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1952

LEGISLATIVE COUNCIL  
FIJI

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**MEDICAL DEPARTMENT**

(ANNUAL REPORT FOR 1950.)

I—ADMINISTRATION.

(1) ESTABLISHMENT AND STAFF.

(a) MEDICAL DIRECTORATE.

The departmental establishment is shown at Appendix I to this Report.

2. Dr. J. M. Cruikshank, O.B.E., Inspector-General, South Pacific Health Service, and Director of Medical Services, Fiji, and Dr. K. R. Steenson, Deputy Director of Medical Services, continued their substantive duties throughout the year.

3. Mr. R. B. Fyfe, Health Instructor, acted as Chief Health Inspector from 1st January until the 15th August, on which date Mr. W. C. Cockell, Chief Health Inspector, returned from overseas leave.

4. Mr. A. L. Baker, Secretary to the Medical Department, was transferred to the Secretariat on 4th August and his duties in the Medical Department were taken over by Mr. J. G. Garnett in an acting capacity.

5. Miss D. T. Pedersen, Nursing Superintendent, left the Colony on leave and was subsequently appointed to World Health Organization Headquarters, New Delhi, India. Miss J. Sinclair, Matron at the Colonial War Memorial Hospital, Suva, was appointed to the post of Nursing Superintendent in April.

(b) MEDICAL, NURSING AND TECHNICAL STAFF.

6. As will be seen at Appendix I, the establishment of Medical Officers is 31, including the posts of Medical Superintendent, Fiji Leprosy Hospital, Makogai, and the Principal of the Central Medical School, Suva. In January, 1950, there were three vacancies in the Medical Officer group of 17 and, in addition, the posts of Surgeon-Specialist and Medical Officer of Health remained unfilled.

7. Dr. M. L. McCauley returned from leave in the United Kingdom on 9th November, and the following officers proceeded on leave:—

Dr. P. G. Griffiths (31/5/50), Dr. F. R. T. Hollins (2/7/50), Dr. A. S. Frater (7/2/50), and Dr. B. H. B. Upton (16/6/50).

Dr. J. R. Reid who had proceeded on leave to the United Kingdom in 1949 remained absent from the Colony during the whole of 1950. During his leave in the United Kingdom Dr. McCauley was successful in passing the examination for the degree of Master of Obstetrics (M.A.O.).

8. The following Medical Officers were appointed to the Staff:—

Dr. L. Achmatowicz (28/2/50), Dr. H. W. Conran (10/3/50), Dr. G. O. Hallman (10/3/50), Dr. H. E. Knowles (25/7/50), Dr. E. A. Knowles (25/7/50), Dr. A. Aronson (10/5/50) and Dr. H. Bor (17/7/50).

9. The following promotions were made in the Senior Nursing Staff:—

Miss M. Cleaver, Matron at Lautoka Hospital was appointed Matron at the Colonial War Memorial Hospital, Suva;

Mrs. U. Stevenson, Assistant Matron at the Colonial War Memorial Hospital, Suva, was appointed to be Matron at Lautoka Hospital; and

Miss N. Sullivan, Nursing Sister, was promoted to be Assistant Matron, Colonial War Memorial Hospital.

10. New Zealand continued to send Trained Nursing Sisters to Fiji, some appointments being on one year contract and others on two year contracts. The acute shortage of Nursing Sisters in New Zealand was reflected in the number available for secondment to Fiji. Towards the end of the year the Colonial War Memorial and Tamavua Hospitals staffs were reduced to half normal establishment and the Lautoka Hospital to three-quarters.

11. One trained Health Sister (Miss Schultz) proceeded to New Zealand for post-graduate study in child welfare, the expenses of the course being met by a Government bursary.

12. One Indian and five Fijian students graduated from the Central Medical School in December bringing the total strength of the Assistant Medical Practitioner staff at the end of the year to 92. Two hundred and three locally trained Nurses were on the staff in 1950, of whom 103 were engaged in hospital duties and the remaining 100 on district work in towns and villages. Fijian and Indian girls in training as pupil nurses numbered 167. Of these, 84 received tuition at the Central Nursing School and the Colonial War Memorial Hospital, 65 at Lautoka Hospital

and training school, 14 at Tamavua Hospital and 4 at Labasa Hospital. The first four Indian girls to qualify as Nurses at a Government Training School graduated at Lautoka in July. A total of 31 pupils were successful in passing their final examination at the Central Nursing School, Suva, and the Lautoka School in 1950.

## (2) LEGISLATION.

13. Laws and regulations relating to medical and public health matters were enacted as follows:—

Public Health (Aerated water, Ice and Ice-cream) (Amendment) Regulations 1950 made by the Central Board of Health for the purpose of providing for the suspension of ice-cream permits by the local authority when considered necessary in the interests of the Public Health.

The first schedule to the Customs Duties Ordinance was amended to allow entry into the Colony, free of duty, anti-microbial organic substances produced by living organisms and any preparation thereof and any substance or preparation the chemical properties of which are identical with any of the foregoing.

Part III of the Dangerous Drugs Ordinance was amended by the addition to the schedule of ten synthetic drugs including Amidone (under new molecular composition), Matapon and Heptalgin.

## (3) FINANCE.

14. The revenue and expenditure of the Department during 1950 is shown in the following table:—

Gross Expenditure . . . . .	£438,414
Revenue . . . . .	39,249
Net Expenditure . . . . .	399,165

As the total expenditure of the Colony was £3,589,458 the gross cost of Medical and Health Services was 11.12 per cent of the total Colony expenditure or £1 7s. 2.11d. per head of population.

15. The following table shows the expenditure on medical and public health services per head of the population over the past 15 years.

Year	Population	Expenditure (per caput)	Remarks
1936	201,086	8s. 0.77d.	
1939	215,030	10s. 7.42	
1942	233,895	10s. 0.78	
1944	246,485	12s. 0.81—£30,614	free grant from C.D. & W. funds deducted.
1945	254,676	14s. 1.67—£26,264	free grant from C.D. & W. funds deducted.
1946	260,468	16s. 6.38—£14,880	free grant deducted. £5,000 for new X-ray plant included.
1947	269,274	20s. 7.85—£15,762	free grant from C.D. & W. funds deducted.
1948	277,372	24s. 4.49—£12,130	free grant from C.D. & W. funds deducted.
1949	284,955	25s. 0.48—£2,426	free grant from C.D. & W. funds deducted.
1950	293,764	27s. 2.11—£24,451	free grant from C.D. & W. funds deducted

Rising cost of drugs, equipment and food for patients and also increasing population are mainly responsible for the increase.

16. Colonial Development and Welfare Projects:—

## (i) Suva Medical Centre.

Tenders submitted for the construction of the Suva Medical Centre exceeded the allocation to such an extent that no tender was accepted. The plans are being revised and if steel for reinforcement remains available it is hoped construction will be commenced in 1951.

## (ii) Tuberculosis Survey.

This has been proceeding satisfactorily. Mantoux testing has been extended to more rural areas. Approximately 15,000 Mantoux tests were performed and 9,000 inoculations of B.C.G. were given.

An X-ray Survey of three schools, Draiba married quarters for Native Junior officials and seven Government Departments, disclosed one school teacher, one student and three government officials with open lesions, among a total of 1,500 X-rayed.

## (iii) Central Medical Research Library.

Initiated in 1949 it has been greatly appreciated both by students in training and officers of the Medical Department. Many text and reference books were purchased, also current medical journals were provided.

## (iv) Anaemias and Dental Diseases.

A preliminary survey was undertaken early in the year. The report is attached as Appendix IV.

## (4) MEDICAL STORES AND EQUIPMENT.

17. The difficulty and delay in obtaining supplies of medical stores and equipment experienced in previous years continued during the year.

18. The total value of drugs, instruments, appliances, clothing, bedding and equipment passing through the hands of the Government Pharmacist and Medical Storekeeper was £58,225. Of this amount items to the value of £87 were issued to missions, £3,199 for child welfare work and £592 sold to private practitioners and other persons and departments.

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## II—PUBLIC HEALTH.

## (1) GENERAL REMARKS.

19. In each of 48 areas into which the Colony is divided there is a district, or a rural hospital or a dispensary, which is in the care of a Medical Officer or an Assistant Medical Practitioner. From each such unit monthly mortality returns are sent to Administrative Medical Headquarters and any necessary action which may not already have been taken by the reporting officer is put into operation. In addition to monthly returns, the Medical Officer in charge of each district submits a telegraphic return weekly of the infectious diseases which have occurred in his district. This information is referred to the Health Department staff and immediate action is taken to investigate the conditions under which the diseases have occurred and to prevent their spread. With the exception of an outbreak of influenza there was no epidemic during the year which affected the health of the community as a whole.

## (2) COMMUNICABLE DISEASES.

20. *Influenza*.—An outbreak of this disease reached epidemic proportion in November and December. (Similar outbreaks in Cook Islands, Gilbert and Ellice Islands, American Samoa and Tahiti). In Cook Islands and Gilbert and Ellice Islands pneumonia was a common complication but the outbreak in Fiji was mild in form. The number of cases actually reported was 5,293.

21. *Typhoid and Dysentery*.—The programme of anti-typhoid inoculations has been accelerated and during the year included many more school children and Colonial Sugar Refining Company employees and their families. In conjunction with the inoculation programme every encouragement has been given to the installation and use of bore-hole latrines. Sanitary fixtures for these installations are made by the Medical Department and are sold at cost. A total of 437 cases of dysentery was reported during the year, of which 34 were classified as amoebic, 148 bacillary, and 255 were unclassified. Notified cases of typhoid and para-typhoid amounted to 206 compared to 223 in 1949.

22. *Infantile Diarrhoea*.—Cases numbering 918 were notified, mostly occurring in Fijian villages.

23. *Whooping Cough*.—One hundred and fourteen sporadic cases were notified for the whole Colony. No particular area was affected.

24. *Dengue Fever*.—The number of cases reported was 264. Although this no doubt does not represent the actual incidence it is generally conceded that this disease was not prevalent.

25. *Hookworm*.—This disease which was prevalent in past years is now declining due undoubtedly to the use in Fijian villages and Indian settlements of borehole latrines with concrete slabs and pedestals. It is very rare to see any physical effects of hookworm infestation which was so evident before sanitary latrines were brought into use. In conjunction with sanitary measures for the disposal of human excrement, hookworm treatment is given by Medical Officers and Health Sisters to all sections of the community, particularly to school children and those in institutions. Whenever possible tests are carried out and the condition treated before gross symptoms have had time to develop. Health Education plays a big part.

26. *Yaws*.—School children are thoroughly examined by Health Sisters and Nurses for signs of yaws and treatment by injections of Sobita given immediately to positive cases to render them non-infectious. The disease is not prevalent in towns and settlements. As with hookworm health education has played no small part in the control of this disease.

## (3) VENEREAL DISEASE.

27. Two hundred and ninety-seven cases of Gonorrhoeas, 11 of ophthalmia neonatorum and 27 of syphilis were reported.

## (4) IMMUNIZATION AND PROPHYLAXIS.

28. Anti-diphtheria and anti-whooping cough immunization is carried out on a voluntary basis at all public health centres and mass immunization against typhoid and para-typhoid fever and vaccination against smallpox is arranged in all areas. B.C.G. inoculations have been performed in connexion with the Anti-Tuberculosis Campaign.

## (5) TUBERCULOSIS.

29. The administration of B.C.G. vaccination has been extended, comparative tests have been made using Commonwealth Serum Laboratory fresh B.C.G. from Australia, dried vaccine from the Pasteur Institute, Paris, and the dried vaccine made into solution and given intradermally. Figures are not sufficiently extensive to draw a firm conclusion but so far the fresh B.C.G. from Australia gives the highest conversion rates. Fresh B.C.G., if given as soon as received from Australia (4th day after preparation), gives 98 per cent conversion. When stored locally under refrigeration to the tenth day 84 per cent conversion is obtained, and if transported to rural areas under local conditions the conversion rate falls to 60 per cent. Mantoux check readings are being undertaken at years intervals on various groups to ascertain the percentage of reversions. No cures can be attributed to streptomycin and P.A.S. alone but the use of these drugs has been fully justified combined with routine treatment. Relapse three to six months after stopping streptomycin has been common.

30. A 25-bed tuberculosis unit was provided at the Lautoka District Hospital which, together with furnishing empty wards at Tamavua Tuberculosis Hospital, brings the total number of beds available for tuberculosis patients to approximately 350. This figure includes beds at rural hospitals occupied by tuberculosis patients.

31. Orders were placed during the year for a mass miniature X-ray unit, a portable diagnostic X-ray unit, and a modern fixed X-ray installation for the tuberculosis centre at Tamavua. Delivery is expected in 1951.

32. A complete report of the year's activities in tuberculosis under the following heading is to be found in Appendix XII:—

Part 1—Report on the Mantoux Results for the Population of Fiji obtained during the year 1950.

Part 2—Observations on the Preparation, Dosage and Dilution of Old Tuberculin as Used in Fiji.

Part 3—Analysis of Mantoux Results Obtained by Using a Dosage of 1/10cc of 1/1000 Dilution of Old Tuberculin during the year 1950.

Part 4—Observations on the Size of the Mantoux Reactions by Age and Racial Distribution.

Part 5—Report on the B.C.G. Inoculations in Fiji, 1950.

Part 6—Radiological Tuberculosis Survey Undertaken in Suva during 1950.

Part 7—Colony Registration of Tuberculosis.

#### (6) LEPROSY.

33. Among the 700 patients in the Fiji Leprosy Hospital, Sulphetrone has continued to give good results in cases of lepromatous leprosy. The development of anaemia has not been serious but careful observation of patients under treatment is required. Controlled groups of patients are receiving oral sulphone but it is too early in our experience to state the comparative efficacy of this drug. The report of the Medical Superintendent of the Fiji Leprosy Hospital at Makogai is given in Appendix III to this report.

#### (7) ANTI-MOSQUITO CONTROL.

34. A Todd Insecticidal Fog applicator has been ordered to supplement the anti-mosquito measures of drainage, filling of low areas, oiling and elimination of breeding receptacles in urban and rural areas. Residual D.D.T. spraying of buildings on the airport has been continued. The programme of clearing Crown land of tall grass in residential areas is also progressing.

35. *Aedes aegypti* mosquitoes still continue to be non-existent on Nadi Airbase as a result of residual spraying and constant inspection of premises and other possible breeding places.

36. The main drainage system of Nadi Airbase and of the port of Suva have been maintained free of mosquitoes.

#### (8) FILARIASIS CONTROL.

37. A preliminary analysis of the figures obtained from approximately 70,000 blood examinations among Fijians reveals that 15 per cent of Fijians have microfilaria bancrofti in their blood. These figures relate to a survey which has been conducted over the past five years. During 1950 the full staff of five supervising Inspectors and 44 Field Inspectors paid 5,800 visits to native villages in every part of the group to give advice and to check progress of control methods.

38. A map showing geographical distribution of filariasis in Fiji with age and sex incidence was prepared for the Congress of Tropical Diseases sponsored by the American Medical Association in San Francisco. A complete breakdown of the figures will be finished in 1951 when a separate report will be submitted.

39. Re-examinations of blood smears from inhabitants after the five-year period and of children born during this period is being done and should reveal whether bush clearing in the vicinity of villages has reduced *Aedes cutellaris pseudo-scutellaris* sufficiently to cause a drop in the microfilaria in the blood during the first five year period of the anti-filariasis campaign.

40. A school for the training of personnel is conducted at Suva. Students who undertook the full entomological course in relation to the Anti-Mosquito and Filariasis Control Schemes during 1950 comprised one European, two Gilbert and Ellice Islanders, two New Hebridean, three Fiji-Indians and twelve Fijians.

#### (9) DENTAL HEALTH.

41. The Dental Clinic is ancillary to the Colonial War Memorial Hospital and is under the direct supervision of the Medical Officer in Charge of that institution. The staff consists of two fully qualified Dental Officers, two Assistant Dental Practitioners and one Dental Mechanic. Attendant Nurses are supplied from the general nursing staff of the Colonial War Memorial Hospital. One of the Dental Surgeons and one Assistant Dental Practitioner travel throughout the Colony and give treatments to school children and other inhabitants of country districts.

42. The Dental School for the training of Assistant Dental Practitioners is run in conjunction with the Dental Clinic, students receiving instruction in pre-clinical subjects at the Central Medical School. Students at the school numbered two and comprised one Fijian and one Ellice Islander. It is intended not to expand the Dental School until the new school building is completed.

43. During the year under review 6,871 extractions and 1,394 fillings were done for all races at the clinic and other treatments numbering 314 were also given.

#### (10) DIETETICS AND NUTRITION.

44. Menus for school lunches and for adults of the various races in Fiji were initiated but are not yet completed due to the resignation of the Dietitian. Two food posters which were prepared locally were reproduced in New Zealand and have been distributed throughout the Colony. Late in the year Government established its own silk screen process and one anti-tuber-

culosis poster was produced by this process. A set of Walt Disney colour cartoon health films was obtained and a large audience was reached by including these films free of charge in the commercial 16 mm. circuits operated within the group. The interest and response to these films is manifested by the constant requests for repeat showings.

#### (11) VITAL STATISTICS.

45. Tables of vital statistics will be found at Appendix V, and from these it will be seen that the relative increase in the population of all races noticed in recent years is still being maintained. The Fijian population increased by 3,246 and the Indian by 4,484.

46. The increase in population since the census of 1946 is estimated at 34,100. The natural increase per thousand of population in 1950 was 29.08.

47. The crude birth rate per thousand for 1950 was 39.20 compared with 38.07 in 1949. The Fijian birth rate was 37.11 and the Indian 42.49 while the Fijian death rate was 12.31 and the Indian 9.99.

48. The Fijian infant mortality rate in 1950 was 60.36 per thousand (70.00 in 1949) and the Indian 57.80 (56.01 in 1949).

49. Infant mortality and crude birth and death rates for Fijians and Indians for the years 1926 to 1950 are shown on a graph which forms part of Appendix V.

### III—HYGIENE AND SANITATION.

#### (1) ADMINISTRATION.

50. The administration of the Public Health Ordinance is vested, by the terms of that Ordinance, in the Central Board of Health and is decentralized by the Board to local authorities. Advisory functions are shared between the Director of Medical Services and the Central Board of Health. The latter body receives regular reports from and, where necessary, directs the activities of the local authorities.

51. Port health and quarantine in Suva is in the charge of the Medical Officer of Health and all Government Medical Officers in country districts are Medical Officers of Health for the sanitary districts in their charge. The activities of the fully trained Health Inspectors and locally trained Assistant Health Inspectors are co-ordinated by the Chief Health Inspector who is also Secretary to the Central Board of Health. District Health Sisters are employed on district work, field inspections and the direction of child welfare activities in the towns, schools and villages. The work of these nurses is more fully described under Section V of the Report.

52. There were 19 local authorities functioning in the Colony and the minutes of 96 meetings were forwarded to the Central Board of Health. The Suva and Lautoka Urban and Suva Rural Local Authorities met each month; other local Authorities met at irregular intervals. The Central Board of Health acted as Local Authority for the area covered by Nadi Airport.

53. The following is a summary of the work carried out by Health Inspectors and Assistant Inspectors during the year:—

- (a) *General Sanitary Inspection.*—63,296 inspections and re-inspections were carried out and 4,918 written notices were issued which resulted in 23,447 sanitary defects being remedied. Buildings in urban and sub-urban areas which were unfit for occupation received attention as follows—

Closing Orders issued	.. .. .	63
Demolition Orders issued	.. .. .	38
Buildings demolished by owners	.. .. .	20
Buildings demolished by Local Authority	.. .. .	5

- (b) *Food Supplies and Premises.*—8,369 inspections were made of food premises and vehicles and 1,009 improvements to such premises completed during the year. Food inspection was well maintained, approximately 15½ tons of unsound foodstuffs being condemned and destroyed. 188 samples of food were taken for laboratory examination (143 chemical; 45 bacteriological) and appropriate action was taken in respect of substandard goods. The majority of samples taken were of milk and ice cream.

- (c) *Supervision of Erection of New Buildings.*—The standard of new housing in the township and suburban areas continued to show improvement. Every new building where a piped water supply exists has a septic tank system of sewage disposal and concrete is in a large measure replacing timber frame construction.

In 18 sanitary districts, excluding the town of Suva, Health Inspectors, who also act as Building Inspectors, dealt with 1,075 applications in respect of new buildings or structural alterations or repairs, to a value of £690,950. At the end of the year 694 building projects were under supervision.

- (d) *Legal Proceedings.*—Legal proceedings were instituted as follows—

Offences under Public Health Ordinance—Cases, 100; Convictions, 93; Penalties, £168.

Offences under Pure Food Ordinance—Cases, 38; Convictions, 33; Penalties, £291.

#### (2) SEWAGE DISPOSAL.

54. Householders in suburban and rural districts continued to take advantage of the facilities offered for improved sanitation. Many applications to install septic tanks were received and 365 reinforced concrete latrine slabs were supplied at cost price to applicants.

## (3) GARBAGE DISPOSAL.

55. Garbage collection services were extended in two districts. In 14 sanitary districts more than 5,000 premises were served by regular garbage collection services supported by garbage collection rates.

