white) and Sahli tests taken alternatively at weekly intervals a necessity. Iron and Yeast is given all the time, but if, for instance, the Red Cell count falls below the 3,000,000 mark, Sulfa treatment is discontinued, Iron and Yeast are given in increased quantities until the count reaches near normal again.

Dosage for Diasone:—

1.8 gms. first week.

3.6 gms. for five weeks.

5.4 gms. for seven weeks, followed by an interval of two weeks. When treatment is recommenced, up to 7.2 gms. can be given after some weeks on in smaller doses.

Promin:—

6 gms. 1st week.

12 gms. for eight weeks.

18 gms. for seven weeks after an interval of two weeks, dosage began with—

18 gms. for four weeks, reaching

24 gms. for seven weeks.

Promin then became unprocurable, and the course was finished with Sulphetrone.

Sulphetrone:—

9 gms. 1st week.

12 gms. for 12 weeks. First course 1948.

18 gms. for eight weeks.

The present scheme of treatment with Sulphetrone starts with 1 or 1½ gms. daily rising every two weeks by 3 gms. weekly, to the maximum of 18 gms. weekly, provided the blood picture is satisfactory.

Recently Yeast and Iron were given two weeks in advance of the Sulphetrone treatment to build up a reserve in the patient's blood, as many patients showed a low red-count after only a few weeks of treatment.

Diasone:—

14 patients received this drug, of these were—

8 advanced cases;

2 moderate cases;

4 early cases.

2 patients showed dramatic improvement;

8 patients showed improvement;

5 patients showed no improvement.

Sulphetrone:—

36 advanced cases;

21 moderate cases;

13 early cases.

8 patients showed dramatic improvement;

37 patients showed improvement;

27 patients showed no improvement.

Of those marked "no improvement," 16 patients had the drug for six months only.

The two white patients are on a combined course of Promin (3 gms. daily) and Sulphetrone (6 gms. weekly).

The Sulpha treatment was in a few cases combined with intra-dermal injections of Hydrocarpus and Chaulmongra Oil. The results were satisfactory.

The improvement is based on clinical evidence in all cases marked as such, although smears remain positive with one exception, a lad of 15 years, but there is in a few cases a decline in the number of Bascilli noticeable.

The most gratifying result was the flattening of Nodules, and the lessening and loss of activity in Maculae and other lesions. Here again a marked improvement is noticed in patients, who suffered from eye, nose and throat complaints.

No new lesions were detected in any of the cases marked as "dramatically improved" or "improved." during the year.

All cases under treatment are "lepromatons" or "lepromatons and neural" (mixed).

We found Promin at first the best tolerated drug. During the early administration of Sulphetrone, several cases of severe anaemia and reaction with hospitalisation occurred which necessitated discontinuance of treatment. One patient, after only six weeks of treatment, died of a very severe Exfoliative Dermatitis. This was the only fatal case.

Patients receive now high doses of Yeast, Iron and Hepasol, starting two weeks before Sulfa treatment commences, and continuing all along. Only the best of these supplementary drugs will be successful.

Blood and other tests are taken of every newly arrived patient, in case there may be evidence of Hook worm, Yaws or other diseases.

In my opinion, results during the second year should be better, if patients were given the right quality and quantity of the supplementary drugs, thus eliminating anaemia and other reactions, and so promote an uninterrupted course of Sulpha treatment.

APPENDIX XVIII.

A NOTE ON FLUOROSIS.

By E. G. Saint, M.D., B.S., B.Sc., Medical Officer,
Port Hedland.

Fluorine is the lowest member of the halogen series of the Mendeleev table. In nature it is found in volcanic rock and many geographical formations containing phosphorus (1), e.g., the rich North African formations. Fluorspar (CaF_2) and cryolite, an industrial source of aluminium (NaAlF_6) are the richest sources. The industrial uses of fluorine are many and varied (2); the etching of glass-ware, in the plastics industry, the manufacture of germicides and anaesthetics and of fire proofing material; recently the fluoride of uranium has been used in the making of the atomic bomb. "Fluorine" is derived from a root meaning flux and lately the fluorides of sodium and calcium have been used in a process designed to produce steel of improved surface qualities.