## (4) RAT DESTRUCTION.

56. 18,333 traps were set and 5,319 rats caught in 1950. 148 of these rats were submitted for laboratory examination but none was found to be infected.

## (5) WATER SUPPLIES.

57. One hundred and thirty-four samples of drinking water were taken for laboratory examination during the year. Nine samples were taken from sea baths and eight were found to be satisfactory.

## (6) SCHOOL HEALTH AND HYGIENE.

58. District Medical Officers, Health Sisters and Assistant Medical Practitioners made routine inspections of schools throughout the year in all parts of the Colony. The following summarizes the work carried out at these inspections:—

- (a) Each child was weighed and measured and was given a vision test. The head was examined for lice and nits. Observations were made of signs of ill health and nutritional deficiencies from the state of teeth, mouth, skin, eyes, muscle tone and posture. The results of findings were recorded on individual medical cards.
- (b) Children suspected of suffering from a chronic or acute disease were referred to a Medical Officer. Those in need of dental attention were advised to visit their dentist or arrangements were made for their attendance at the Dental Clinic. Arrangements were made for children with defective eyesight to see an eye specialist.
- (c) Specimens of stools were sent for examination for parasites and arrangements were made for treatment when this was necessary.
- (d) Careful investigation was made in the cases of children having relatives with tuberculosis, leprosy or syphilis.
- (e) In cases of minor complaints and pediculosis, the children were treated either at the Health Office Clinic or in the schools.
- (f) Home visiting was continued for the purpose of advising parents in regard to further treatment and talks were given on general welfare matters.
- (g) Standard first aid materials were supplied to the schools with instructions and demonstrations as to use.
- (h) Anti-typhoid inoculations were given in all schools and an extensive vaccination campaign was carried out.

## IV—SEAPORT AND AIRPORT HEALTH AND QUARANTINE.

59. Suva, Lautoka and Levuka are the three ports of entry in the Colony for overseas ships, with Suva the only port of entry for ships from malarial ports. Aircraft use the airports at Nadi and Nausori and flying boats land at Laucala Bay, Suva. During 1950 the total numbers of ships and aircraft arriving at these ports from overseas were as follows:—

<i>Ships</i>				<i>Aircraft</i>			
Suva	..	..	136	Nadi	..	..	741
Lautoka	..	..	9	Nausori	..	..	30
Levuka	..	..	1	Laucala Bay	..	..	81
			146				852

60. Nadi, as the Colony's main airport, handled the bulk of the traffic during the year. There were 3,628 landing passengers as compared with 2,275 in 1949. There is a Medical Officer stationed at Nadi Airport and a Health Inspector who carries out disinsectization of aircraft and general sanitary measures. Aircraft from malarial places are required to land at either Nadi or Laucala Bay but may use Nausori in exceptional circumstances.

61. Seventeen overseas vessels and 75 local vessels were fumigated mostly with cyanide and 807 aircraft were treated with Aerosol dispensers.

62. The Medical Officer of Health and Health Inspectors inspected the quarantine islands of Nukulau and Makuluva regularly during the year. These islands are serviced by the medical launch.

## V—MATERNITY AND CHILD WELFARE.

63. At Appendix V will be found infant mortality figures and the graph shows the birth and death rates of Fijian and Indian infants from 1926 to 1950. The Fijian infant mortality has now fallen to approximate the Indian rate. Although the Indian rate has increased over the past three years the overall picture shows a declining infant mortality rate. The crude birth rate in both races continues to show a rising tendency.

64. The number of Health Sisters was increased from 7 to 9 and the number of locally trained Assistant Nurses increased from 94 to 100. In addition, on the island of Rotuma, a Mission Sister carries out child welfare work and in the hill area of Namosi another Mission Sister performs similar useful work. There is at times difficulty in obtaining transport for Health Sisters to outlying islands but it is hoped that a Medical Department vessel will be ready for use next year which will facilitate welfare work on these islands.

65. Attendances at the Suva and other clinics, including the Mobile Clinics were as follows:—

Europeans .. .. .	1,632
Part-Europeans .. .. .	1,449
Fijians .. .. .	31,844
Indians .. .. .	13,534
Chinese .. .. .	476
Others .. .. .	628
Total .. .. .	49,563
T.A.B. Inoculations (including those given at schools) .. .. .	44,265
Smallpox vaccinations .. .. .	484
Pertussis, Diphtheria inoculations, etc. .. .. .	986
Home visits made .. .. .	6,337
Number of children under 2 years seen at Clinics .. .. .	7,242

66. Two mobile child welfare clinics under the charge of Health Sisters were in operation throughout the various districts of Viti Levu, the headquarters of one being at Suva and the other Lautoka.

67. Twenty-four beds are available at the Maternity Annexe, Colonial War Memorial Hospital, and all beds were kept constantly in use. The following figures give an indication of the work carried out and the increasing use made of the Maternity Annexe in the past three years:—

	1948	1949	1950
Births .. .. .	773	841	967
Ante-natal Attendances .. .. .	3,387	4,800	6,178

## VI—HOSPITALS AND DISPENSARIES.

### (1) GENERAL REMARKS.

68. Hospital units in the Colony are classified as general or specialized hospitals, district hospitals, rural hospitals and rural dispensaries. At the Colonial War Memorial Hospital, Suva, which is the general and consulting hospital for the Colony, the services of a Physician Specialist and a Surgeon Specialist are available as well as specialist ophthalmic treatment and dental treatment. Patients are admitted to this hospital from all parts of Fiji for specialized investigations and treatment. There are district hospitals at Lautoka, Labasa and Levuka under the charge of fully qualified staff. In country districts there are 14 rural hospitals and 36 dispensaries at strategic points. These hospitals and dispensaries are in the charge of Assistant Medical Practitioners and Assistant Nurses and are visited at frequent intervals by Medical Officers and Sisters of the Senior Staff. Special facilities for the treatment of tuberculosis are available at the Tamavua Tuberculosis Hospital situated on a ridge overlooking Laucala Bay about five miles from Suva. Patients from all parts of the Colony requiring special attention are admitted to this hospital. The Colony's Mental Hospital is situated at Suva and patients are received from all parts of the group.

69. In addition to the Government Hospitals there are the following four small private hospitals in the Colony:—

- Nurse Morrison's Maternity Home, Suva.
- The Methodist Mission Indian Women's Hospital, Ba.
- The Cottage Hospital, Ba.
- The Waiyevo Hospital, Taveuni.

Each of these is subsidized by Government. Shown at Appendix VI are the numbers of out-patient attendances at Government Hospitals and Dispensaries during 1950.

### (2) COLONIAL WAR MEMORIAL HOSPITAL.

70. Dr. T. A. Doran continued as Medical Officer in charge of the hospital and Dr. P. E. C. Manson-Bahr was Physician Specialist. The post of Surgeon Specialist made vacant by the departure on transfer of Mr. K. J. Gilchrist in 1949 remained unfilled, the duties being taken over by the Medical Officer in Charge and other Medical Officers posted at the hospital. Two Dental Surgeons carried on the work of the Dental Department and the Nursing staff consisted of the Matron (Miss J. Sinclair until May 17th and thereafter Miss Cleaver); the Assistant Matron (Mrs. Stevenson until May 22nd when she was appointed Matron, Lautoka Hospital in place of Miss Cleaver; thereafter Miss N. Sullivan was promoted to the position); a staff of Sisters varying in number between 22 at the beginning of the year and 14 in December; 24 locally trained Nurses and 104 Pupil Nurses.

71. The revenue collected during 1950 amounted to £4,023 and unpaid fees were maintained at a minimum by accepting deposits from patients on admission to hospital.

72. Dr. Manson-Bahr continued his research in the study of Malignant Malnutrition in Fijians and in Megaloblastic anaemia in Fiji. A favourable report of the use of Chloromycetin in influenzal meningitis was confirmed and a long term study of Syphilis and Yaws in Fijians was started consequent to the finding of congenital Syphilis in a macerated Fijian foetus during the year.

73. Early in the year an air conditioning plant was installed in the operating theatre. Operations performed in the main theatre numbered 1,003, and minor operations in the out-patients department 1,170. Assistant Medical Practitioner S. T. Uluilakeba continued as officer in charge of the Eye Clinic. Towards the end of the year this officer proceeded to Otago University Medical School, New Zealand, for a short course of higher training in Ophthalmology and is due to return



to the Colony early next year. Dr. J. Lodge, Consultant Ophthalmologist from Sydney, visited Fiji and was given the facilities of the hospital for his work. He did a great deal of work amongst hospital patients. A.M.P. Vilikesa Ramaqa who was sent to the Otago University Medical School to undertake a short course in anaesthetics towards the end of last year, returned to the Colony early in 1950 having gained much valuable knowledge which assisted greatly in his work as Anaesthetist to the hospital. The system of Assistant Medical Practitioner Housemen inaugurated last year was continued and three new graduates were appointed.

74. The work of the X-ray Department has continued to increase. Radiographic examinations were carried out on 11,507 patients requiring 15,630 exposures which include:—

Lung Fields .. .. .	4,366
Bones .. .. .	2,308
Teeth .. .. .	157
Abdomen .. .. .	392
Screenings .. .. .	148

With the miniature X-ray equipment 2,150 patients were examined with the use of 2,539 exposures and 1,294 patients were examined with the photo fluroscopic apparatus. 486 inductotherapy and 398 infra-red treatments were given.

75. The outpatients department handled 71,092 cases which is a substantial increase on last year's work, no doubt due to the increasing population of Suva.

76. The Dental Department rendered treatments to the following:—

Fijians .. .. .	3,941
Indians .. .. .	2,671
Others .. .. .	540

A total of .. 7,152 patients.

### (3) TAMAVUA TUBERCULOSIS HOSPITAL.

77. Dr. L. G. Poole, Tuberculosis Officer, was Medical Officer in charge of the hospital during 1950. The bed capacity was increased to 250. Miss E. E. Butt continued as Matron in charge and with her was a staff of overseas Sisters which, as in other hospitals, was reduced very much towards the end of the year owing to the difficulty experienced in replacing those whose tour of duty was completed and who had returned to their homes. Locally trained nurses continued to work as in previous years.

78. Admissions, discharges and deaths during 1950 are shown in the following table:—

Total number of patients in hospital on 1st January, 1950 ..	178
Admitted during 1950 .. .. .	339
<hr/>	
Total tuberculosis patients, 1950 .. .. .	517
<hr/>	
Discharged .. .. .	181
Died 1950 .. .. .	77
In hospital on 31st December, 1950 .. .. .	259
The daily average of patients was .. .. .	192

79. During 1950 at Tamavua 1,434 X-ray examinations were made on in-patients, out-patients and staff.

80. A total of 5,466 X-ray films from other hospitals were received for examination and report as follows:—From Colonial War Memorial Hospital, 3,570; Lautoka Hospital, 361; Labasa Hospital, 101.

81. A general out-patient clinic is also conducted daily at Tamavua Hospital to cater for the staff of the institution and for the population of nearby settlements and villages. At this clinic 1,624 dressings, 14 minor operations, 94 injections for various purposes and 57 T.A.B. inoculations were given as well as 1,526 medical treatments.

82. The laboratory at the institution performed the following work:—Sputum examinations, 5,198; gastric juice, 1,458; blood sedimentation rate, 1,468; other blood examinations, 987.

83. The operative procedures undertaken in the hospital theatre included:—Initial artificial pneumothorax, 60; refills, 1,115; artificial pneumo-peritoneum, 102; refills, 3,445; aspiration, 9; air replace, 5; phrenic crush, 38; pneumolysis, 1; biopsy of gland, 4; application of plaster of Paris, 54; Eye operation, 3; and circumcision, 4—a total of 4,840.

84. As regards the tuberculosis out-patient aspect of the institution, there are three categories of patients:—

- Known cases returning to the department at stated intervals for review in the follow-up system; 436 attendances.
- Out-patients receiving artificial pneumothorax or pneumo-peritoneum at weekly intervals (included in the theatre figures above).
- New out-patients sent from Medical Officers and Assistant Medical Practitioners and private practitioners for confirmation of diagnosis or as contacts of known cases. In this class 796 tuberculosis and 204 non tuberculosis cases were investigated.

85. *Plantation.*—During the year a pair of working bullocks and a plough and harrow purchased and through the courtesy of the Colonial Sugar Refining Company 50 tons of coral sand was obtained for improvement of the soil.

86. *Entertainment.*—Pictures were screened once per week for the entertainment of the patients. The band of the Fiji Military Forces gave four very much appreciated concerts and presented carols at Christmas time. St. Andrews' Guild visited the wards at Christmas as usual and distributed gifts to all patients. A radiogram controlling two speakers in each ward, together with an address system, was installed towards the end of the year and has proved a great asset, allowing of radio programmes between 7 and 9 a.m., 12 and 2 p.m., and 5.30 and 9 p.m.

87. The occupational therapy unit made sales valued at £65 16s. 0d. showing a gross profit of £52 14s. 7d. and sales from the hospital canteen showed a gross profit of £37 9s. 1d.

88. The following table shows the new cases of tuberculosis and the number of deaths registered in the years 1946–1950:—

Race	No. of new cases notified	No of deaths notified
1946—Fijian	246	117
Indian	95	40
Others	33	11
Total	374	168
1947—Fijian	284	209
Indian	87	17
Others	65	42
Total	436	268
1948—Fijian	334	148
Indian	148	35
Others	75	26
Total	557	209
1949—Fijian	288	128
Indian	118	30
Others	57	35
Total	463	193
1950—Fijian	274	114
Indian	105	25
Others	45	19
Total	424	158

#### (4) MENTAL HOSPITAL, SUVA.

89. Daily visits were made to the Mental Hospital by Dr. K. R. Steenson in his capacity as Medical Superintendent of the institution. Weekly visits were made to the female side by the Matron of the Colonial War Memorial Hospital.

90. The figures for admissions, discharges and deaths during 1950 are as follows:—

Remaining in hospital at end of 1949	86
Admitted during 1950	45
	131
Discharged during 1950	34
Died in institution in 1950	3
Remaining in institution at end of 1950	94
	131

91. The following tables show the sex and racial distribution and the classification of admissions by type of disease:—

#### (i) RACIAL AND SEX DISTRIBUTION.

Race	Male	Female	Total	Percentage
Europeans	7	9	16	12.2
Fijians	17	11	28	21.3
Indians	46	34	80	68.7
Others	5	2	7	5.4
	75	56	131	

#### (ii) DISTRIBUTION BY TYPE OF DISEASE.

	No. of cases	No. of deaths
1. Maniac-depressive	77	1
2. Paranoia and Paranoid states	7	1
3. Schizophrenia	4	.
4. Puerperal	7	.
5. Epilepsy	7	.
6. Hysteria	3	.
7. Senile Dementia	17	1
8. Mental Deficiency	8	.
9. Alcoholism	1	.
	131	3

92. Electro-convulsive therapy, commenced in 1948, was continued by Dr. D. J. Oldmeadow and the Medical Superintendent, 595 treatments being given to 58 patients.

93. Gifts to the inmates of the institution were made by the Mahila Mandal Association, Shankar Singh and Company, St. Andrews' Presbyterian Xmas Cheer Fund and Dr. E. Williams.

#### (5) DISTRICT AND RURAL MEDICAL UNITS.

94. A full list of these units will be found at Appendix VII and the distribution of these units is shown in the outline map of the Colony at the back of this report.

95. Statistical tables at Appendix VIII indicate admissions to and attendances at the three district hospitals. Lautoka and Labasa hospitals are situated in closely settled sugar growing areas and each is in the charge of a Senior Medical Officer.

96. Appendix IX includes the diseases treated at the three district hospitals.

#### (6) AIDED HOSPITALS.

97. The Methodist Mission Hospital for Indian women at Ba is under the medical charge of Dr. (Mrs.) D. Delbridge assisted by a staff of three trained nursing sisters and one Indian Staff Nurse and ten Indian nurses in training. A grant-in-aid is made by Government towards the cost of maintaining the institution. A special grant towards the erection of additions to this hospital was also made by Government in 1950. Patients admitted to the hospital numbered 1,031, the daily average being 28 and 5,714 out-patients were treated—a daily average of 15.9. Seventy-six general and 25 local anaesthetics were administered. 224 obstetric cases were attended in hospital—a substantial increase on the figures for previous years. The out-patient attendances included 616 ante-natal and 201 baby clinic visits.

98. The Cottage Hospital, Waiyevo, Taveuni, has three beds available and is situated close to the rural hospital. The hospital is managed by a Committee of the local residents of which the Medical officer is Chairman and is supported by public subscriptions augmented by a Government subsidy.

99. Nurse Morrison's Maternity Home at Suva admits maternity cases attended by private practitioners and is subsidized by Government to the extent of £500 a year. In 1950 there were 91 births of the following racial groups:—

Europeans .. .. .	62
Part-Europeans .. .. .	12
Chinese . . . . .	15
Indians . . . . .	2
	<hr/>
	91

### VII—LABORATORIES AND RESEARCH.

100. Dr. P. E. C. Manson-Bahr, Physician Specialist at the Colonial War Memorial Hospital, acted as Government Pathologist and as Police Surgeon throughout the year, in addition to his substantive duties. He was assisted by Mr. J. E. Pery-Johnston, Laboratory Superintendent, until the latter proceeded on leave towards the end of December. Mr. Pery-Johnston was relieved by Mr. T. J. Waldron, a qualified Medical Technologist from Australia, on a temporary appointment. During the year five new students were admitted to the Laboratory course of instruction in medical technology and this includes one student from the Cook Islands. There were three Assistant Medical Practitioners and three Laboratory Assistants also working at the institution throughout the year. The total number of investigations completed during the year was 29,742 which shows a substantial increase on the number for 1949. The total number of post mortem examinations was 152 as compared with 135 in 1949. The enumeration of procedures carried out at the laboratory during the year is at Appendix X of the report.

101. A great deal of time was spent by the Laboratory staff in assisting in the production of a coloured cine film, " Filariasis in Fiji ", which was being prepared by Sir Philip Manson-Bahr of London and photographed by Dr. Work. Dr. Bell, Director of the Nutrition Department of Otago University, and Dr. Wills, from the United Kingdom, were accorded laboratory facilities during January and February in their investigations of anaemia and dental caries associated with nutrition, and the estimation of serum protein. A study of the megaloblastic anaemias in Fiji was carried out by the Acting Pathologist and this work is to be continued in 1951. Papers for publication were prepared by the Acting Pathologist as follows:—

- (1) " Megaloblastic Anaemia in Fiji "—accepted by the *Journal of Tropical Medicine & Hygiene*.
- (2) " Congenital Syphilis in a Fijian "—accepted by the *Lancet*.

102. The Lautoka laboratory equipment was improved and became a subsidiary of the Suva laboratory with a certificated Laboratory Assistant in charge.

103. The Central Medical Research Library which was initiated in 1949 has been greatly appreciated both by students in training and officers of the Medical Department. Many text and reference books were purchased in addition to current medical journals.

### VIII—TRAINING.

#### (1) GENERAL.

104. None of the tenders submitted for the construction of the Suva Medical Centre was accepted. The plans are being revised and it is expected that construction will be commenced in 1951. When the buildings have been completed a greatly improved centre for the teaching of medical, health, nursing and allied sciences will be available for students from the South and West Pacific Islands.

## (2) CENTRAL MEDICAL SCHOOL.

105. The Principal, Dr. A. S. Frater, M.B.E., proceeded on leave at the end of January and his duties were taken over by Dr. T. A. Doran, Medical Officer in Charge of the Colonial War Memorial Hospital. In 1949 the Central Medical School accommodated 44 students from Fiji, Western Samoa, Tonga, Nauru, Cook Islands, Gilbert and Ellice Islands, British Solomon Islands Protectorate, Niue Island and Papua-New Guinea but early in 1950, by reorganization of accommodation in the hostel, it was possible to increase the total number of students to 85.

106. A summary of the students from the various administrations attending the school in 1950 is contained in the Principal's report at Appendix XI.

## (3) NURSES' TRAINING SCHOOL.

107. Tuition at the two training centres extends over a period of three years in accordance with a syllabus drawn up by the South Pacific Board of Health. In addition the Labasa Hospital became a training school for 1st Year Nurses and the Tamavua Hospital for B-grade Nurses.

108. Nurses obtain their full general nursing including Midwifery and Public Health at the Colonial War Memorial Hospital and the Lautoka District Hospital, while specialized Tuberculosis training is given at the Tamavua Hospital. The B-grade nurses specialize in a two year course of Tuberculosis nursing but some of these nurses may be transferred to the General Hospitals for further training if they prove satisfactory. Miss Storck continued to perform duties of the Principal of the Central Nursing School, Suva, and Miss Farland, M.B.E., who was responsible for the nurses training at Lautoka until September, resigned her post and was relieved by Miss M. Duignan.

109. Fifty-six nursing candidates were accepted for training during the year; of the 56 three were Indian, two Rotuman, one New Hebridean and one part-European and fifty Fijian. At the Central Nursing School, Suva, pupil nurses numbered 104; at Lautoka 65; at Labasa 4 and at Tamavua 14. Twenty nurses graduated from the Central Nursing School and 11 from the Lautoka Nursing School.

110. The Methodist Mission Hospital, Ba, is also recognized as a training unit for nurses and receives seven to eight students each year.