Murray and Wilson (1) have described no less than 28 occupations in which workers are exposed to the fluorine hazard. Pharmacologically two types of reaction must be distinguished (3):—

1. Acute intoxication. Ingestion of the sodium salt causes acute vomiting and diarrhoea, abdominal colic, convulsions indicating damage to the central nervous system, and death.

2. Chronic intoxication with fluorides causes gastro-intestinal symptoms, nasal irritation, respiratory symptoms including dyspnoea, dermatitis and osteosclerosis.

The pathology and pharmacology of fluorine are well reviewed by Robolm (1937) (4).

Wilson and Murray (1) classify the industrial hazards of fluorine in the following manner:—

1. The accidental ingestion of insecticides—generally the fluorosilicate of sodium (Na_2SiF_6) (5).

2. Poisoning from baking powder rich in F—containing phosphate (e.g. Nottingham 1942, (6)).

3. Chronic absorption, causing mottling of the teeth and developmental disturbances of ossification. The first report of dental mottling due to high concentrations of fluorine in the drinking water was by Ainsworth (7) who described cases occurring in Maldon, Essex, in 1933.

4. Industrially, intoxication has occurred in England in workmen employed in manufacturing HF from fluorspar (8). Cryolite particles from a factory have settled on surrounding pastures poisoning cattle and sheep (9). On the river Meuse in Belgium, HF was liberated from a factory at a time when a heavy fog lay above a town. Sixty people died as a result of the pulmonary effects of this agent.

It is with the effects of chronic intoxication that we are most concerned. A peculiar mottling of the teeth was first described by McKay in 1916 (10) in endemic areas in the U.S.A. Similar cases were described by Ainsworth in 1933 who was able to incriminate the high fluorine content of the drinking water. Clinical descriptions of these dental effects have been recorded in India (11) (12),

Argentina (4), China (13a), South Africa (13), U.S.A. (14). So far there are no published cases in Australia.

Macroscopically, the enamel in these cases of fluorosis is of a dull white or yellow appearance, sometimes almost brown; characteristically it shows a whitish mottling. The surface is often irregular. It has been shown that levels of fluorine in the drinking water above about one part per million are associated with these clinical changes.

Concentration above three parts per million are likely to be associated with osteosclerotic changes. Lyth (13) investigated cases of spondylitis occurring among tribesmen in the Weichow province of China. The skeletons he examined showed total ankylosis of the vertebrae, including the atlas and occipital bone. The bone was usually dense and heavy, and there was evident calcification of the ligaments. Samples of water examined gave recordings of the order of 3-13 parts per million. Linsman and McMurray record excellent radiological pictures of a male Texan suffering from fluorotic osteosclerosis. Water samples contained 4-13 parts per million. Radiograms showed unusually heavy bony reticulations of all the vertebrae, ankylosis of the vertebrae, calcification of the spinal ligaments. The patient had a considerable anaemia and it was thought that this was possibly secondary to the osteoporotic change, encroaching on the marrow. Wikie (8) described an almost identical radiological lesion in two cryolite workers. To the unwary the picture presented might be confused with osteitis deformans, syphilitic osteitis, the carcinomatosis associated with cancer of the prostate and less commonly, the breast; and, perhaps, Albers-Schonberg disease ("marble bones").

Kemp et al (15) investigated radiologically five adults and twenty children in endemic areas in Oxfordshire and Essex in an attempt to discover whether fluorine was an aetiological agent in spondylitis deformans. Six of the Maldon children showed a degree of irregular ossification at the epiphyseal nuclei and end plate of the lower dorsal vertebrae. They concluded that spondylitis deformans "is the result of progressive degeneration and malformations laid down in youth; that fluorine in soil and water in conjunction with defective nutrition may favour such maldevelopment."

Fluorine is a tissue poison and an inhibitor of enzymatic activity. It is likely that in high proportions it inhibits certain phosphates, causing the deposition of bone.

It has been suggested that fluorine, in small concentrations, is an essential element in the protection of dental enamel. Various surveys (15) have shown that caries is commoner in areas where F. concentration in the drinking water is abnormally low, than in areas where it is "normal." Indeed dentists in the U.S.A. have been employing weak concentrations of NaF as a prophylactic measure. However in this respect fluorides have a mechanical action in precipitating and blocking up the microscopic canals where infection is liable to occur (16) and other inert substances (e.g. Zn salts) are found to be equally efficacious.

In brief then, the following facts are of importance:—

1. Above an arbitrary level of 0.8-1.0 parts per million fluorine causes a mottling of the teeth which, though unsightly, is not pathological, but rather bespeaks teeth which are more resistant to infection. A concentration of 0.5-0.8 p. per million is therefore the optimal one to work for.

2. Above a concentration of 3.0 p.p.m. more serious results, pathological bone changes, affecting in particular the spine, are prone to occur.

Local Geography.

Split Rock, Hillside and Bamboo Springs are a group of closely related stations situated about 150 miles to the South-East of Port Hedland. The country is both gold and tin bearing, but I have been unable to obtain any other details regarding the mineralogical features of this terrain.

As a sort of pilot survey, Split Rock and Bamboo Springs were chosen for investigation, since two families were known to have resided there at least two decades, and in each instance a generation of children has been brought up under local conditions. At first it was thought that one might garner much information from the natives, but experience has given no help whatsoever. The native is so migratory that it is impossible to chart individually places of residence. It is also impossible to get hold of them when wanted, so frequently are they found to be out mustering, or on pink eye, etc.

Split Rock.

This station is a heritage of the T. family, pioneers of the N.W. Mr. T. has lived there most of his 50 years; Mrs. T. has lived there since she was married, about 30 years ago. The three children, now in their early twenties, were brought up on the station, at least until going to school; significantly, during the years of teeth development and formation.

Mr. T., aged 50. For some years has complained of a stiff neck and back. Examination shows this to be in a state of fixed extension. Movements are limited to a few degrees. The entire bony skeleton was x-rayed by Dr. Godby, who has kindly allowed me to view the plates. From the atlas to the sacrum, the vertebrae are the seat of dense osteosclerosis. Each vertebrae is ankylosed to its neighbour and the spinal ligaments are the seat of calcification; similar changes surround the sacro-iliac joints. The ribs are sclerosed. In the peripheral skeleton changes are less easy to see, though there is evidence of increased reticular markings in the long bones.

This particular picture is even more convincing than those recorded in the literature (8) (14); and is as severe as the skeletons which Lyth dug up in China (13).

Mrs. T. has complained of only slight symptoms. Radiologically it is possible to desery unequivocal early osteosclerotic changes in the spine.

The three T. sibilings, 21 23 and 24 years of age, all show marked dental mottling. The teeth are of a uniformly dark yellow colour, with a peculiarly pitted appearance. Patches of brown, yellow and white staining are present on all teeth. Caries is absent; no teeth have been lost, and past fillings are surprisingly rare.

Samples of water were taken at Split Rock and analysed by the Government Analyst. Water from the well which formerly supplied the drinking water contained 10.0 parts per million of fluorine. The T. family has been aware of the dangers of this water for the past year and now use rain water.

Bamboo Springs.

This station is situated 40 miles away from Split Rock. Mr. and Mrs. Q. have each lived on the station about twenty years. The four children have been brought up on the station during the first decade of their lives.

No radiological details are available yet in the case of Mr. Q. Mrs. Q. is without symptoms and radiography shows no signs of skeletal "fluorosis."