111. A system of post-graduate bursaries enables selected nurses to gain higher qualifications overseas.

## (4) ASSISTANT HEALTH INSPECTORS.

112. During the year 14 students were on the roll of the Central School of Sanitation. The period of training for locally recruited students is three years and for overseas students, two years. All of the above students were attached to the various Health Offices for varying periods for practical instruction. Included in the above figure are students from Niue; Ellice Islands; New Hebrides and Papua.

## (5) ASSISTANT LABORATORY TECHNICIANS.

113. No laboratory students qualified as Laboratory Assistants during the year but, as has been stated, five students are in training.

## (6) ASSISTANT PHARMACISTS.

114. There were two qualified Assistant Pharmacists at the beginning of 1950, one being posted to the Colonial War Memorial Hospital and one at the Government Pharmacy. Two students from the Cook Islands Administration enrolled in the Pharmacy course which extends over a period of three years.

## IX—METEOROLOGY.

115. A summary of meteorological observations for the year is included as Appendix XIII.

J. M. CRUIKSHANK,  
Director of Medical Services.

## APPENDIX I.

## ESTABLISHMENT, 1950.

Director of Medical Services .. .. .	1
Deputy Director of Medical Services .. .. .	1
Secretary .. .. .	1
Senior Medical Officers .. .. .	3
Senior Health Officer .. .. .	1
Physician Specialist .. .. .	1
Surgeon Specialist .. .. .	1
Medical Officers .. .. .	17
Ophthalmologist .. .. .	1
Radiologist .. .. .	1
Dental Surgeons .. .. .	2
Pathologist .. .. .	1
Medical Officer of Health .. .. .	1
Assistant Medical Practitioners .. .. .	86
Assistant Dental Practitioners .. .. .	2
Nursing Superintendent, R.N., Australia . . . . .	1
Trained Nursing Staff, R.N., N.Z. or Australia .. .. .	66
Health Sister , R.N., N.Z. or Australia .. .. .	9
Principal, Central Nursing School, R.N., N.Z. .. .. .	1
Tutor Sisters, R.R., N.Z. or Australia .. .. .	4
Nurses locally certificated .. .. .	268
Laboratory Superintendent . . . . .	1
Chief Health Inspector, S.I. certificate, London.. .. .	1
Health Instructor, S.I. certificate, Scotland .. .. .	1
Health Inspector, S.I. certificate, England or N.Z. . . . .	8
Health Inspectors, locally certificated .. .. .	20
Government Pharmacist and Medical Storekeeper .. .. .	1
Pharmacist, English qualification .. .. .	1
Pharmacists, locally certificated .. .. .	3
Radiographers . . . . .	2
Dietitians .. .. .	2
Clerical Staff .. .. .	34
Mental Hospital Staff .. .. .	19
Principal, Central Medical School . . . . .	1
Assistant Principal, Central Medical School .. .. .	1
Medical Superintendent, Fiji Leprosy Hospital . . . . .	1
Nursing Staff, Fiji Leprosy Hospital .. .. .	28
Orderlies, Tuberculosis Hospital .. .. .	43
Subordinate Staff .. .. .	402

APPENDIX II.

TABLE A.—NOTIFICATION OF INFECTIOUS DISEASES BY DISTRICTS FOR THE YEAR 1930.

NAME OF DISEASE.	SUVA.			SOUTHERN.						WESTERN.							EASTERN.		NORTHERN.			CAKAUIGOVE.		ROTUMA.	TOTAL.					
	Suva Urban.	Suva Rural.	Aircraft.	Ships.	Talevu.	Reva.	Naitasiti.	Sera.	Kadavu.	Nadroga.	Nadi.	Lautoka.	Ba.	Tavea.	Nadivatu.	Ra.	Aircraft.	Ships.	Nadi Aerodrome.	Lomalava.	Lau.	Macuata.	Bua.	Taveuni.		Sava Sava.	Rabi.	Rotuma.		
Cerebro-Spinal Meningitis	1	2																			1			1						5
Chicken Pox (Varicella)		7			15																			1	1					132
Amoebic Dysentery	3	3			1	1				1	8	1	1										2	1						34
Bacillary Dysentery	9	20			10	2				2	24	10	1										36							148
Unclassified Dysentery					25	1				12	68	1	44	28									10							255
Influenza	4	92			638	1				208	186	249	328	102									174							5,293
Measles (Morbilli)	3	2			20					2	2	2	3	1									41							133
Measles (German)	1	4																												23
Mumps																														1
Enteric Fever		16			11	1				22	4	11	35	2																140
Para-Typhoid fevers		22			3	1				9		8	3																	66
Whooping Cough (Pertussis)	1				6	1				40	30	1	1	1																114
Dysentery		4			30	2				10	26	12	94	3									2							284
Diphtheria		1			1					1	5	1																		10
Erysipelas												6	2																	10
Infantile Diarrhoea		12			185	13				32	60	47	6	32																11
Intestine Hepatitis		12			12	1				1																				11
Leprosy		2			1					4	3	1	8	3																39
Malaria	3				2					3	6	2	17																	48
Puerperal Fever																														2
Scarlet Fever																														2
Tetanus					2																									4
Traehoma					3					1	4	6	1	5																27
Tuberculosis Pulmonary	10	26			56	3				10	10	1																		51
Tuberculosis other forms		2			22	1				33	13	41	20	8																303
Gonorrhoea	45	77			16	2				10	10	17	51	9																70
Ophthalmia neonatorum & Gonorrhoeal Sord Chance					1	1				1		3		2																297
Syphilis					5	1																								11
Umbilical Fever	1				1							5	7																	27
Total	97	313		6	1,068	33	475	172	124	446	438	494	643	203	164	370		2	289	1,501	343	316	209	222	516	6	77		8,457	

TABLE B.  
NOTIFICATION OF INFECTIOUS DISEASES BY RACE FOR THE YEAR 1950.

Disease.	Europeans.	Part-Europeans.	Fijians.	Indians.	Others.	Total.
Cerebro-Spinal Meningitis .. ..	....	....	3	2	....	5
Chicken Pox (Varicella) .. ..	1	9	94	23	5	132
Amoebic Dysentery .. ..	4	2	12	15	1	34
Bacillary Dysentery .. ..	7	2	21	113	5	148
Unclassified Dysentery .. ..	1	2	59	193	....	255
Influenza .. ..	48	55	3,740	1,412	38	5,293
Measles (Morbilli) .. ..	2	11	100	20	....	133
Measles (German) .. ..	3	5	8	4	3	23
Mumps .. ..	....	....	....	1	....	1
Enteric Fever .. ..	....	4	72	61	3	140
Para-Typhoid Fevers .. ..	3	3	28	26	6	66
Whooping Cough (Pertussis) .. ..	....	1	92	21	....	114
Dengue Fever .. ..	3	5	94	189	3	264
Diphtheria .. ..	....	....	....	9	1	10
Erysipelas .. ..	....	....	5	6	....	11
Infantile Diarrhoea .. ..	7	15	680	210	6	918
Infective Hepatitis .. ..	....	....	15	17	....	32
Leprosy .. ..	....	....	15	20	4	39
Malaria .. ..	....	....	2	....	....	2
Puerperal Fever .. ..	....	3	10	35	....	48
Scarlet Fever .. ..	....	....	....	....	....	....
Tetanus .. ..	....	....	12	15	....	27
Trachoma .. ..	....	....	45	5	1	51
Tuberculosis Pulmonary .. ..	....	4	210	76	13	303
Tuberculosis other forms .. ..	....	1	52	17	....	70
Gonorrhoea .. ..	24	19	102	144	8	297
Ophthalmia Neonatorum .. ..	....	....	3	8	....	11
Soft Chancre .. ..	....	....	....	....	....	....
Syphilis .. ..	....	1	....	26	....	27
Undulant Fever .. ..	....	....	....	3	....	3
Total .. ..	103	142	5,474	2,641	97	8,457

TABLE C.  
NOTIFICATION OF INFECTIOUS DISEASES BY MONTHS FOR THE YEAR 1950.

Disease.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cerebro-Spinal Meningitis .. ..	..	..	2	..	..	..	1	..	..	..	1	1	5
Chicken Pox (Varicella) .. ..	16	6	9	12	17	6	11	23	14	14	2	2	132
Amoebic Dysentery .. ..	2	2	9	3	2	6	4	3	..	..	..	3	34
Bacillary Dysentery .. ..	12	20	25	12	10	21	11	22	2	6	6	1	148
Unclassified Dysentery .. ..	9	22	26	29	20	42	35	26	16	17	4	9	255
Influenza .. ..	136	157	143	128	176	217	106	204	100	94	803	3,029	5,293
Measles (Morbilli) .. ..	27	21	10	7	33	11	..	7	2	9	5	1	133
Measles (German) .. ..	1	9	7	5	..	..	..	..	..	..	1	..	23
Mumps .. ..	..	..	..	..	..	1	..	..	..	..	..	..	1
Enteric Fever .. ..	8	22	20	12	17	16	11	6	12	6	6	4	140
Para-Typhoid Fevers .. ..	4	2	19	3	23	12	11	13	14	3	4	6	114
Whooping Cough (Pertussis) .. ..	8	10	6	12	5	9	3	5	4	2	..	2	66
Dengue Fever .. ..	14	28	28	52	37	34	8	13	5	24	6	15	264
Diphtheria .. ..	..	1	5	..	..	..	2	1	..	..	1	..	10
Erysipelas .. ..	1	..	1	..	1	..	..	4	1	2	1	..	11
Infantile Diarrhoea .. ..	158	102	183	74	86	81	55	55	40	37	33	14	918
Infective Hepatitis .. ..	..	1	1	10	7	3	4	1	1	1	2	1	32
Leprosy .. ..	11	3	6	1	1	3	4	1	2	2	3	2	39
Malaria .. ..	..	2	..	..	..	..	..	..	..	..	..	..	2
Puerperal Fever .. ..	2	8	8	5	7	2	4	5	1	4	1	1	48
Scarlet Fever .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tetanus .. ..	5	2	1	2	5	2	2	3	1	1	1	2	27
Trachoma .. ..	4	4	6	..	8	9	5	7	2	2	..	4	51
Tuberculosis Pulmonary .. ..	29	11	23	35	20	30	22	31	24	32	28	18	303
Tuberculosis Other Forms .. ..	4	4	5	7	8	2	10	7	5	13	5	..	70
Gonorrhoea .. ..	25	21	29	19	20	26	30	25	19	41	22	20	297
Ophthalmia Neonatorum .. ..	2	1	1	1	1	1	..	..	1	3	..	..	11
Soft Chancre .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Syphilis .. ..	4	4	4	1	..	2	..	..	4	4	3	1	27
Undulant Fever .. ..	..	..	..	1	..	..	..	1	..	..	1	..	3
Total .. ..	482	463	577	431	504	536	339	463	270	317	939	3,136	8,457

## APPENDIX III.

**FIJI LEPROSY HOSPITAL, MAKOGAI.**

THE MEDICAL SUPERINTENDENT, MAKOGAI TO THE DIRECTOR OF MEDICAL SERVICES, SUVA.  
(ANNUAL REPORT FOR THE YEAR 1950.)

21st March, 1951.

I have the honour to forward the Annual Report on the Makogai Leprosy Hospital for the year 1950.

Outstanding among staff changes was the retirement of the Rev. Mother Agnes, M.B.E. on her 80th Birthday, after 34 years of devoted service at Makogai. Among those who travelled to Makogai to mark the occasion, and to join with the patients in their tributes of gratitude and affection, were the Hon. A. F. R. Stoddart, Acting Governor of Fiji, Sir Henry Scott, K.C., Chairman of the Lepers Trust Board; Sir Lala Sukuna, Secretary for Fijian Affairs; Hon. Dr. J. M. Cruikshank, O.B.E., Director of Medical Services; and Mr. W. E. Donovan, K.S.G., Secretary of the Fiji Lepers Trust Board. It was felt by all that the Revd. Mother's retirement signaled the ending of an epoch. She had indeed borne the burden and heat of the day when the general attitude towards leprosy was totally different from that of the present time, when funds were extremely short and when the possibility of cure was almost beyond conception. Her own continual and forceful advocacy of necessary improvements so influenced a succession of visiting officials that funds gradually became more readily available and she has lived to see most of her dreams come true. She has retired moreover with the knowledge that the advent of newer drugs has completely revolutionized leprosy treatment and outlook. All at Makogai rejoiced to know that she had decided to live out her retirement in their midst.

## LEPER TRUST BOARD CONFERENCE.

The first Conference of the New Zealand Lepers trust Board, whose benefactions throughout the Pacific are so well known, was held in Christchurch early in December. Meetings of the Board in Christchurch have hitherto been attended by local members only, and it was felt that for a Dominion-wide movement of this kind, representatives from other parts of New Zealand as well as from the Pacific Islands should be invited to participate.

Sir Henry Scott, K.C., Chairman of the Fiji Lepers Trust Board, kindly agreed to represent the Fiji Board at the Conference, and I was sent as representative of the Medical Department of Fiji. It was hoped that apart from the necessary business aspect of the meetings, the Conference would be definitely informative. Sir Henry Scott gave a very comprehensive address outlining the past history, present position and probable future needs of the Fiji Board. He also conveyed a tentative suggestion from the Inspector General, Pacific Health Services, regarding the possible establishment of bursaries by the Board to meet the expenses of doctors from neighbouring administrations wishing to obtain experience at Makogai. The Conference unanimously agreed to the suggestion and authorized the Secretary to proceed with the matter.

My paper on our experience with modern drugs was later recast on more popular lines in a Broadcast over the National network, where I also took the opportunity of expressing our gratitude on behalf of patients at Makogai and throughout the Pacific for the continued munificent generosity of the people of New Zealand towards them. A paper dealing with leprosy in the Solomons prepared by Dr. McKenzie Pollock, Senior Medical Officer, in that group was read by Dr. McGusty, and other papers dealing with various aspects of the work added to the general interest. The Conference was thus definitely instructive, as well as affording opportunities for the scattered members, associated by a common aim, to become personally acquainted. It was unanimously regarded as a very successful gathering.

A well planned and comfortably furnished Recreation Hall has been erected by the Board in the Women patients' area at Makogai during the year. It was officially opened on the 21st October by the Revd. Mother Agnes, supported by Sir Henry Scott, Mr. Donovan and Dr. K. R. Steenson, Deputy Director of Medical Services.

The Board also started the construction of a Guest House at Nasau for the use of visitors to Makogai. This guest House will moreover be very useful for Medical Officers taking advantage of the Bursaries already mentioned.

Other gifts to Makogai from the Board during the year include a portable 16mm. sound projector, new amplifiers for the main 35mm. sound projectors, musical instruments, radios, motor scythe for play ground, garage for patients' lorry, etc. These are additional to improvements to the Rehabilitation Centre of the Makogai Sub-station, Suva, amenities to patients there, and rehabilitation allowances to discharged patients. A total sum of £8,880 was disbursed in Fiji alone by the Board, to whom the deep gratitude of Government and patients is due.



TABLE I—ADMISSION.

	Tubercloid I		Tubercloid II		Lepromatous I		Lepromatous II		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
European .. ..	..	..	..	1	..	..	..	1	..	2	2
Euronesian .. ..	..	..	..	..	1	..	..	..	1	..	1
Fijian .. ..	1	..	2	2	..	1	4	4	7	7	14
Indian .. ..	3	..	8	3	..	..	11	4	22	7	29
Solomon Islander .. ..	..	..	..	..	..	..	2	..	2	..	2
Chinese .. ..	..	..	..	..	..	..	1	..	1	..	1
Rotuman .. ..	..	..	..	..	..	..	2	..	2	..	2
Samoan .. ..	1	..	4	..	..	2	7	4	12	6	18
Tongan .. ..	..	..	..	3	..	..	2	1	2	4	6
	5	..	14	9	1	3	29	14	49	26	75
Totals ..	5	..	23	9	4	3	43	..	75	..	..

Five of the 80 original admissions during the year proved to be non-lepers. The remaining 75 are classified from the point of view of Race and type of disease in Table I. It is worth noting that once again the Samoan admissions include a high proportion of lepromatous cases—13 out of 18, which is even higher than the 53 lepromatous out of the total of 70 Samoan patients here. The Tongans, by contrast, though probably nearest to the Samonans in racial stock, have three lepromatous cases out of six admissions, and only 10 of their total number of 28 patients are lepromatous in type.

TABLE 2.

	Tubercloid 1		Tubercloid 2		Tubercloid 3		Lepromatous 1		Lepromatous 2		Lepromatous 3		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
European .. ..	..	..	..	1	..	..	..	..	2	1	..	..	2	2	4
Euronesian .. ..	1	..	2	1	..	1	..	1	11	5	..	..	14	8	22
Chinese .. ..	..	..	2	..	..	..	..	..	3	..	1	..	6	..	6
Fijian .. ..	4	2	30	32	4	3	2	..	36	19	11	2	87	58	145
Indian .. ..	12	6	43	12	1	1	25	2	117	33	20	7	218	61	279
Solomon Islander .. ..	..	..	5	1	1	..	..	..	5	3	1	1	12	5	17
Rotuman .. ..	..	..	3	..	..	..	..	..	1	4	1	1	5	5	10
Niue Island .. ..	1	..	..	..	..	..	..	..	1	..	1	2	3	2	5
Tongan .. ..	1	1	7	3	3	1	..	..	6	3	1	2	18	10	28
Samoan .. ..	2	..	12	3	..	..	7	4	17	16	5	4	43	27	70
Cook Island .. ..	10	2	10	3	1	..	2	1	9	8	5	2	37	16	53
Gilbert Island .. ..	3	3	9	6	..	..	3	2	27	22	15	2	57	35	92
	34	14	123	62	10	6	39	10	235	114	61	23	502	229	731
Totals ..	48	..	185	..	16	..	49	..	349	..	84	..	731	..	..

TABLE 3.

Races	Arrested		Quiescent		Improved		Stationary		Worse		Died		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
European .. ..	..	..	..	..	1	1	1	..	..	1	..	..	2	2	4
Euronesian .. ..	1	1	3	1	5	3	4	3	1	..	..	..	14	8	22
Chinese .. ..	1	..	1	..	2	..	2	..	..	..	..	..	6	..	6
Fijian .. ..	6	8	25	7	33	22	11	13	7	5	5	3	87	58	145
Indian .. ..	17	5	47	14	102	28	35	9	7	2	10	3	218	61	279
Solomon Islands .. ..	2	1	1	..	6	4	3	..	..	..	..	..	12	5	17
Rotuman .. ..	1	..	..	..	2	3	2	1	..	..	..	1	5	5	10
Niue Island .. ..	..	..	..	..	2	1	1	1	..	..	..	..	3	2	5
Tongan .. ..	1	1	4	2	9	4	1	1	3	1	..	1	18	10	28
Samoan .. ..	1	..	5	3	25	15	9	7	3	1	..	1	43	27	70
Cook Islands .. ..	9	1	5	5	14	6	7	2	2	2	..	..	37	16	53
Gilbert Island .. ..	2	..	6	7	28	16	10	6	6	5	5	1	57	35	92
	41	17	97	39	229	103	86	43	29	17	20	10	502	229	731
Totals ..	58	..	136	..	332	..	129	..	46	..	30	..	731	..	..

As may be calculated from Table 2 the general proportion of lepromatous cases among our patients was 65 per cent, the main racial proportions being:—

- (1) Gilbert Islanders .. .. . 77.2 per cent
- (2) Samoans .. .. . 75.7 ..
- (3) Indians .. .. . 73.1 ..
- (4) Cook Islanders .. .. . 50.9 ..
- (5) Fijians .. .. . 48.3 ..

TABLE 4—DISCHARGES.

Race	T-1		T-2		T-3		L-1		L-2		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
Euronesian .. .. .	1	..	..	1	..	..	..	..	..	..	1	1	2
Fijian .. .. .	..	..	4	2	..	1	..	..	1	..	5	3	8
Indian .. .. .	3	2	2	..	..	..	3	..	4	1	12	3	15
Chinese .. .. .	..	..	1	..	..	..	..	..	..	..	1	..	1
Rotuman .. .. .	..	..	1	..	..	..	..	..	..	..	1	..	1
Cook Island .. .. .	5	..	1	..	..	..	..	..	..	1	6	1	7
Tongan .. .. .	..	1	..	..	..	..	..	..	..	..	..	1	1
Gilbert Islands .. .. .	..	..	1	..	..	..	1	..	..	..	2	..	2
Totals .. .. .	9	3	90	3	..	1	4	..	5	2	28	9	37
	12		13		1		4		7		37		

None of the 37 discharges can be attributed to Sulphone treatment, as these patients were already inactive and on their 2-year period of survey before the local introduction of the Sulphones. Twenty-five of the patients discharged were, as might have been anticipated, in the fairly early stages of tuberculoid leprosy, but it is encouraging to note that 11 lepromatous cases also went on to "Arrest".

TABLE 5—DEATHS.

	T-2		T-3		L-2		L-3		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
Fijian .. .. .	..	1	..	..	3	2	2	..	5	3	8
Indian .. .. .	3	..	1	..	4	1	2	2	10	3	13
Rotuman .. .. .	..	..	..	..	..	1	..	..	..	1	1
Samoan .. .. .	..	..	..	..	..	1	..	..	..	1	1
Tongan .. .. .	..	..	..	..	..	..	1	..	..	1	1
Gilbert Islands .. .. .	..	1	..	..	..	..	5	..	5	1	6
Totals .. .. .	3	2	1	..	7	5	9	3	20	10	30
	5		1		12		12		30		

The following are the certified causes of death:—

Amyloidosis .. .. .	2
Advanced Leprosy .. .. .	7
Nephritis, etc. . . . .	11
Pulmonary Tuberculosis .. .. .	3
Abdominal Tuberculosis .. .. .	1
Glandular Tuberculosis .. .. .	1
Cerebral Thrombosis . . . . .	2
Cerebral Haemorrhage .. .. .	1
Septic Absorption .. .. .	1
Senile dementia and debility .. .. .	1
	30

It will thus be seen that approximately 20 of the 30 deaths were more or less due to leprosy, assuming that the lack of previous history of nephritis points to leprosy as at least the main cause of the nephritis. Five deaths were due to tuberculosis and the balance of five to incidental accidents which might affect any population.

#### TREATMENT.

The 539 patients on sulphetrone treatment are classified from the dual aspect of type of disease and results in Table 6, which may be compared with Table 7 giving a general picture of results in all our patients.

TABLE 6.

	T-1	T-2	T-3	L-1	L-2	L-3	Totals
Arrested .. .. .	....	....	....	....	2	....	2
Quiescent .. .. .	6	21	....	11	36	..	74
Improved .. .. .	5	51	3	22	179	55	315
Stationary .. .. .	2	9	1	8	76	18	114
Worse .. .. .	....	6	....	1	21	4	32
Not stated .. .. .	....	....	....	....	1	1	2
Totals .. .. .	13	87	4	42	315	78	539

There were 30 patients completely unable to take sulphetrone, and 92 of the 539 on sulphetrone able to take only minimal doses, for the following reasons:—

Poor general condition .. .. .	45
Continual or severe reactions .. .. .	66
Psychotic manifestations .. .. .	6
Allergic "dermatitis" .. .. .	5
	122

Thirty-six of these patients were advanced lepromatous cases of long standing. With regard to the reactions, there is a general feeling that while reactions are more frequent under sulphone treatment, they are on the whole less severe than formerly. On the other hand, a few cases who had previously suffered from frequent reactions appear to have completely lost the tendency.

Our early trials with the sulphones gave us the impression that patients were gaining in weight, but loss of weight is now common and is regarded as a definite indication for caution in dosage. It is also frequently an early warning of impending reaction. The women patients are particularly liable to this loss of weight and as a result their average dosage over the year has been only about 2.0 G. per day. Only 16 of them have been able to take 3.0 G. daily and only three to exceed this dose.

Five patients have been on treatment throughout the year with *Diamidin*, supplied by the courtesy of Messrs. Parke Davis & Co., Sydney. *Diamidin* is said to contain 55.3 per cent of diaminodiphenyl-sulphone (regarded as the "active and parent-nucleus" of all sulphones) as compared with 28 per cent in sulphetrone, so that other things being equal, it should prove more efficacious.

Two of the five cases developed marked anaemia after about three month's treatment but were able to resume treatment after a few week's rest. Muir suggested a target of 2.0 G. but none of our patients exceeded 1.0 G. per day. In spite, however, of this moderate dosage, our results in this small series have been at least as satisfactory as those with sulphetrone:—

- Two tuberculoid—2 cases became Quiescent.
- Two lepromatous—2 cases Improved.
- One lepromatous—2 cases remained Stationary.

In certain cases where sulphetrone was not tolerated oral diaminodiphenyl-sulphone (D.A.D.P.S.), has proved acceptable, and by the end of the year 46 patients were taking it. Only 12 patients however had received D.A.D.P.S. for five months or more, with the following results:—

- Two tuberculoid—2 cases became Quiescent.
- Three tuberculoid—2 cases Improved.
- Two tuberculoid—2 cases remained Stationary.
- Five lepromatous—2 cases Improved.

A few quiescent cases with trophic ulcerations have been taking sulphones at their own request after seeing improvement of similar ulcerations in other cases.

Three Samoan patients, suffering from frequent attacks of filariasis, were transferred from sulphetrone to D.A.D.P.S. as a result of Muir's report of the beneficial result of D.A.D.P.S. in filariasis. All three have greatly improved, two of them having had no subsequent attacks, while one has had a single mild attack of filariasis following influenza. Why D.A.D.P.S. should be superior to sulphetrone in this regard is so far unexplained.

About 80 patients persisted with Chaulmoogra injections in preference to the sulphones but as they were mainly quiescent or very slightly active cases, results, though almost uniformly good, are not comparable with the sulphone figures.

TABLE 7.

	T-1	T-2	T-3	L-1	L-2	L-3	Totals
Arrested .. .. .	13	26	6	4	9	..	58
Quiescent .. .. .	22	59	5	12	38	..	136
Improved .. .. .	5	62	3	24	186	52	332
Stationary .. .. .	6	17	1	8	80	17	129
Worse .. .. .	2	17	..	1	22	4	46
Died .. .. .	..	4	1	..	14	11	30
Totals .. .. .	48	185	16	49	349	84	731

Percentages of improved cases for the past five years (including those classified in the Tables as Arrested, Quiescent and Improved) show the definitely improved prognosis since the advent of the sulphones. It should be recalled that the sulphones were first used here on about 60 advanced cases at the end of 1948 and that the number under sulphones has since been steadily increasing.

1946	..	..	..	..	53.1 per cent of patients improved
1947	..	..	..	..	56.9       "       "
1948	..	..	..	..	55.9       "       "
1949	..	..	..	..	63.9       "       "
1950	..	..	..	..	71.9       "       "

Racial differences in results are less marked than usual, the following list giving percentages of improved cases in the main groups represented here:—

Of 270 Indians	..	..	..	76.3 per cent improved
53 Cook Islanders	..	..	..	75.5       "
28 Tongans	..	..	..	75.0       "
70 Samoans	..	..	..	70.0       "
145 Fijians	..	..	..	69.7       "
92 Gilbert Islanders	..	..	..	64.1       "

The criterion of improvement is necessarily a mainly clinical one, but 72 patients are recorded as "bacteriologically improved" under sulphone treatment, and 36 of the 489 cases bacteriologically positive at the beginning of treatment have become negative.

The optimistic attitude originally engendered among patients by the "new" treatment persists or intensifies as they see results for themselves, and there is every reason to anticipate still better results with continued use of the sulphones.

C. J. AUSTIN,  
Medical Superintendent, Makogai.

#### DAILY AVERAGE FOR THE DIFFERENT ADMINISTRATIONS FOR THE YEAR 1950.

New Zealand—				
Niue	..	..	..	1.00
				————— 1.00
Western Samoa—				
Euronesian	..	..	..	9.94
Chinese	..	..	..	1.00
Melanesian	..	..	..	1.00
Samoan	..	..	..	50.64
				————— 62.58
American Samoa—				
Euronesian	..	..	..	3.00
Samoan	..	..	..	18.46
				————— 21.46
Cook Islands—				
Euronesian	..	..	..	1.00
Cook Islanders	..	..	..	50.44
Niue Islanders	..	..	..	5.00
				————— 56.44
Tonga—				
Tongan	..	..	..	29.89
				————— 29.89
Gilbert Islands—				
European	..	..	..	1.00
Euronesian	..	..	..	1.00
Chinese	..	..	..	1.00
Gilbert Islanders	..	..	..	77.05
				————— 80.05
Fiji—				
European	..	..	..	2.25
Euronesian	..	..	..	6.05
Chinese	..	..	..	3.30
Melanesian	..	..	..	15.49
Rotuman	..	..	..	9.42
Samoan	..	..	..	0.85
Ocean Islanders	..	..	..	11.17
Indian	..	..	..	259.62
Fijian	..	..	..	136.29
				————— 444.44
				————— 695.86

TABLE 1.  
STATISTICS FOR THE YEAR 1950.

	Euro- pean		Euro- nesian		Solomon Islander		Fijian		Indian		Chinese		Rotuman		Samoaan		Niue Islander		Cook Islander		Tongan		Gilbert Islander		Totals			
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
In Hospital, 1st January, 1950	2	..	13	8	11	5	84	53	200	58	5	..	5	5	33	20	3	3	37	16	19	10	58	35	470	213	683	
Admissions	..	2	1	..	2	..	8	7	23	7	1	..	2	..	12	6	..	..	..	..	3	6	..	..	52	28	80	
Deaths	..	..	..	..	..	..	5	3	10	3	..	..	..	1	..	1	..	..	..	..	..	..	1	5	20	10	30	
Conditional Discharges	..	..	..	..	..	..	5	3	12	3	1	..	1	..	..	..	..	..	6	1	..	1	2	..	28	9	37	
Unconditional Discharges	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	
In Hospital, 31st December, 1950	2	2	13	7	13	5	82	54	201	59	5	..	6	4	45	25	3	3	31	15	22	12	51	34	474	220	694	
Totals	4	..	20	18	136	5	280	10	70	6	46	34	85	684	1	Baby.	..	..	..	..	..	..	..	..	..	..	..	..

Schoolboys : 48 — Schoolgirls : 46.

## SUMMARY OF STATISTICS, 1911—1950.

	Europeans.	Euronesians.	Solomon Islanders.	Fijians.	Indians.	Chinese.	Rotumans.	Samoans.	Niue Islanders.	Cook Islanders.	Tongans.	Gilbert Islanders.	Maoris.	Total.
Admissions ..	22	50	209	858	1,315	26	103	124	15	254	64	192	4	3,236
Repatriations ..	1	..	..	..	435	..	..	..	..	..	..	..	..	436
Discharges ..	5	15	65	338	313	6	57	24	2	139	13	35	1	1,013
Deaths ..	12	15	126	384	307	15	36	30	7	69	17	72	3	1,093
Totals ..	4	20	18	136	260	5	10	70	6	46	34	85	0	694

## 1950

	INJECTIONS.							Patients Dressed.	Dressings.	Operations.	Post-Mortem.	X-Rays.	Pneumoth.	LABORATORY EXAMINATIONS.						Visitors.		
	Chalim. Oil.	Salv.	Insulin.	Floor.	Vit. B <sub>1</sub> , B <sub>2</sub> , K.	Pencil.	Various Inj.							Totals.	Urine Analys.	Bacter. Exam.	Helminth.	HB. Examin.	Blood Cl.		Blood Sugar.	Totals of Lab. Exam.
January ..	441	13	8	70	15	141	187	875	4,122	7,083	5	..	59	2	74	241	8	303	39	..	665	1
February ..	610	12	14	50	42	123	156	1,007	3,872	6,512	3	..	45	3	55	391	..	383	12	..	841	2
March ..	732	4	32	35	53	98	932	1,886	4,029	7,021	2	..	78	4	97	98	55	503	11	..	764	8
April ..	129	3	109	56	40	86	221	644	4,284	5,763	1	..	55	4	94	258	8	417	14	..	791	15
May ..	335	5	145	39	63	119	225	931	4,369	7,123	3	1	61	4	216	281	18	414	13	..	942	9
June ..	309	4	124	48	35	49	127	696	3,859	6,562	3	..	71	3	222	209	10	522	16	..	979	11
July ..	356	7	188	57	58	39	162	867	3,780	6,642	..	..	..	4	171	134	65	376	13	..	759	2
August ..	421	14	182	43	96	15	359	1,130	4,338	5,670	..	..	..	2	285	274	31	430	12	18	1,050	..
September	248	17	169	72	21	60	85	672	3,621	5,678	1	..	..	..	326	188	6	297	11	3	831	12
October ..	191	14	193	48	40	42	132	660	3,349	5,593	..	..	..	..	280	326	19	476	11	..	1,112	10
November .	166	5	176	96	78	47	71	639	3,298	5,610	..	..	..	..	187	217	22	280	11	..	717	26
December .	..	2	167	45	43	39	87	383	3,970	4,986	..	..	..	..	152	134	14	268	17	5	590	5
Totals ..	3,938	100	1,507	69	584	858	2,744	10,390	46,891	74,243	18	1	369	26	2,169	2,751	256	4,689	180	26	10,051	101

## RAINFALL DURING THE YEAR 1950.

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
11-04	12-97	21-29	8-61	7-60	91	2-96	2-82	5-37	4-22	14-0	5-04	97-03

## APPENDIX IV.

REPORT ON PILOT SURVEY ON STATE OF NUTRITION OF FIJIANS AND INDIANS  
IN FIJI, JANUARY-FEBRUARY, 1950.

by

M. E. BELL, M.B., Ch. B. (N.Z.); M.D. (N.Z.); F.N.Z.I.C.

and

L. WILLS, M.R.C.S. (Eng.); L.R.C.P. (London); M.B., B.S. (London).

We have investigated the state of nutrition of Fijian and Indian peoples with particular reference to anaemia and dental caries.

Though there was a limit to the time we could spare for the survey, and to the accessibility of inland villages during the wet season, we endeavoured to cover as large a cross section of the population as we could. After visiting hospitals, ante-natal and health clinics, maternity wards and dispensaries, where we expected to see such disorders as might reflect any serious dietary shortcomings commonly occurring in either race, we made investigations among the ordinary population in the coastal zone of towns and villages, and in certain villages remote from easy access to European foods or to supplies of sea-fish. As an indication of the ground that was covered, the following is a list of the areas investigated: Suva (including Samabula, Draiba, Flagstaff, Loftus Street, Nasova), Mau, Navua, Sigatoka, Raiwaqa, Nadi, Lautoka, Tavakuku, Namoli, Natabua, Ba, Sorokobo, Balevutu, Korovou (near Tavua), Tavua, Raki Raki, Malaki Island, Penang, several villages along the Wainibuka valley, based on Drekeniwai village (Nayavu Rural Dispensary) on the Waidina tributary, Korovou (near Lodon), and Nausori. Pupils of the following schools were also examined: Arya Samaj Girls' (Samabula), Vatuwaqa (Flagstaff), Indian Girls' (junior classes also containing boys), Draiba School, Arya Samaj Boys' (Nausori), Adi Cakobau, Lodon (two schools), the Ratu Kadavulevu Intermediate, and the Queen Victoria School for older Fijian Boys), The Fulton Seventh Day Adventist College and School, the Teachers' Training College, the School for Solomon Islanders, Nasautoka Village School, and the Mau School.

We were unable to visit and cannot express an opinion on the more remote parts of the interior.

The examinations made were: 1,002 for haemoglobin, and 820 for serum protein, in addition to a clinical examination of the skin, mouth, teeth, eyes, hair, bones, posture, muscle tone and thyroid gland. A close watch was kept for those clinical defects on which the previous adverse report by Dr. F. Adam Thomson in 1947 had been based.

Our findings, which are briefly outlined below, enable us to state that, as far as we were able to judge from the areas visited, malnutrition is not a serious problem.

Regarding the haemoglobin survey, it may be said that in general anaemia was not widespread, and where it occurred was on the average only of medium degree. The results are recorded in Appendix I. Referring to Chart I, Table I and the accompanying histograms, it is seen that there are three groups that show relative anaemia as compared with the normally accepted standards:—

- A.—Fijian children of the 6-9 age period;
- B.—Indian women of the child-bearing age;
- C.—Indian infants aged 1-2 years.

Commenting on these three groups, the lowered haemoglobin average for the 6-9 year Fijian children seemed to us directly connected with a high rate of sepsis. It is in this age group where the children have such appalling sores. Of 147 Fijian children examined, 73 or 58 per cent had sores, whereas of 46 Indian children examined, 13 or 30 per cent had sores. Moreover, no Indian child had as severe or as widespread skin infections, as the Fijian children. Sepsis is known to act adversely on blood formation. As an explanation of the greater freedom of the Indian child from sepsis, we offer the hypothesis that since milk is used by the Indians for feeding their children, the skin of the Indian child is better equipped for resisting invading organisms.

The tendency for anaemia to occur in the Indian pregnant women is shown by the fact that 10 per cent of the 100 women examined had values for haemoglobin of under 60 per cent, 25 had under 70 per cent haemoglobin, while only 30 per cent attained the 90-100 per cent level. Non-pregnant Indian women in the child-bearing period also had significantly lower haemoglobins than those found in the corresponding series of Fijian women. Though the explanation of this anaemia is to some extent a dietary lack, the main factor is the earlier age of marriage in the Indian women, and the short intervals between pregnancies. The pregnant adolescent girl has to furnish iron for her own growth as well as for the avid demands of the growing child. If she is anaemic, her infant having stored insufficient of this element, runs short of iron at a time when its main article of diet is milk, which is notoriously deficient in iron. If a further pregnancy supervenes before she has had time to build up her reserve of iron, her anaemia, as well as the anaemia of the next infant, is of greater degree. The anaemia of the Indian infant is clearly due to the shortage of iron in the mother.

Apart from these groups, the haemoglobin values were surprisingly good in both Fijians and Indians. Of the 49 boys studied at the Lodon school the average haemoglobin was 95 per cent; none of the 15-19 year group at the Queen Victoria School had under 98 per cent, while at the Intermediate School, the 10-16 year group contained only one anaemic boy with a haemoglobin level of 79 per cent. At the Adi Cakobau School, the average for 41 girls between 10 and 19 years

was 90 per cent, even when two anaemic girls were included. The anaemic girls had 66 per cent and 53 per cent haemoglobin respectively. To find two with anaemia out of 41 tested is a proportion such as would be found among European girls of this age. Indian adolescents in the schools showed very good haemoglobin values, as summarized below:—

<i>Boys</i>	<i>Girls</i>
Arya Samaj, 10-14 years. Average for 20 boys: 98 per cent	Arya Samaj, 10-14 years. Average for 28 girls: 89 per cent. Vatuwaqa, 14-10 years. Average for 7 girls: 88 per cent
Arya Samaj, 15-19 years. Average for 12 boys: 102 per cent Training College, 17-19 years. Average for 7 boys: 106 per cent.	Arya Samaj, 15-19 years. Average for 5 girls: 91 per cent. Training College, 17-18 years. Average for 10 girls: 95 per cent.

These figures are very reassuring, for they indicate that the diets consumed in general are reasonable sources of iron.

The haemoglobin figures for inland Fijian villages were however not quite up to the same standard, as for the coastal zone perhaps because of lesser supplies of fish and meat, though we have no figures on which to base this speculation.

A few cases of severe anaemia were encountered, but in all except one of these, hookworm infestation, with its attendant loss of blood from the intestine, was responsible, while the one exception was a girl who adhered to a strictly vegetarian diet from religious convictions.

The above results were based on random sampling of the people in the towns and villages. They do not include specially selected cases brought to us by health sisters or medical practitioners for diagnosis or for progress reports.

Regarding the occurrence of macrocytic anaemia, a few cases of which were shown to us in the wards of the C.W.M. Hospital, no instances were found during our survey. Taking the 1948 statistics for anaemia cases admitted to the C.W.M. Hospital, as recorded by Barnes, there were only 49 cases of severe anaemia of whom 28 cases were Indian females (among them there were 24 aged between 10 and 29), 18 were Indian males, while the Fijians numbered only three. Of those cases of severe anaemia, 10 Indian females and one Indian male, but no Fijians, had the macrocytic type of anaemia. True it is that the incidence of this disease undergoes a seasonal variation, lessening in the season when we happened to be there, but we feel assured that macrocytic anaemia does not occur frequently enough to be a great problem in Fiji. Certainly it is not comparable with the frequency of its occurrence in India, where early marriage, close succession of pregnancies, and abstention from meat for religious and economic reasons are among the casual factors.

Though the serum protein determinations were directed towards ascertaining whether the values were lower than normal, a finding which would have supported the view that protein intake was subnormal, the contrary was found, namely a high average level for all ages after five years. The interpretation of these high values awaits further investigation, but they have been confirmed on sterile samples flown to London and tested by Hoch. High values are often associated with various types of disease, and it is possible that some particular form of infection or multiple infections may cause this condition in the native races in Fiji. Both Fijians and Indians had these high values, with the exception of a few individuals, and with the exception of pregnant women who normally have lowered serum protein levels. A number of Europeans who had lived for two years or more in Fiji were found to have normal values. Raised values of the order found in the present investigation should not be mistakenly regarded as indicating high protein intake, for considerably lower serum protein levels are normally present in those consuming plenty of animal protein. By contrast, subnormal values for serum protein are frequent features in certain communities in other countries where the protein intake is very low. The native races in Fiji appear to be in a different position, perhaps because the calories values of the diets are adequate for it is the experience of workers in other countries that little evidence of specific protein undernutrition, at least among adults, can be adduced when the diets provide sufficient calories. Further support for our contention that there is no serious defect in the protein intake seems apparent from the absence of abnormally high figures for cirrhosis of the liver, or for high figures for cirrhosis of the liver, or for primary carcinoma of the liver, or for nutritional oedema. Furthermore, the magnificent physique of the adolescent and mature Fijian belies the suspicion that protein is grossly deficient in the Fijian diet. That the smaller stature of the Indian is to some extent racial was indicated by the small size of some Indian children who had always had an abundance of milk and other protein foods available. Some of the Indians, however grow to a size comparable with Europeans.