The sibilings, aged 16, 14, 10 and 7, all show precisely the same changes in the teeth as do the T family. Infection is notably absent. Another significant abnormality worthy of note has been the delay in shedding the first dentition. In the case of the boy of seven, the second dentition has grown behind the milk teeth which have failed to fall out; consequently a double row of teeth existed in the mouth for a time. The first teeth eventually had to be extracted with forceps; more than usual resistance was offered.

A sample of drinking water taken from the well contained 2.0 parts per million of fluorine.

Discussion.

Clearly fluorosis of possibly dangerous degree exists in this part of the North West, warranting more careful investigation at other stations and small townships, e.g., Nullagine and Marble Bar. In view of what has been said of the relationship between dental caries and the absence of fluorine, a dental investigation of the children of Port Hedland is also considered necessary, for in the absence of any water scheme, a large number of people drink rain water. It is possible that supplementary fluorine may have beneficiary effects, although one must never lose sight of the facts of indubitable subnutrition, which is a more likely cause of poor dentition.

What advice is to be given to householders of stations in the fluorosis belt? It must be first assumed that the concentration of fluorine must not be allowed to exceed one part per million. If we could assume that a given concentration of F in a particular well was constant, we could advise the use of a constant dilution factor; thus Split Rock water could be diluted one part in ten with rain water. But in fact, owing to the vagaries of North West rainfall, fluorine concentrations are in no way constant. After floods the well waters are considerably diluted, to an unknown extent; and after a period of drought (N.B. the above specimens were taken after a period without rain of nine months) the water is considerably concentrated. There remains, then, the possibility of chemical treatment of the affected waters, after the manner in which hard water is softened. Only research will indicate in what way fluoride can be brought out of solution conveniently and economically.

Summary.

1. The literature on fluorosis is briefly reviewed, indicating the toxic effects and the industrial hazards.

2. A case of gross osteosclerosis of the spine due to absorption of excessive amounts is described in a man from Split Rock Station. Seven children and adults, from Bamboo Springs and Split Rock, are shown to have severe mottling of the teeth.

3. The size of the local problem is indicated and certain recommendations with regard to prevention are put forward.

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APPENDIX XIX.

HEALTH DEPARTMENT.

Revenue and Expenditure for Year 1948.

REVENUE.		£	s.	d.
License Fees	.....		59	15 0
Meat Inspection Fees	.....	7,999	8	9
Village Area Sanitary Contracts	.....		1	7 2
Patho. Laboratory	.....		741	19 0
Sanitation Refunds	.....		113	1 2
Inspection of Plans (Septic Tanks)	.....		1,458	3 11
Miscellaneous	.....	(a) 4,686	14	8
Nurses and Midwives Registration and Examination Fees	.....		664	10 5
Local Health Authorities Recoups	.....		269	16 11
		<u>£15,994</u>	<u>17</u>	<u>0</u>

(a) Main Item—T.B. Revenue of £3,270 4s. 2d. which includes recoup from Commonwealth Government for part cost of Diagnosis and After Care.

EXPENDITURE.

		£	s.	d.
Salaries	.....	48,321	12	7
Village Area Sanitation	.....		4	10 9
Payments Local Health Authorities	.....	7,624	19	6
School Hygiene	.....		446	12 10
Travelling and Transport	.....	1,959	13	9
Postages and Telephones	.....		462	19 1
Laboratory	.....		1,261	16 7
Veneral Disease	.....		3,566	6 4
Miscellaneous	.....		2,342	1 4
Infant Welfare Centres	.....		11,722	4 7
Maintenance and Transport of Lepers	.....		12,409	10 6
Medical Officer and School Dentists Travelling	.....		1,716	9 11
Diphtheria Immunisation	.....		791	2 1
T.B. Clinics	.....		14,933	10 8
		<u>£107,563</u>	<u>10</u>	<u>6</u>
Sanitation Government Buildings	.....		10,182	13 4
Total Expenditure	.....	<u>£117,746</u>	<u>3</u>	<u>10</u>