Muscle tone had been taken in the previous report of Dr. Thomson to be an index of nutrition, and on poor muscle tone was based a large proportion of the cases of subnormal nutrition that she found. Certainly the turgor of the muscles in Fijian children seems low compared with that in Indian children, but we were hesitant to label this diminished turgor as poor muscle tone when straight backs and limbs appeared to be the rule among Fijian children and adults. Sports among boys at school, children at play, men punting or playing games, as well as the reports of Fijian triumphs at the Empire Games then in progress all bore testimony to the high grade muscular performance of the Fijian.

These findings, however do not indicate that the intake of animal protein is optimal for all sections of the native communities. The vital statistics for Fiji contain disquieting figures for Fijian infant mortality in the post-weaning period—we have expressed these graphically in the appendix, comparing them with the figures for Indians. We have no doubt that the root cause



is the failure to provide an adequate amount of protein food when the baby is weaned. The baby, in the period when it is suddenly called on to adapt itself to foods having a low protein content, such as dalo, coconut and banana, loses condition and becomes a prey to intercurrent infection, which is the immediate cause of the high death rate. The lower rate of infant mortality among the Indians at this period of infancy is an index, in our opinion, of their traditional high regard for milk as a valuable food for the infant, for practically every Indian child receives a ration of milk.

Other evidence that protein intake is not optional for the period of growth comes to us through the observations related by others that children and adolescents improve in health when given a good ration of milk and other animal protein. This leads us to comment again on the high incidence of sepsis among the Fijian children, to which we attributed the lower haemoglobin levels in the 6-9 year group, where skin sores were so rampant. Contrast with the lower rate of sepsis among Indian children led us to advance the theory that the customary use of milk by the latter is what makes the difference. It appears notable that after the age of nine, these infections in the Fijian tend to disappear spontaneously. Whether or not the explanation for their disappearance lies in the improved ability of the body to digest and absorb the constituents of their largely carbohydrate foods, or whether it bespeaks the greater self-reliance of the child in getting its necessary ration of protein food, we are at a loss to say, but we are inclined to think it possible that the extra protection from skin infections is afforded by the protein and other valuable constituents present in the milk given by the Indians to their children. Among the other valuable constituents of milk, the possibility of calcium and riboflavin being important factors must also be kept in mind. No food other than milk can provide the quantities of calcium and riboflavin that are considered necessary for optimum nutrition and growth.

While dealing with the subject of protein, we were often told that supplies of protein foods were erratic, and insufficient to meet the demands even of those who had the money to pay for them. Those who had to arrange for the feeding of children at school found difficulty in securing their catering requirements. Individuals whom we questioned in towns regarding the number of times a week that they ate meat or fish often answered that they could get them only once or twice a week, and that they were expensive items.

The sources of protein in the diets of the two races in Fiji are very largely of vegetable origin, with supplements of small quantities of protein of animal origin. The "carbohydrate" foods, in which the percentage of protein is relatively small, are consumed in such large quantities that they supply a total quantity of protein that is not inconsiderable. When mixtures of "vegetable" protein are consumed, the more important amino-acids are often all represented in the total mixture of vegetable protein from the foods traditional to a particular native race, but it is usual for such mixtures of amino-acids to be sub-optimal for maximum growth and well-being of the child unless supplemented by a considerable quantity of animal protein, even though the adult may maintain good health, adapted as he is to digesting vegetable foods in large quantities. Figures for the consumption of foods by average families of Indian workmen were available in the Government publication "Report on the Cost of Living of Indian Workmen Earning Less Than 50s. per week in the Island of Viti Levu". This was a result of a study done by Mr. C. H. Carne in 1939, and on it have been based increases in wage rates to offset increases in the cost of foods that have occurred since 1939. It supplied for us a quantitative basis on which to calculate the nutrients supplied by the foods consumed, and these are set out in the Appendix, together with comments on the separate components. While it is possible to make an assessment of the Indian diets, or at least of those eaten by a certain section of Indians, it has been impossible to get quantitative estimates of the foods eaten by Fijians. When we tried to ascertain from menus used at schools what were the quantities of foods provided, we learnt that menus on paper were impracticable because of the erratic nature of supplies on the markets. Though every effort was being made by the school authorities to increase the supplies of animal protein, they were experiencing great difficulty in obtaining regular supplies. We were given a list of the protein foods which the Fijian eats—fish, crabs, molluscs, sea-slugs, meat, poultry—we learnt that milk is in general not an acceptable food to the Fijian, since he has never been accustomed to it. From what we were told, the large quantity of dalo eaten is a source of a considerable amount of vegetable protein. In or near the towns, bread and biscuits are also figuring as contributors of vegetable protein in the Fijian diet. Tapioca root is used very largely to replace dalo, on account of its less seasonal habit. We learnt too that dalo is frequently sold to the mining towns, creating a shortage in local supplies. We were given a list of green leaves eaten by the Fijians as vegetables—dalo, kumala, bele, tapioca, ota, koca, papuki, karisi but though these are potential source of Vitamins A and C, we do not know the quantities eaten, or how frequently they are consumed. These uncertainties make it difficult to state whether the Fijian dietary is lacking in particular nutrients, e.g. whether there is a shortage of vitamins or minerals. On the question of calcium intake, most dietaries that contain no milk are judged to have sub-optimal amounts of calcium. On the evidence of the haemoglobin survey the Fijian foods appear to be reasonable sources of iron. Inquiry into the possibilities of soil deficiencies elicited the information that phosphate was lacking, but that, we think, would be reflected in the lowered production of agricultural products rather than in a direct phosphate deficiency in the human dietary. We sought for evidence of vitamin deficiencies by clinical examination, especially for those signs reported by Dr. Thomson, but failed to corroborate her evidence of widespread nutritional defects. We saw some instances of rickets in children which made us deplore the custom of putting unnecessary amounts of clothing on those dark-skinned bodies when the Europeans from whom the custom was acquired have abandoned it in favour of letting children run about naked whenever the weather permits. Those dark skins, with their protective layer of melanin that prevents them from absorbing the ultra-violet light, are less able than white skins to make their own Vitamin D if only a small area of the body is exposed to the sun's rays. Practically none but the Eskimo can obtain a sufficiency of Vitamin D from foods; and those who clothe their children's bodies

for warmth's sake must give their children cod liver oil. But the sun should be able to make what the Fijian child requires, if the skin is allowed to be exposed to its rays. We applauded the doctor who offered a prize for the best-dressed baby, and gave it to the one who only had a singlet on! It should always be borne in mind that when a race has been adapted for centuries to a low calcium intake, a sudden change in the environmental conditions of the skin may make a considerable difference to that race's ability to absorb calcium from foods. Unnecessary amounts of clothing on the woman's body may also play a part in preventing her during pregnancy from conferring adequate amounts of calcium on her offspring. Those in charge at the Adi Cakobau School were emphatic in saying that they had observed a difference in the health of the children since the allocations of cod liver oil had been stopped. If this is so, can it be for the reason that the cod liver oil was supplying what the skin was failing to make? or was it Vitamin A that was lacking? We saw none of the skin manifestations of Vitamin A deficiency in our survey of the island. As to the numbness and tingling of the fingers reported to occur in pregnant women, a condition for which Vitamin B preparations are often prescribed, we are uncertain as to whether this symptom bespeaks rather a deficiency in calcium. Examinations of skins and mucous membranes in our survey did not suggest that there was a serious shortage of Vitamin B factors. Apart from gingivitis which may or may not be a manifestation of Vitamin C deficiency, the stigmata of scurvy were absent.

#### DENTAL CARIES.

On the subject of the nutritional factors underlying the state of the teeth in Fiji, we find it impossible to make any definite pronouncements. The following points however emerged:

The teeth in the primary dentition in Fijian children were often structurally defective, particularly in the four top incisors. This led to early caries and subsequent fracture of these teeth, which then decayed to the level of the gums, a state often reached as early as the second and third year. We understand from Mr. Davies, who did the dental survey last year, that the histological basis of this defect is a developmental derangement. In the present state of knowledge concerning the effects of dietary factors on tooth development, it is impossible to pin this to a definite dietary lack, but from the fact that it occurs in teeth that are among the first to erupt, it is some condition in the mother that causes it. It may be some fault in her dietary, either a defect in it or a constituent that acts adversely on the ameloblasts or upsets calcification while the enamel is forming. It was more noticeable in some of the Fijian villages than in others, for instance, though we did not examine with probe and mirror in the fashion in which a proper dental examination would be made, or record the number of tooth surfaces affected, we noted 20 per cent of 50 children in Namoli, Balevutu, Tavua, Korovou (Tavua), Sorokoba and Nausori as having "caries" of the primary dentition, but 64 per cent of the 66 children examined at Fulton School, Suva, Tawakubu, Malaki Island, Mau and the School for Solomon Islanders. This made a total of 53 per cent among the Fijian children. Indian children showed a higher percentage, 40 out of 52 school children (77 per cent) having "caries" in the primary dentition. Enamel-forming constituents such as calcium; phosphorus, Vitamins A and D are perhaps implicated, but we are unable to unravel this problem, which we consider should be the subject of further investigation. The puzzling feature was that the secondary dentition appeared well-formed, especially in comparison with the teeth of New Zealanders. Caries in the second dentition in the two groups of Fijian villages already named amounted to a total of 37 per cent of children affected, the incidence being about equal in the two groups of villages. Again the Indians showed a higher incidence, viz., 57 per cent. Of 75 boys at Fijian schools, 29 per cent were noted with caries, while of 48 boys (Indian), 51 per cent had caries. Fijian school-girls were recorded as having a 48 per cent incidence, and Indian school-girls likewise 48 per cent incidence. Even villages comparatively remote from stores (such as Balevutu and Malaki Island), showed a considerable incidence of caries, making the puzzle an even greater one.

Examination of the fluorine contents of Fijian teeth by the Nutrition Research Department on 10 specimens submitted by Mr. Davies last year showed them to have 0.0061 per cent F' in the enamel while five specimens previously examined by Miss Harrison had 0.0076 per cent. For comparison, New Zealand teeth have the low average value of 0.0042 per cent, but the figures for Fijian teeth have an amount of the same order as Armstrong and Brekhus found (0.0069 per cent) for carious enamel, whereas their average for non-carious enamel in Minnesota teeth was 0.011 per cent. In Mr. Davies' study, the drinking waters also showed a low average F' content. It is therefore possible that low fluorine ingestion may be one of the factors tending to lessen the resistance of the enamel to carious attack.

#### PREVALENCE OF GOITRE.

Having noticed a large adenomatous goitre in a Fijian woman at the inland village of Balevutu, we began from that time onwards to look carefully for signs of thyroid enlargement. We had been told that goitres did not occur in Fijians, though the Indians were sometimes affected. Then we heard that there was a goitre belt in the Sigatoka valley, where we had unfortunately made no particular examination of the necks. Our observations were chiefly on the coastal zone between Ba and Suva, but they were sufficient to show that thyroid enlargement is spread over a much wider area than was hitherto suspected, that it is by no means confined to the Indians, and that the "goitre of adolescence" is far from being the only manifestation of thyroid abnormality. It was seen in both boys and girls, even in the youngest classes in Indian schools and in Indian adults, but it was also seen in Fijian children and adults, both male and female. Following are some figures:—

*Indians.*—In girls at the Arya Samaj School, in the classes where the ages ranged from 6-9 years, out of 33 there were 17 with definitely enlarged thyroids, and 10 with incipient goitre. Of a total of 105 Indian girls examined, 80 or 76 per cent had goitre.

Of a total of 56 boys, again the percentage was 76 with goitre. Among the adults, 24 out of 31 (or 77 per cent) females had goitre, and two out of six males. In addition, on stopping the car at a village near Ba and examining the Indians standing around, all except an old lady had some enlargement of the gland.

*Fijians.*—At a village near Nausori, none of the women appeared to have goitre, though goitre had been seen in many Indians in Nausori, but among the Fijian children subsequently examined in other districts, six out of 75 males, or eight per cent, and 22 out of 60, or 27 per cent of females had enlarged thyroids.

*Pregnant Women.*—Of 76 Indian pregnant women, 58 had goitres, or 74 per cent. Of 53 pregnant Fijian women, 14, or 26.5 per cent showed some enlargement. While these figures indicate a higher percentage among Indians than among Fijians, they are unequivocal in showing that there is a widespread lack of iodine; for it may be categorically stated that the cause of goitre is insufficiency of iodine. The difference in incidence between the two races requires explanation, but only a full survey of the iodine content of the foods of the respective races would elucidate the problem. It may be the greater intake of fish by the Fijian, but it is useless to speculate. The important point is that a goitre problem exists, and that two of its attendant medical side-lines are beginning to appear, namely hyperthyroidism, requiring operative treatment, and cretinism, requiring early and life-long medication with thyroid extract, or causing deaf-mutism, or imbecility. In all countries where salt has been iodized as a prophylactic measure, the incidence of goitre and its attendant evils have diminished.

#### ECLAMPSIA.

As there are those who maintain that there is a dietary basis for the etiology of the toxæmias of pregnancy, we inquired into the incidence of this disorder, though its cause has not yet been elucidated. There is an interesting racial contrast, for eclampsia among Fijian women in the obstetrical ward at the C.W.M. Hospital is unknown, whereas it occurs with considerable frequency among Indian women. The figures given to us were as follows: in 1949, 266 Fijian women were confined, with no cases of eclampsia; of 416 Indians, there were seven eclamptics. In 1948, 254 Fijians, no eclampsia; 369 Indians, six eclamptics. In 1947, 195 Fijians, no eclampsia; Indians, 321 with five eclampsia cases. An analysis of the Indian cases of pre-eclampsia and eclampsia for the year 1949 indicated that 13 had occurred in primiparae, 14 in multiparae (all in Indians). This is practically an even distribution between primiparae and multiparae whereas it is usually stated that 77 per cent of cases occur in primiparae. Whether the difference in incidence between Fijians and Indians can be attributed to a dietary factor or whether it is hormonal remains to be seen.

#### RENAL STONE.

In view of the high oxalic acid content of dalo leaves, which are one of the important green vegetables used by the Fijians, it was interesting to inquire whether renal stone was common among them but the answer was that it was rarely seen.

#### SUMMARY.

1. There is no evidence of widespread anaemia.
2. A moderate anaemia occurs in Indian pregnant women, and in Indian woman of the child-bearing age; and as a sequel to this, in Indian infants. There is also a moderate anaemia in Fijian children of the 5-9 age group, which we attribute to the high incidence of sepsis.
3. Macrocytic anaemia is not a great problem, though it exists.
4. Serum proteins show a high average level, higher than normal.
5. Dental defects are common, more so in the Indian child.
6. Rickets occur occasionally, but otherwise vitamin deficiency is not a great problem.
7. Goitre is prevalent in many areas.

#### RECOMMENDATIONS.

1. That thought be given to the provision of milk for infants, pre-school children and school children. Milk seems to us to be an urgent requirement for the Fijian infant in the post-weaning period, the toddler and the pre-school child, i.e. up to the age of five. Justification for this suggestion lies in the high death-rate for Fijian infants (see appendix). If it is feared that the cost to the government would be too great, two schemes are submitted.

- (a) The sale of dried milk at a subsidized price from the clinic vans, so much being allowed per infant per month, lest the scheme be abused. This method already works well in Jamaica.
- (b) Dried skim milk would be better than no milk at all, and could be obtained at a cheaper rate. Vitaminized margarine could be added to it by the mother, or alternatively, a recipe given for adding coconut cream and cod-liver oil. The nutrition Research Department, Medical School, Otago, would be willing to help in composing the formula. New Zealand has considerable potentialities for supplies of dried skim milk. Some comparisons between milk, dried whole or dried skim, and alternative protein foods are given, to demonstrate the superiority of milk as a food for infants (see appendix). As it would be unfair or politically unwise to differentiate between Indians and Fijians in such a scheme, it should be available for both races. It is however particularly desirable that it should be distributed to the inland villages where the haemoglobin levels were found to be lower.

A school milk scheme is also suggested on the grounds that the 6-9 year group of Fijians has a suboptimal haemoglobin level coupled with a high incidence of sepsis, which we think may be due to the lack of milk in the Fijian diet. Before putting such a scheme into operation, it is advisable first to try an experiment in one school. Draiba, which was a high incidence of skin sores and bad teeth, is probably a suitable school for such an experiment, in which the incidence of sepsis should be checked before and after the institution of the scheme. Skim milk or skim milk powder could again be the basis for the scheme: bulk skim milk powder could be made into a cocoa mixture, and distributed cold. It must be distributed free, because the staff at the schools is not adequate to collect payment for it, or to spare time for making the mixture at the schools, even if they had rooms suitable for making it. Since sepsis in the Indian child is fairly considerable, both races should finally be included in the milk-in-schools scheme.

In putting forward such suggestions, we are not unmindful of the cost that will have to be met by the government, or of the possibility of encouraging too much reliance on a beneficent government and detracting from the sense of responsibility of the individual. But, as we see it, Fiji is likely to be faced with a shortage of protein foods in the not too distant future, and agriculturally speaking, milk production is a better proposition than beef production. We shall refer to this again, but meantime, the training of the palate to accept milk as a food must be begun early and we feel that both the schemes that we have suggested are laying the foundation for future agricultural developments, as well as dealing with immediate medical problems. It is obvious that a school-milk scheme cannot be developed hurriedly and that the town will be at an advantage in implementing it to begin with.

2. That all domestic salt should be iodized. The grounds for this recommendation lie in the very widespread incidence of goitre, present in both races, though more pronounced in the Indian race. Exophthalmic goitre and cretinism are beginning to appear, and are likely to increase unless a policy for iodization of salt is put into effect. It is suggested that as any other scheme for conferring iodine, e.g. in pill form, is likely to miss the important periods—gestation, infancy, and adolescence—while a non-compulsory scheme is bound to fail if there are none of the ordinary channels for propaganda, there should be no alternative domestic salt available. Commercial salt could still be bought for manufacturing purposes; and the amount of iodide to be added will depend on the average salt intake via domestic channels and on the present average excretion of iodine which is an index of the present intake.

3. That iron medicine should be distributed to all hospitals and clinics, to be sold at cost price and advocated for all pregnant women, particularly for the Indian women, who show a definite anaemia in pregnancy that responds to iron. This should meantime serve to diminish the anaemia in Indian infants, for until baby clinics are organized on an adequate scale to reach all infants, administration of iron to infants requiring it, such as Indian babies, twins, prematures, is difficult.

4. Regarding the free use of vitamin preparations, we are doubtful whether there is enough justification for their use. Dealing with them seriatim: The absence of data about the average intake of green vegetables and of foods containing vitamin A make it impossible to say whether the intake of vitamin A is up to a good standard, but we understand that vitamin A is to be added to margarine, which in our opinion is a step in the right direction, particularly as it will cost less than butter or ghee.

Vitamin B1 is well represented in dhall and in the atta and flour on sale in Fiji (see appendix), while dalo is a good source for the Fijians.

The riboflavin intake is also in some doubt, again because of insufficient data, but it is better to encourage the greater use of milk, which is rich in riboflavin, rather than to supply single members of the vitamin B complex, for there is evidence that an imbalance may be created if one member of the complex is supplied alone. We did not find evidence of gross shortage of riboflavin.

If there are good supplies of good quality protein containing the amino-acid tryptophane, the need for nicotinic acid is lessened, as a compensatory relation occurs between the amounts of these two constituents in a food. The red tongue of pellagra was not seen, though we saw the red tongue that accompanies chewing of the betel nut.

Fruit and vegetables should be used to supply vitamin C, for there are probably factors in natural foodstuffs that are required additional to the vitamin C that they contain.

Except in the case of young infants, and even including them up to a point, vitamin D should be largely supplied in Fiji by the skin, which is capable of making it if the sunshine is allowed to have access to the skin.

#### INVESTIGATIONS REQUIRED.

1. *Skins*.—A study of the skin affections along bacteriological and other lines is needed. It is stated that the organism causing scabies has never been demonstrated under the microscope from material sent to the laboratory. There is on the other hand the evidence that what looks like typical scabies clears when the appropriate treatment by sulphur ointment is applied. Some of the confusion has undoubtedly arisen through sending the specimen at the wrong stage, either when it is secondarily infected, or when it has had over-treatment with sulphur with the production of a sulphur dermatitis. Though we sought for suitable material to prove the presence of the organism, we did not come across any at the right stage when we had the means for magnifying it, and yet we felt certain that some of the lesions were scabetic. It would not be difficult to put this diagnosis on a satisfactory basis and differentiate scabies from other skin infections, provided that time and equipment were available.

The types of ringworm and their response to treatment could also be investigated. Ringworm of the scalp was commonly seen, a contrast with what occurs in Samoa.

A study of possible virus affections of the skin would also be profitable, as Dr. Verrier has some evidence already that some of the skin lesions are produced by a virus. A competent bacteriological examination is also urgent. Controlled experiments are also required into the effects of treatment of skin conditions, for it is these skin affections which seemed to us to pull down the health particularly of the Fijian child. The treatment should be under the categories of—

- (a) drugs, such as N.A.B., etc.;
- (b) anti-biotics, such as penicillin dressings;
- (c) dietary factors, such as vitamin A, increased protein, as in milk, and calcium.

The Mobile Clinic van should be used for this purpose with as Assistant Medical Practitioner in charge, under the direction of the Bacteriologist and a paediatrician. It is suggested that Draiba would be a suitable locality for doing the work.

2. Investigation is also required into the cause or causes of the high serum protein values that were so prevalent in our survey. A specimen sent by air to Hoch in London arrived in good condition and was found by electrophoresis study to have a marked increase in the gamma-globulin fraction. That this fraction should be increased to the extent of being twice the normal level, and yet should occur in apparently healthy persons is a matter of considerable interest, and well worth further study. When the recently arrived electrophoresis apparatus is in working order the Medical School in Dunedin, a more complete study of the range of gamma-globulin content will be possible, on specimens sent by air.

3. A Goitre Survey is recommended, even if it is agreed to introduce iodized salt, because at a later date the figures will be useful as a baseline from which to judge the effectiveness of the prophylaxis. The personnel conducting this survey should first be instructed in the methods of determining the presence and degree of thyroid enlargement. An investigation into the reason for the greater incidence of goitre in the Indians might also be made.

4. *Nutritional Studies.*—The Nutrition Research Department, Otago Medical School, is now equipped to make some studies of the amino-acid content of island foods, and hopes to be able to offer to do these in the near future. This will add to the information regarding the value of such foods as dalo, breadfruit, kumala, bananas, coconuts and tapioca, etc.

A survey of the foods eaten by Fijians is also desirable. This is a difficult matter, as it requires someone who is trained in the accurate methods of dietary survey, and yet someone who is sufficiently in the confidence of the Fijian to be accepted into their home-life. Such a survey would miss the point if special foods were prepared in honour of a guest, a feature which is part of the inherent courtesy of the Fijian. A knowledge of the Fijian language would also be a prerequisite. A Fijian trained in dietetics would be best suited, but we are not aware that any Fijian is so trained. It is to be regretted that such a person is missing the opportunity of joining the research team that is being sent this year by the Fiji Department of Education to live in Fijian villages and record the social, agricultural and other affairs that pertain to Fijian life.

*Vitamin A Status.*—In order to clear away the doubts about the vitamin A intake, two lines of study might be made:—

- (a) into the vitamin A content of blood;
- (b) into the vitamin A content of livers obtained at post-mortem examinations.

The Nutrition Research Department hopes to be able to offer to examine livers collected and sent with the appropriate precautions. As a measure of the amount stored, the vitamin A content of the liver would be an index of the amount provided by the diets.

*Calcium.*—It has been said that one of the outstanding nutritional achievements in Britain in recent years has been the addition of calcium to bread and flour. Such a policy can be effective when bread and flour are universally used; but it is perhaps worth considering its addition to *atta* and flour used in Fiji since bread and biscuits are so commonly used by Fijians in the towns, where dental decay is said to be more prevalent, and since the Indian population uses *atta* in such large amounts. We noted, for instance, that chappattis were the lunch taken by all the children at the Arya Samaj School; and also the Cost of Living Survey (see appendix) records a high consumption of *atta*. The addition of calcium carbonate would have to be done in the mills from which the flour and *atta* are obtained, and this implies that the mills would have to install machinery for mixing it in. We suggest that consideration be given to this policy, because, even if a scheme for distribution of milk is put into effect, it will be some time before it reaches all those children and pregnant women who now use bread, biscuits, flour and *atta*.

#### AGRICULTURAL POLICIES, AND FISHERY RESOURCES.

We had too little time to discuss the questions related to future policies for agriculture with those directing them, and if what we say appears to be said in ignorance of what is intended or what the authorities are already trying to put into effect, we hope that they will bear with us. From what we read in the newspaper, there was an appeal for greater production of beef. While that is a future plan that needs to be implemented, we wish to point out that, if areas for cattle grazing are limited, the production of milk is a more efficient way of providing animal protein. The milch cow is able to convert animal fodder to human food more efficiently than if the animal fodder is used for beef production. The ratio given by Boyd-Orr is as follows: The number of lbs of feeding required to produce 1 lb of human food, reckoned as dry matter in each case is:—

Milk cow	..	..	..	..	..	5
Pig	..	..	..	..	..	8
Hen	..	..	..	..	..	15
Beef cattle	..	..	..	..	..	20

As the population expands, supplies of animal protein may become even more restricted than they are at present, and it may become necessary to make the best possible use of the land available. To make a sudden change is unsatisfactory, because food habits are difficult to change once they have become established. The earlier that a food is given in childhood the greater is the chance of its being acceptable to the palate. The Fijians are unaccustomed to milk as a food; they would rather eat the cow's flesh than drink its milk, and it is only among the younger Fijians that milk is becoming acceptable as a food. If the palate is trained through the medium of a school milk scheme, it will help future agricultural policies, if, as we see it, the authorities then turn to, greater milk production. This is part of the background for our advocacy of milk schemes for children. Children are imitative and will often take a food together when they will not take it singly—at least that is our experience with our milk scheme in New Zealand.

We were inclined to think that there was a disproportionately large amount of good land devoted to the cultivation of the sugar cane.

Greater rice production would help the Indian and provide an export trade—there are points in getting trade when the demands are high.

If the Fijians were encouraged to grow more dalo, there would not be the present hiatus between demand and supply. What is grown now is often sold to meet the demands of the mining areas, creating a shortage with attendant rise in prices. We heard many complaints that dalo was now too dear. Dalo is a better food than tapioca, though there is a tendency to grow tapioca on account of its non-seasonal habits. In our opinion, policies should be directed towards maintaining the indigenous diet as far as possible, at any rate in respect to foods of vegetable origin, but with the addition of milk for children. A survey of Fishery Resources is also considered desirable.

#### ACKNOWLEDGMENTS.

We wish to thank the many Assistant Medical Practitioners, school masters and mistresses, Health Sisters and Nurses of all races who, by their willing co-operation, made this work possible. We are deeply indebted to Mr. Pery-Johnston, Superintendent of the Laboratory of the Colonial War Memorial Hospital, Suva, for technical help given most ungrudgingly, and to Dr. J. M. Cruikshank, O.B.E., Inspector-General, South Pacific Health Service, Suva, Fiji. Our thanks are due to the British Colonial Development Fund, and the N.Z. Department of Health, for providing the funds that enabled us to carry out the investigation.

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#### APPENDIX I.

##### BLOOD HAEMOGLOBIN AND SERUM PROTEIN LEVELS.

This investigation was planned to obtain samples of blood for analysis from the most representative cross section possible of both the Fijian and Indian communities, but special importance was attached to the younger age groups, to the groups of women of the child-bearing age and of pregnant women, as these groups more than any others will show anaemia in any population which is suffering from nutritional deficiencies. Towns and villages on or near the King's and Queen's Road were visited, samples being obtained from both races from all round the island, both from the coastal zone and from the inland area based on Drekeniwai (Nayavu Rural Dispensary) village on the Waidina River (Wainibuka Valley). The individuals examined were random samples of the so-called "healthy" population, specially selected individuals sent to us by Health Sisters and Assistant Medical Practitioners as cases of anaemia or other diseases were not included in the series. It should be noted that the total number of severely anaemic cases seen, other than the few in the C.W.M. Hospital, Suva, was only five.

#### METHODS.

The copper sulphate specific gravity method of Phillips, Van Slyke *et al* (1945) was used throughout for the determination of both haemoglobin and protein, but Hoch and Marrack's (1945) formula, 364 (SGs—1.0060) was used to determine the serum protein level instead of Van Slyke's formula. Capillary blood was used for the estimations after cross checks against venous blood had been found to be satisfactory. The estimations were carried out as soon as possible after taking the blood, but a delay of 3 or 4 hours made no difference to the results. The findings in the different groups are strictly comparable, as they were all obtained by the same method and by the same observers. Though there was no method of checking the findings against those obtained by another method, the error is probably not great as the values for Europeans (control group) and for infants fall within the expected range.

## RESULTS.

The haemoglobin results are analysed in tables 1 and 2 and charts 1 and 2 and the range of haemoglobin in the various groups of subjects shown in the attached histograms.

The haemoglobin figures have been analysed by race, sex and age, and the inland villages have been separated from the towns and villages of the coastal zone. In the case of the protein figures the values for the two races showed no difference, so these have been combined in the various groups. Figures from the M.R.C. report on Haemoglobin Levels in Great Britain in 1943 are included in the haemoglobin tables for comparison; these have been calculated to agree with ours, which are based on the standard, 100 per cent equal 14.5 g./100 ml.

It is clear from the tables and charts and histograms that, generally speaking, there is no serious anaemia problem in the populations sampled, with certain exceptions which will be referred to later. The figures for Fijians are consistently slightly below the M.R.C. standards but except for those for the age group 6-9 years and possibly for those of the age group 10-15 (both sexes) the difference is probably not significant. The low mean figure for 6-9 year old Fijian children is remarkable, especially when compared with their Indian counterparts. The factors that might be responsible for this difference are different diets, but this racial and dietetic distinction is common to all groups and the much higher incidence of sepsis (ulcers, infected scabies, etc.) in the Fijian as compared with the Indian child is suggested as the more likely explanation.

The figures for Indian children other than those for the infant under 2 years of age and for the male are surprisingly good: the average Indian female, however, suffers from anaemia as soon as she reaches the child-bearing age, which is reflected in the lower mean haemoglobin in the 15-19 year old group and the still lower value in the 20-30 year old group. The low figures for Indian infants are also an index of the degree of anaemia in their mothers.

As would be expected from the above figures the Fijian woman during pregnancy does not suffer from anaemia, though her haemoglobin level is lower at this period as is the European woman's and would be raised by the administration of iron throughout pregnancy. The figures for the Indian woman show a high incidence of anaemia in the so-called "normal" pregnant woman. In our series of 100 women, 2 per cent had values below 50 per cent, 10 per cent had values below 60 per cent, and 25 per cent values below 70 per cent. It is from this class that the severe cases of megaloblastic anaemia are drawn, but no such cases were found in our survey of the general population.

A further analysis of the Fijian figures in the inland and coastal zone districts showed that in every age group, except the one year old group, the mean values for the inland villages was lower than those for the coastal zone.

The serum protein figures are set out in table 2 and chart 2. They have been grouped somewhat differently from the haemoglobin values as analysis showed no sex difference and constant value over much larger age groups. The remarkable feature is the high average level for all ages after five years. The rise is slower than the Indian, but by 15 years of age both races have a mean value of 7.8 g./100 ml. An occasional low case may occur in the older groups but the great majority of individuals have these high values. In pregnancy the values are much lower, the fall by the third trimester being approximately 0.8 g./100 ml., a figure that agrees with that found for pregnancy, in women of European race.

## ADDENDUM.

Sterile samples of serum were sent by air to London to Hans Hoch, who confirmed the high values for serum protein, and tested the samples by electrophoresis. He gave permission to report his results:—

	Fiji Samples		Normal Sera	
	Per cent	g./100ml.	Per cent	g./100ml.
Albumin and alpha <sub>1</sub> -globulin	53.0	4.2	61.0	4.5 (3.7-5.1)
Alpha <sub>2</sub> -globulin .. ..	9.5	0.75	10.4	0.75
Beta globulin . . . .	8.5	0.65	13.8	1.0
Gamma globulin .. ..	29.0	2.3	14.2	1.05

"Albumin and alpha<sub>1</sub>-globulin within normal limits (but the percentage low because of high globulin.

Alpha<sub>2</sub>-globulin slightly reduced, relatively and absolutely.  
Gamma globulin high—about twice normal."

## REFERENCES.

- Phillips, R. A., Van Slyke, D. D., Dole, V.P., Emerson, K. Jr., Hamilton, P. B. and Archibald, R.M. (1945). Copper sulphate Method of Measuring Specific Gravity, Josiah Macy Jr. Foundation, New York.
- Haemoglobin Levels in Great Britain in 1943, Medical Research Council, Special Report Series, No. 252.
- Hoch, H. and Marrack, J. R. (1945). *Brit. Med. J.* 2, 151.

TABLE 1.—MEAN HAEMOGLOBIN PER CENT. (100 per cent = 14.5 g. per cent).

Group	M.R.C. Values Corrected to 100% = 14.5g.				FUJIAN										INDIAN				Diff. F.-I. (1)-(4)	*Significance
	No.	Mean	(1) All Values		(2) Waimibuka		(3) Coastal Zone		(4)				Mean	No.	S.D.	S.E.	Range			
			No.	Mean	No.	Mean	No.	Mean	No.	Mean	S.D.	S.E.						Range		
0-11/12 year ..	51	81	24	76	7.03	1.43	58-84	7	74	17	77	14	74	9.04	2.42	64-85	2	No		
11/12-23/12 ..	111	79	31	79	8.25	1.48	58-93	5	82	26	78	18	68	12.88	3.04	40-87	11	Yes, 3,2		
24/12-35/12 ..	117	84	25	81	5.62	1.12	70-92	4	77	21	82	7	78	.....	.....	54-89	3	No		
3-5 years ..	241	86	62	85	6.07	0.77	72-97	10	80	52	86	25	82	7.84	1.57	63-95	3	No		
2-5 years ..	431	86	87	84	6.15	0.66	70-97	14	79	73	85	32	81	8.64	1.53	54-95	3	No		
6-9 years ..	532	94	64	85	7.22	0.90	60-99	10	82	54	86	63	89	6.66	0.84	60-101	4	Yes, 3,2		
10-14 years ..	1304	97	115	90	7.45	0.69	56-105	8	86	107	90	70	92	9.05	1.08	60-108	2	No		
15-19 years ♂	S 480	105	S 43	98	8.33	1.27	79-112	4	92	39	98	M 21	103	5.34	1.17	90-109	5	No		
	M 419	104	S 37	93	8.87	1.46	53-104	5	86	32	94	M 39	90	12.08	1.93	45-104	3	No		
15-19 years ♀	S 200	100	S 96	96	7.95	1.35	80-114	8	92	22	105	M 11	107	7.12	2.14	92-115	5	No		
20-30 years O	S 299	105	M 30	102	7.39	1.35	80-114	8	92	22	105	M 11	107	7.12	2.14	92-115	5	No		
20-30 years ♀	S 2477	97	M 15	95	7.50	1.94	80-107	4	91	11	96	M 55	85	8.66	1.16	46-107	10	Yes, 4,4		
	M 684	95	S 13	98	8.01	2.22	81-108	6	97	7	100	M 9	104	8.48	2.83	90-111	6	No		
30+ years ♂	M 160	104	M 13	88	6.00	1.73	76-97	3	85	10	89	M 13	89	13.68	3.79	60-105	1	No		
30+ years O	M 1122	96	M 13	88	6.00	1.73	76-97	3	85	10	89	M 13	89	13.68	3.79	60-105	1	No		
PREGNANT WOMEN	690	87	85	84	7.90	0.66	50-100	.....	.....	.....	.....	100	77	12.04	1.20	37-102	7	Yes, 5,4		
1st Trimester..	105	91	17	88	8.40	2.04	72-100	6	83	11	91	14	83	16.02	4.28	37-99	5	No		
2nd "	269	88	32	81	6.21	1.10	64-97	6	81	26	81	46	77	10.77	1.59	54-95	4	Yes, 2,1		
3rd "	376	81	36	84	8.22	1.37	50-98	.....	.....	.....	.....	40	75	11.50	1.82	46-102	11	Yes, 4,2		

S = Single. M = Married. ♂ = Male. ♀ = Female. SD = Standard Deviation.

\* Significance if  $M_1 - M_2$   
 $\sqrt{\frac{SD_1^2}{N_1} + \frac{SD_2^2}{N_2}} = 2$  or more, difference is significant.



TABLE 2.—SERUM PROTEINS. GRAMMES PER 100ml.

Age in Years	Fijians					Indians					Europeans in Fiji				
	No.	Mean	S.E.	S.D.	Range	No.	Mean	S.E.	S.D.	Range	No.	Mean	S.E.	S.D.	Range
	0-23/12 ..	29	7.12	± 0.09	0.47	5.8-8.0	28	6.83	± 0.10	0.51	6.2-7.6	.....	.....	.....	.....
2-5 ..	45	7.36	± 0.07	0.50	6.4-8.4	21	7.01	± 0.13	0.61	6.2-7.9	.....	.....	.....	.....	.....
6-14 ..	159	7.85	± 0.03	0.34	6.8-8.5	119	7.59	± 0.03	0.34	6.9-8.5	.....	.....	.....	.....	.....
15-30 ..	110	7.85	± 0.03	0.35	6.8-8.5	106	7.80	± 0.03	0.35	6.8-8.7	.....	.....	.....	.....	6.9-7.7
30 ..	22	7.65	± 0.08	0.39	6.7-8.2	19	7.64	± 0.05	0.22	7.4-8.1	.....	.....	.....	.....	.....
CONDITION PREGNANT															
1-40 weeks ..	58	7.05	± 0.06	0.43	5.8-8.0	88	6.97	± 0.04	0.36	6.8-8.0	.....	.....	.....	.....	.....
1-16 "	9	7.29	± 0.18	0.53	6.6-8.0	11	7.16	± 0.15	0.51	6.7-8.0	.....	.....	.....	.....	.....
17-28 "	18	7.03	± 0.10	0.41	6.6-8.0	40	7.01	± 0.04	0.29	6.6-7.6	.....	.....	.....	.....	.....
29-40 "	31	7.01	± 0.07	0.39	5.8-7.6	37	6.88	± 0.06	0.39	6.6-7.6	.....	.....	.....	.....	.....

## APPENDIX III.

## NUTRIENT VALUE OF FOODS CONSUMED BY INDIAN LABOURERS IN VITI LEVU.

Average of foods consumed in Cost of Living Survey, 1939, in and outside of Suva, per 1,107 persons. Averaged on man-value of 4.72 per household, per day.

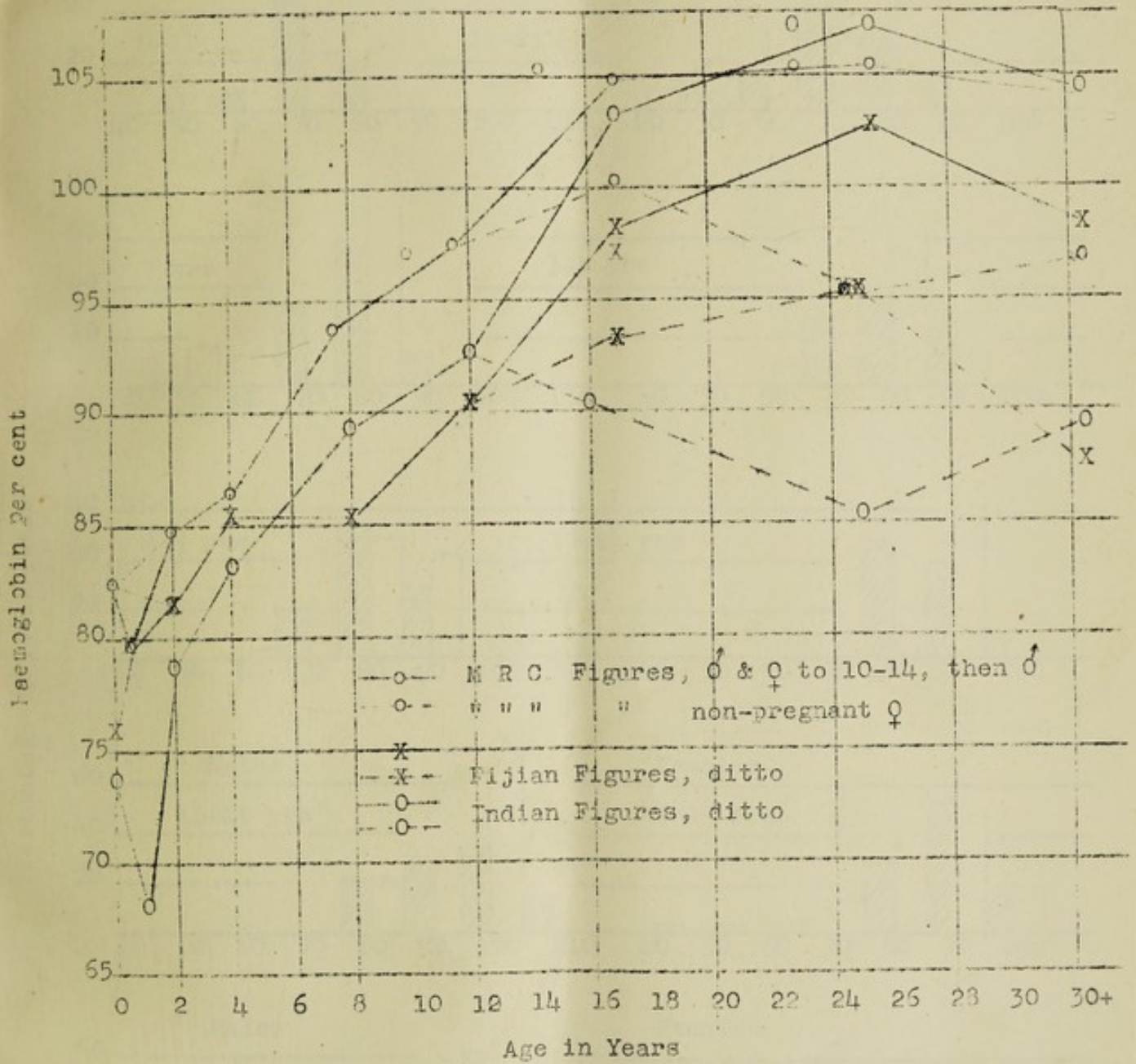
	Amount per man-value	Calories	Protein gm.	Fat gm.	CHO gm.	Ca mg.	Fe mg.	Vit. A I.U. c=carotene	Thiamin mg.	Riboflavin mg.	Nicotinic acid mg.	Ascorbic acid mg.
Bread (white)	7.8 gm.	19.9	0.6	.....	4.3	1.7	0.1	0	0.018	0.003	0.06	0
Sharps ..	317 gm.	1097	34.8	5.1	228	63	7.9	0	1.433	0.317	15.85	0
Rice, polished	208.4 gm.	727	14.6	2.0	162	10.4	1.0	0	125	0.104	2.08	0
Dhali ..	45.7 gm.	139	10.5	0.7	23	41	2.5	46	0.251	0.155	1.05	0
Ghee ..	24.2 gm.	200	0	22	0	.....	.....	605	0	0	0	0
Coconut Oil	35 gm.	315	0	35	0	.....	.....	0	0	0	0	0
Potatoes ..	73.8 gm.	51	1.4	.....	14	7.4	0.5	25c	0.074	0.036	0.74	11
Onions ..	3.0 gm.	1	.....	.....	.....	0.9	.....	7c	0.001	0.003	0.003	0.4
Sugar ..	54.9 gm.	220	.....	.....	55	0	0	0	0	0	0	0
Fresh milk ..	68 cc.	42	2.1	.....	3	82	.....	95	0.027	0.010	0.068	.....
Condensed milk	.3 gm.	7	0	.....	0.09	0.6	.....	1.2	0.001	?	.....	.....
Curry stuffs	5.4 gm.	?	?	?	?	some	some	variable	plus	?	?	some
Vegetables ..	? amount	plus	?	?	plus	some	some	variable	plus	?	?	some
Meat, fresh (mutton or goat)	9.6 gm.	19	1.4	1.4	.....	0.8	0.2	.....	0.020	0.024	0.48	.....
Meat, tinned	1.3 gm.	3	0.3	0.3	.....	0.1	.....	.....	.....	0.002	0.03	.....
Fish, tinned	4.9 gm.	9.8	1.0	0.5	.....	5.0	0.05	.....	.....	.....	.....	.....
Eggs, fresh ..	.0087 gm.	negligible	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cocoa ..	5.5 gm.	25	1.0	1.4	2.4	2.8	0.8	8	0.007	0.015	0.06	.....
Butter, fresh	3.7 gm.	28	.....	3.1	0	0.5	.....	100	0	0	0	0
U.S.A. National Research Council Recommendations for physiologically active man ..	.....	2886.7	67.7	73.8	491.8	216.2	13.0	888	1.857	0.759	29.42	11.4
	.....	3000	70	(not defined)	1000	12.0	5000	1.5	1.8	15	75	75

NOTE.—More complete data for vegetables would probably result in some increase in figures for vitamins A and C.

CHART I

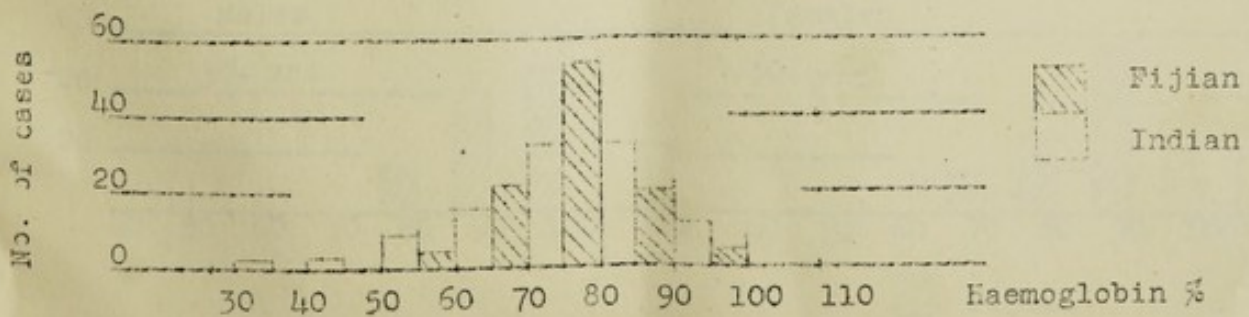
MEAN HAEMOGLOBIN PER CENT

(100% = 14.5 g %)

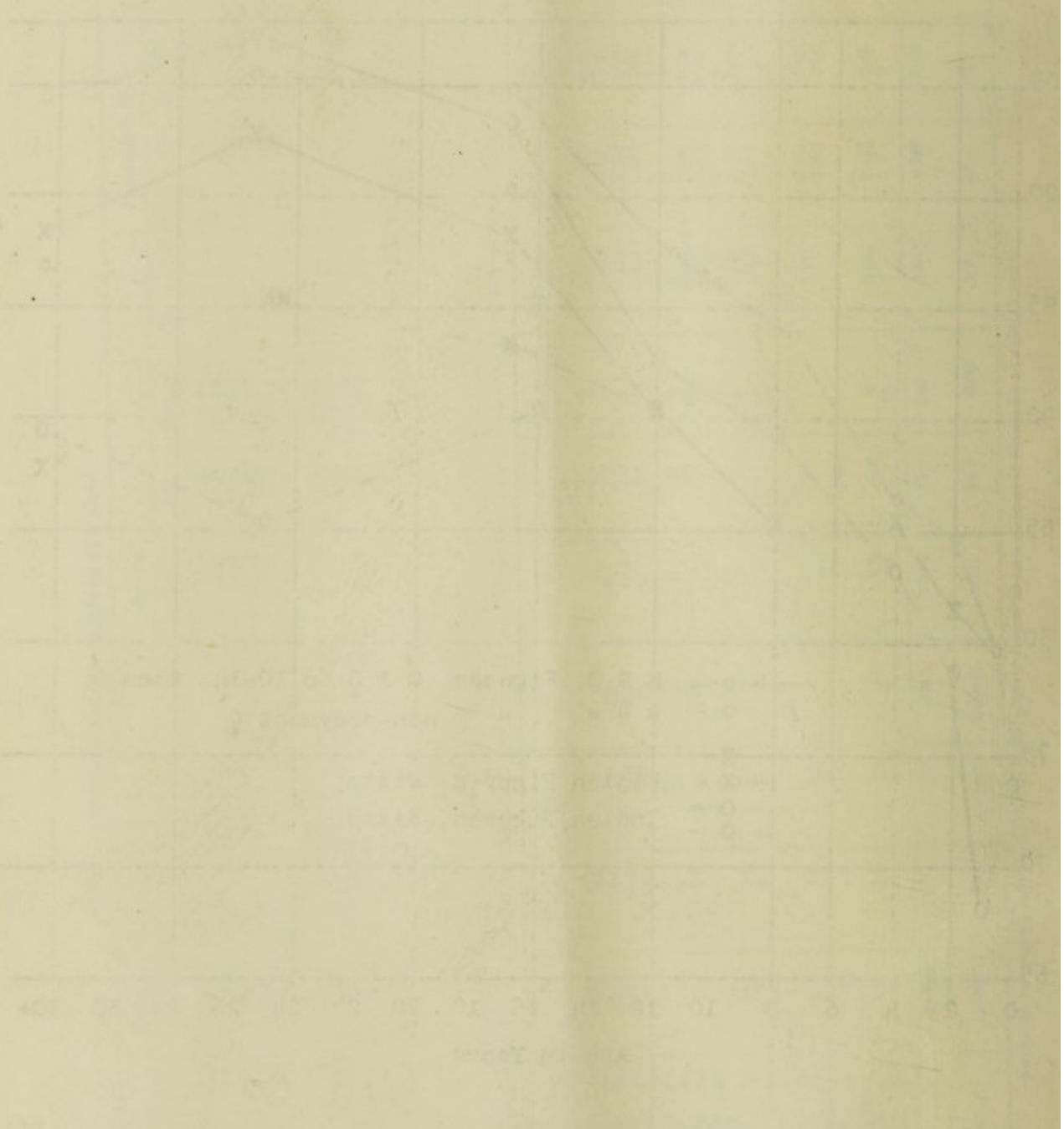


HISTOGRAM

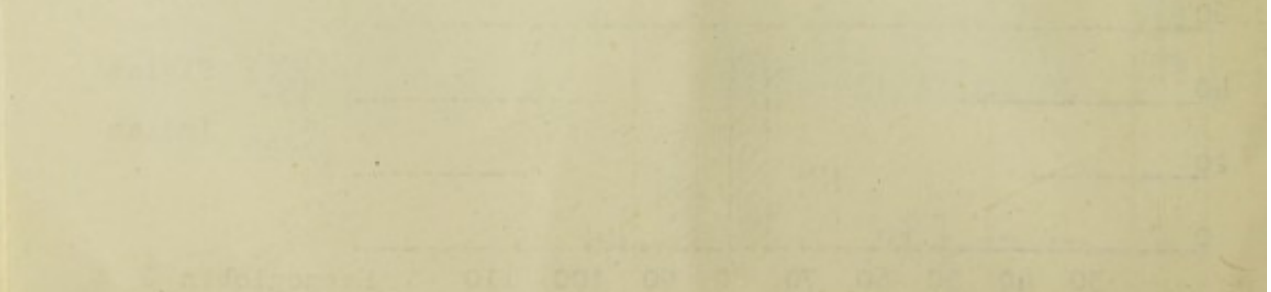
DISTRIBUTION OF HAEMOGLOBIN VALUES IN PREGNANCY CASES



TEMPERATURE RECORD  
(1902 - 1903)

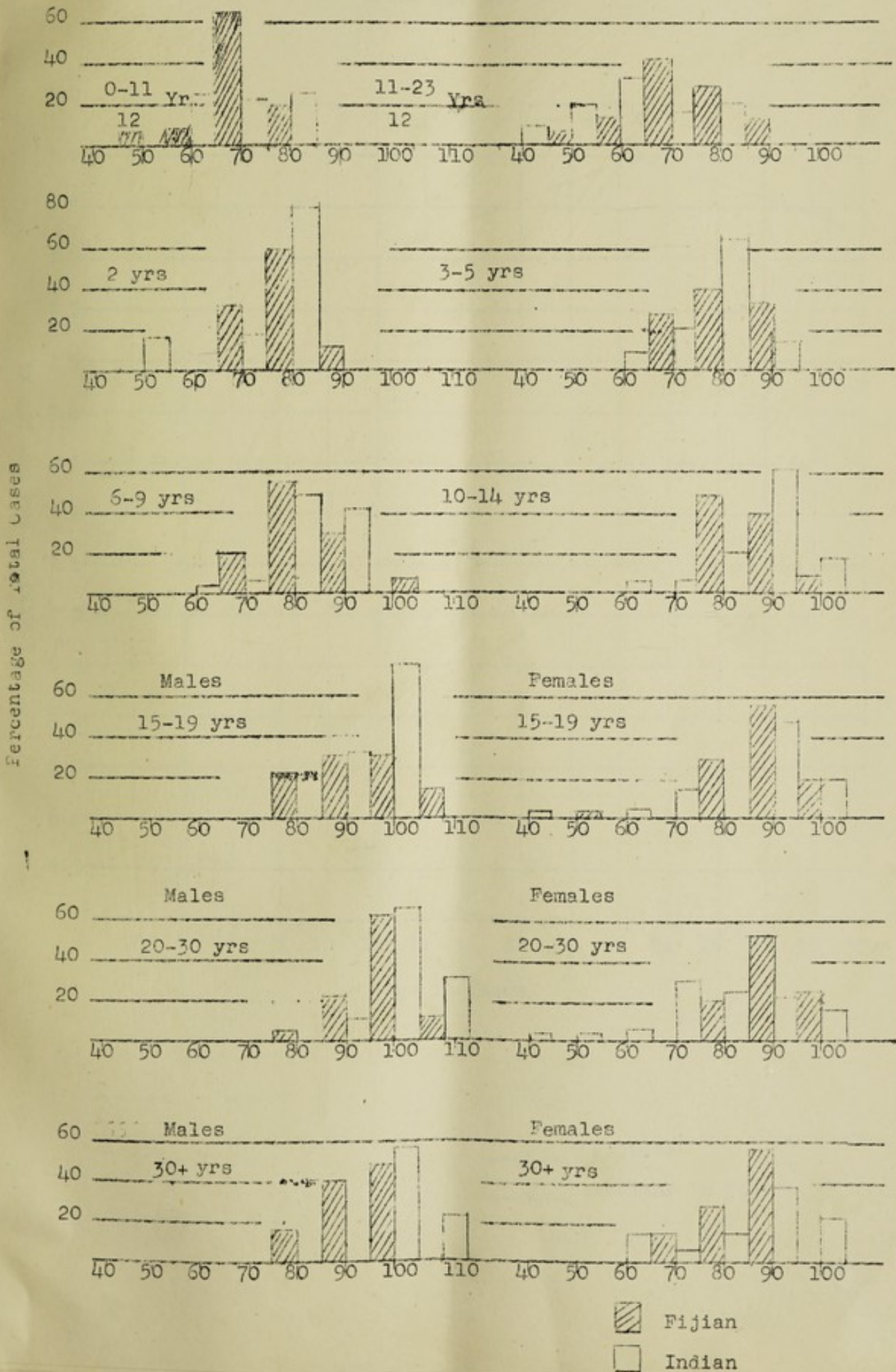


RECORD OF TEMPERATURES IN THE CITY OF NEW YORK



HISTOGRAMS  
HAEMOGLOBIN VALUES

Distribution in Different Age Groups  
Haemoglobin %



HISTORICAL  
 ALMOHO-COIN VALUES  
 Distribution in Different Age Groups  
 (Barro Colorado)

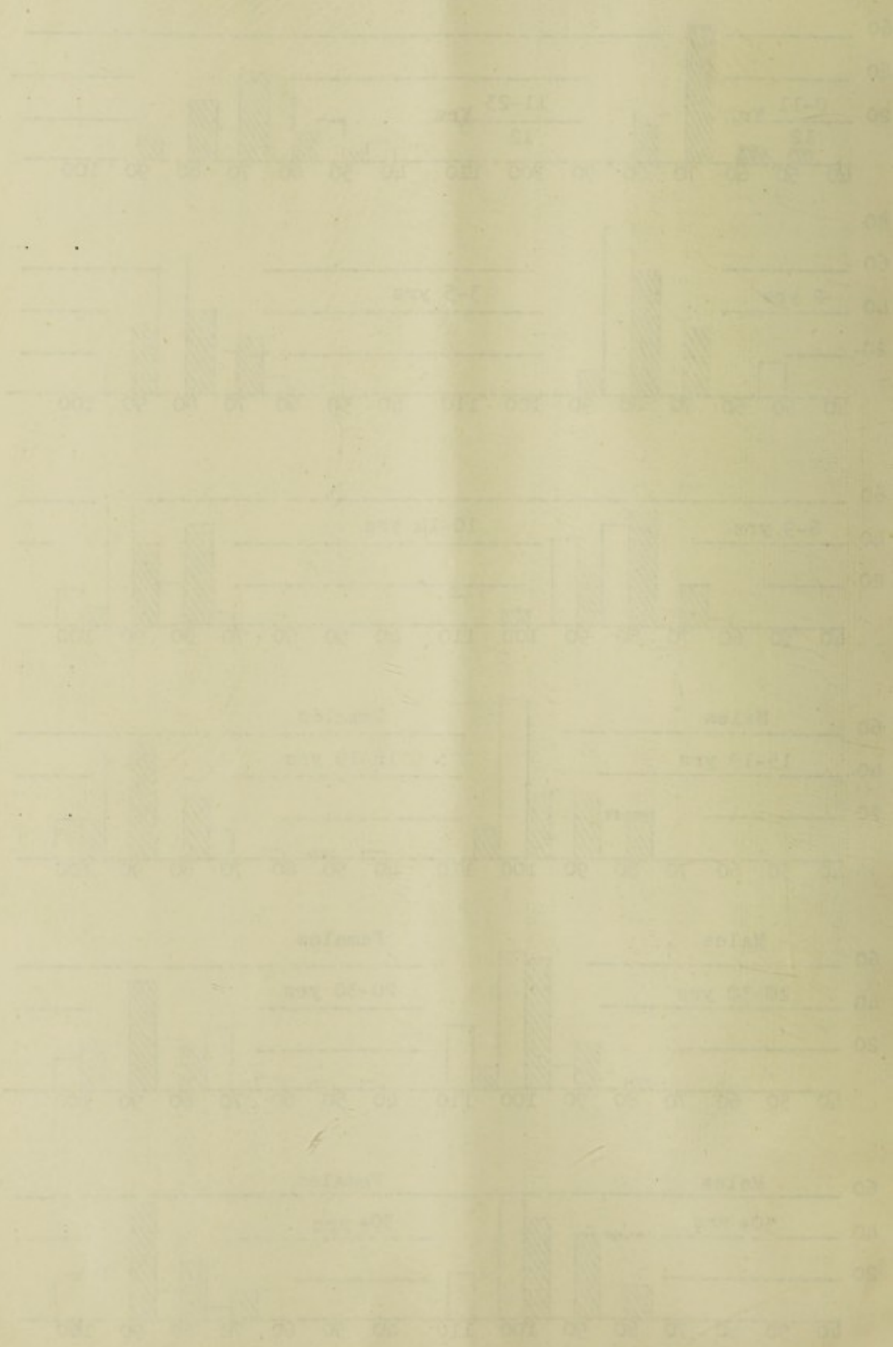
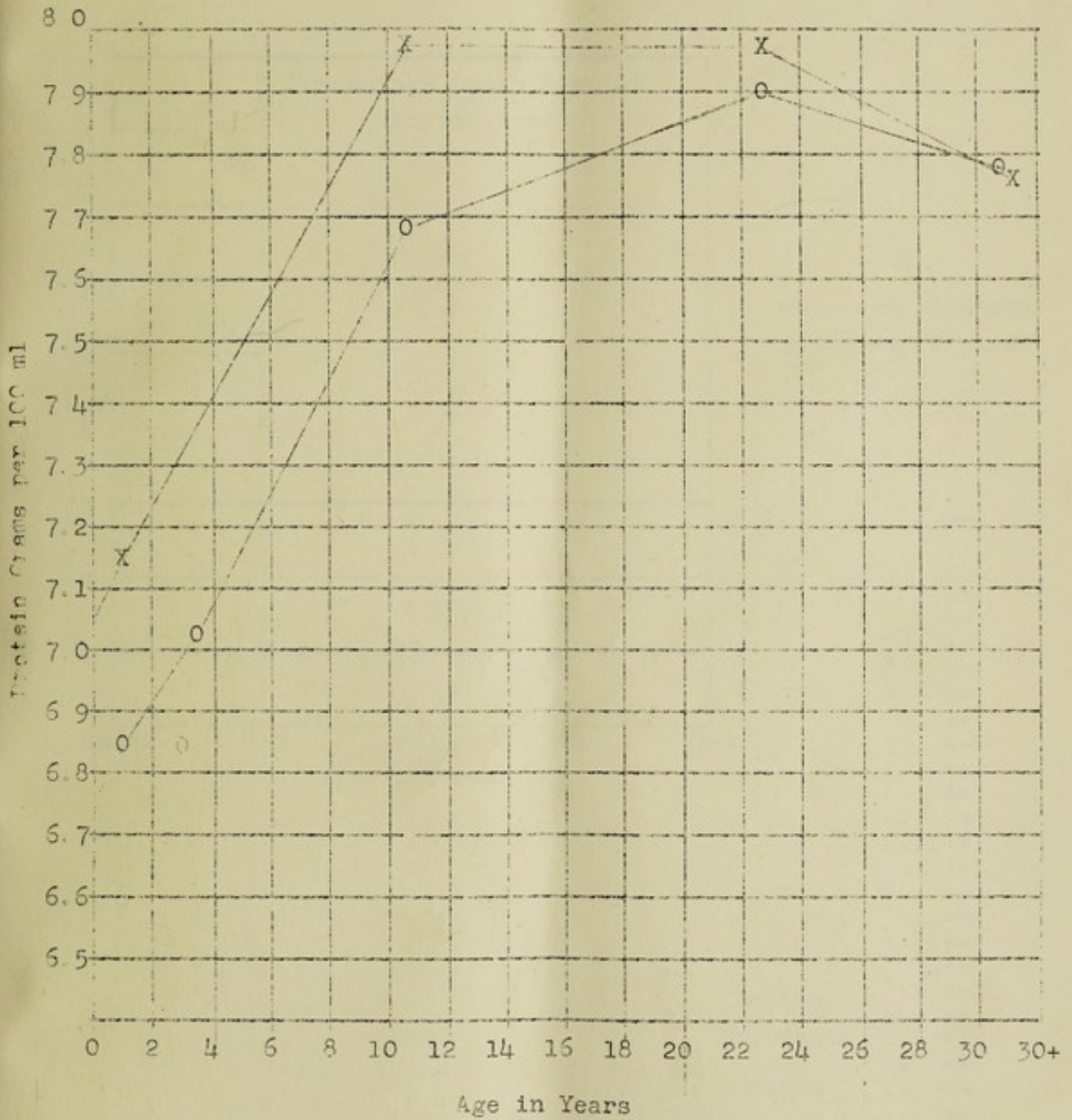


CHART 2

SERUM PROTEINS  
Grams per 100 ml



---X--- Fijians  
---O--- Indians in Fiji

TABLE 1

PERCENTAGE OF  
TOTAL POPULATION



Year

1900

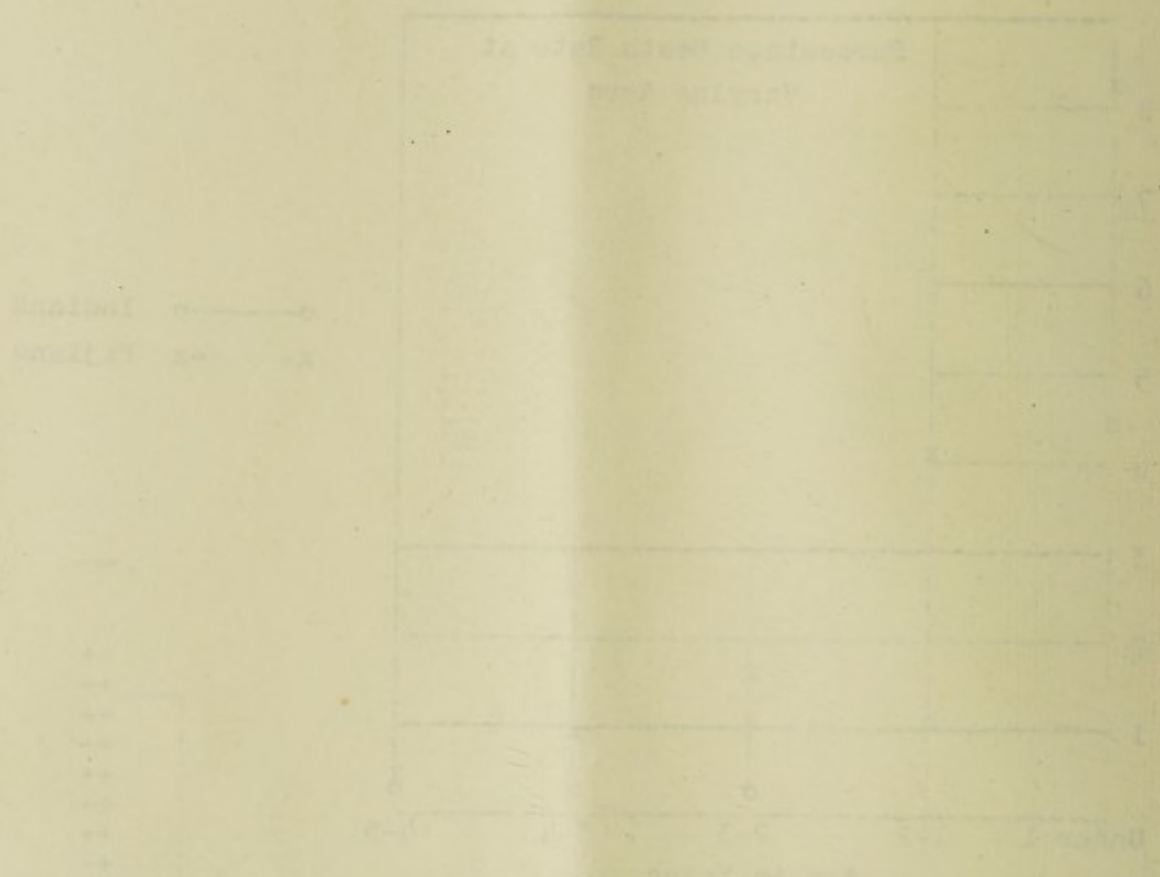
1910





WATER SALES AND SURVIVAL RATES OF TURTLES AND BIRDS  
IN THE GREAT LAKES REGION

1941 - 1942



Turtles  
 Birds  
 ...  
 ...

Total Survival

Survival Rate

Year	Turtles	Birds
1941	50	30
1942	60	40

TABLE 4.—COMPARISON OF NUTRIENT VALUES—ONE PINT OF MILK COMPARED WITH THE AMOUNT OF OTHER FOODS OF EQUIVALENT PROTEIN VALUE.

Food	Amount	Protein g.	Fat g.	Carbohydrate g.	Calories	Calcium mg.	Iron mg.	Vitamin A I.U.	Vitamin B ug.	Riboflavin ug.	Vitamin C mg.
Milk, whole . . . . .	1 pint	19	22	26	379	700	0.2	1,460	283	1,030	? 0
Milk, dry, skim . . . . .	2 oz.	21	1	28	202	765	0.2	0	256	1,102	0
Fish, medium fat, edible portion . . . . .	3 oz.	19	3	0	99	21	1.0	120	90	170	0
Egg, edible portion . . . . .	6 oz.	21	20	2	278	102	5.0	2,892	258	634	0
Meat, lean only, e.g. beef . . . . .	3½ oz.	19	11	0	177	5	4	70	115	210	0

TABLE 5.—NUTRIENT VALUE OF SUPPLEMENTARY FOODS FOR ADDING TO THE DIET OF INFANTS.

Food	Amount	Protein g.	Fat g.	Carbohydrate g.	Calories	Calcium mg.	Iron mg.	Vitamin A I.U.	Vitamin B1 ug.	Riboflavin ug.	Vitamin C ug.
Coconut cream . . . . .	2 oz.	2.3	15	11	187	5.7	?	.....	?	?	.....
Pawpaw . . . . .	3½ oz.	0.6	.....	9	38	10	0.5	2,500	20	20	60
Taro (Dalo) . . . . .	3½ oz.	2.0	.....	20	88	25	1.0	40	(50)	60	0
Banana (ripe) . . . . .	3½ oz.	1.0	.....	24	103	7	0.5	3,850	50	60	10
Young coconut . . . . .	3½ oz.	0.7	1	3	21	?	?	.....	?	?	?

## APPENDIX IV.

## INFANT FEEDING.

One of the major problems in the Pacific Islands is that of feeding infants at the stage of weaning. Where milk supplies are adequate and safe from bacterial contamination, milk is the food of choice for feeding infants. Weaning should be done gradually, not suddenly as is so often the custom among the native peoples of the Pacific. The introduction of foods such as pawpaw, dalo (taro), ripe banana, young (soft) coconut, all in pureed form to begin with, together with egg yolk, fish, and meat in a finely divided state, should be gradually introduced, and increased as the weaning is taking place. Ideally, about  $1\frac{1}{4}$  pints of milk should be used to replace the mother's milk following weaning, the introduction of the milk being made gradually as the weaning proceeds. The milk should be boiled and rapidly cooled, in order to make it safe from harmful bacteria. No food can really replace milk, but as cow's milk is not always available, the suggestion has been made by the Research Council for the South Pacific Commission that formulae for infant feeding should be drawn up, using Island foods. I have tentatively initiated the basis for such formulae in a series of calculations in the accompanying tables. Table 4 shows in measurable terms what quantities of fish, egg or meat (or imported skim milk powder) would be required for furnishing an amount of protein equivalent to that in a pint of milk. ( $3\frac{1}{2}$  oz. of a vegetable food or other wet food is approximately equal to half-a-standard-cupful, which measures 8 fluid ounces.) Note that even the quantities stated do not contain all of the value that there is in a pint of whole milk. Table 5 gives the nutrient values of supplementary foods for adding to the diet of infants. Table 6 shows what foods and supplementary calcium (in a cheap form) would need to be added to the Island foods (or to imported dried skim milk) in order to make them approach the nutritional value of whole milk. Of the Island foods suggested, it is probable that the only one that comes within the range of practicability is fish, at any rate for most villages. Meat, chicken or pork would probably not be available every day. The small eggs in the villages so often serve as a means of trade for obtaining the money for buying needed goods that using what one would estimate as 5 eggs daily to supply about 6 oz. of edible portion of egg, would scarcely ever be achieved, and one also doubts whether it would be advisable—many European children would at any rate not be able to take a large quantity of egg without showing allergic symptoms, but whether allergies would become manifest in Island children, one does not know. A few eggs per week would however serve to help raise the riboflavin and vitamin D intake in which the other foods are deficient. Whole milk is also deficient in Vitamin D, there being only about 10 I.U. per pint, whereas an egg would probably contain about 50 I.U. Whether vitamin D would need to be given depends on the amount of sunshine to which the baby is exposed, and on the incidence of rickets in the Island. At this distance, it is impossible to work out a formula that would fit the conditions in the villages, but it is hoped that the accompanying tables may serve as a basis on which those who know the practicability of the tentative formulae may devise a weekly menu for the weaning.

One would however like to put in a plea for the use of dried skim milk, as being a cheap substitute for dried whole milk. It is likely to keep better than dried whole milk, without the development of rancidity. If it goes lumpy, it can be re-powdered. If bought in bulk, it is a relatively cheap food. It would serve to train the palate to accept milk as a food, a point worthy of attention when the future of the Island's agriculture is being considered. There would be the further advantage that a single, simple formula could be worked out. If there are difficulties about payment, or fears that an allocation of dried milk would be used for purposes other than for feeding the infant, it could be sold from the Clinic Van at a subsidized price, a system that works well in Jamaica. Quantities of skim milk are wasted from milk plants and factories in New Zealand. If the hiatus between the potential resources of skim milk powder in New Zealand and the demand in the Islands could be bridged, it would be to the benefit of both countries; for there is in New Zealand and unfulfilled demand for more Bananas, and other Island fruits.

It should be stated that our standards for the diet of children of the weaning and toddler period include at least an ounce more protein containing food than that present in  $1\frac{1}{4}$  pints of milk, e.g. one ounce of meat or an egg.

TABLE 6.—ADDITIONAL FOODS NEEDED TO RAISE THE FOODS IN TABLE 5 TO THE APPROXIMATE NUTRIENT VALUE OF THAT OF A PINT OF MILK.

		Protein g.	Fat g.	Carbohydrate g.	Calories	Calcium mg.	Iron mg.	Vitamin A I.U.	Vitamin B1 /ug.	Riboflavin /ug.	Vitamin C mg.
2 oz. DRIED SKIM MILK..	.....	20.8	1	28	202	765	0.2	0	256	1,102	0
Coconut cream ..	2 oz.	2.3	15	10.8	187	6	.....	.....	.....	.....	.....
Pawpaw ..	3½ oz.	0.6	.....	9	38	10	.....	2,500	.....	20	60
Dalo (taro) ..	3½ oz.	2.0	.....	20	88	25	1.0	40	(50)	60	0
.....	.....	26	16	68	515	806	2	2,540	326	1,182	60
3½ oz. Fish ..	.....	19	3	0	99	21	1.0	120	90	170	0
Coconut cream ..	2 oz.	2.3	15	11	187	5.7	.....	.....	.....	.....	.....
Pawpaw ..	3½ oz.	0.6	.....	9	38	10	0.5	2,500	20	20	60
Banana (ripe) ..	3½ oz.	1.0	.....	24	103	7	0.5	350	50	60	10
Taro (dalo) ..	3½ oz.	2.0	.....	20	88	25	1.0	40	(50)	60	0
Young coconut ..	3½ oz.	0.7	1	3	21	.....	.....	.....	.....	.....	.....
Calcium carbonate ..	1 teaspoon	.....	.....	.....	.....	880	.....	.....	.....	.....	.....
.....	.....	26	19	67	536	949	3.0	3,010	210	310	70
6 oz. Egg ..	.....	21	20	2	276	102	5.0	2,892	258	634	0
Pawpaw ..	3½ oz.	0.6	.....	9	38	10	0.5	2,500	20	20	60
Banana ..	2 oz.	0.6	.....	13.7	59	4	0.3	200	29	34	6
Calcium carbonate ..	1 teaspoon	.....	.....	.....	.....	880	.....	.....	.....	.....	.....
.....	.....	22	20	25	373	996	6	5,592	307	688	66
3½ oz. LEAN MEAT ..	.....	19	11	0	177	5	4	70	115	210	0
Pawpaw ..	3½ oz.	0.6	.....	9	38	10	0.5	2,500	20	20	60
Banana (ripe) ..	3½ oz.	1.0	.....	24	103	7	0.5	350	50	60	10
Young coconut ..	3½ oz.	0.7	1	3	21	.....	.....	.....	.....	.....	.....
Calcium carbonate ..	1 teaspoon	.....	.....	.....	.....	880	.....	.....	.....	.....	.....
.....	.....	21.3	12	36	339	902	5	2,920	185	290*	7

\* Deficient in riboflavin by comparison with milk. /ug = micrograms (thousandths of a milligram).

APPENDIX V.  
VITAL STATISTICS.

THE ESTIMATED POPULATION AT THE END OF 1949 AND 1950.

Race	Males 1950	Females 1950	Total 1950	Total 1949	Increase	Increase per cent	Decrease	Decrease per cent
Europeans .. .. .	3,801	2,700	6,501	6,126	375	6.12	....	....
Euronesians . . . .	3,571	3,331	6,902	6,712	190	2.83	....	....
Fijians .. .. .	65,915	63,981	129,896	126,650	3,246	2.56	....	....
Rotumans .. .. .	1,871	1,798	3,669	3,581	88	2.46	....	....
East Indians .. .. .	73,704	64,721	138,425	133,941	4,484	3.35	....	....
Polynesians . . . .	2,550	1,790	4,340	4,154	186	4.48	....	....
Chinese .. .. .	2,352	1,027	3,379	3,148	231	7.34	....	....
Others .. .. .	349	303	652	643	9	1.40	....	....
Total .. .. .	154,113	139,651	293,764	284,955	8,809	3.09	....	....

THE NUMBER OF BIRTHS RECORDED DURING THE LAST FOUR YEARS.

Race	1947	1948	1949	1950	Crude birth-rate per 1,000, 1950
Europeans .. .. .	79	117	106	131	20.15
Euronesians . . . .	242	234	237	232	33.61
Fijians .. .. .	4,621	4,512	4,500	4,821	37.11
Rotumans .. .. .	164	157	162	150	40.88
East Indians .. .. .	5,248	6,012	5,606	5,882	42.49
Polynesians . . . .	118	144	124	161	37.10
Chinese .. .. .	99	35	94	137	40.54
Others .. .. .	4	102	18	3	4.60
Total .. .. .	10,575	11,313	10,847	11,517	39.20

The Crude birth rate in 1949 was 38.07.

THE NUMBER OF DEATHS RECORDED DURING THE LAST FOUR YEARS.

Race	1947	1948	1949	1950	Crude death-rate per 1,000, 1950
Europeans .. .. .	32	31	35	32	4.92
Euronesians . . . .	41	45	55	42	6.09
Fijians .. .. .	1,828	1,798	1,894	1,599	12.31
Rotumans .. .. .	76	73	68	68	18.53
East Indians .. .. .	856	1,178	1,369	1,383	9.99
Polynesians . . . .	61	109	74	81	18.66
Chinese .. .. .	11	19	11	24	7.10
Others .. .. .	1	5	5	1	1.53
Total .. .. .	2,906	3,258	3,511	3,230	11.00

The crude death rate in 1949 was 12.32.

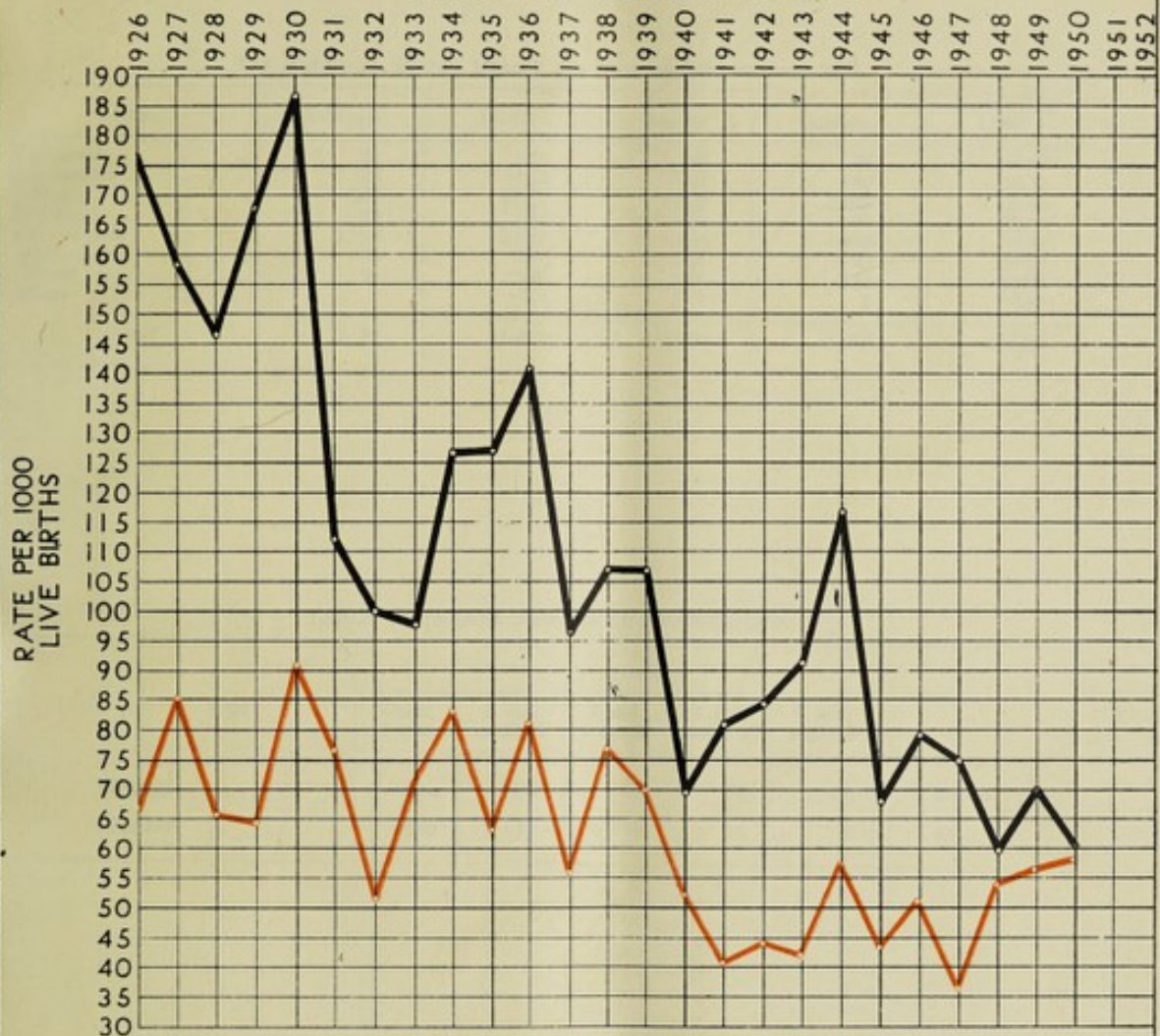
# INFANT MORTALITY, CRUDE BIRTH & DEATH RATES.

FIJIANS AND INDIANS

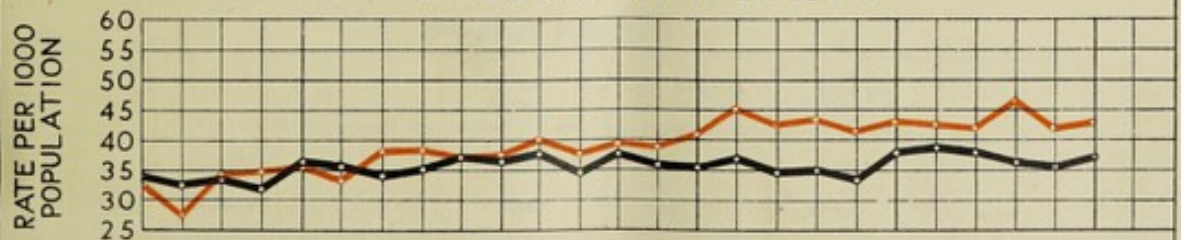
From 1926

Fijians ——— Indians ———

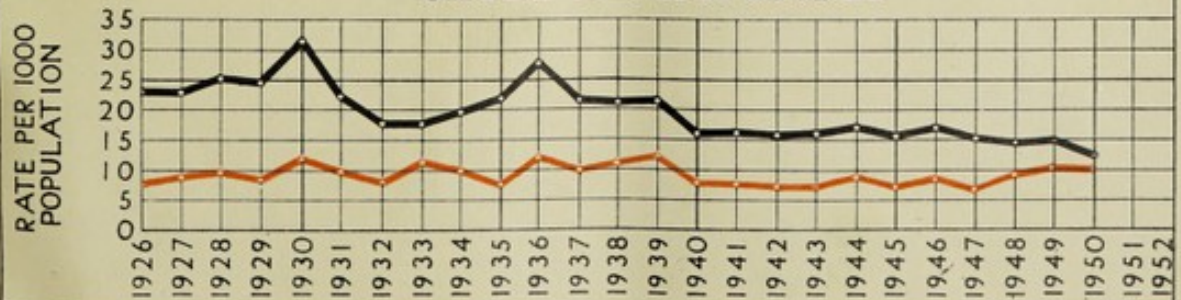
## INFANT MORTALITY



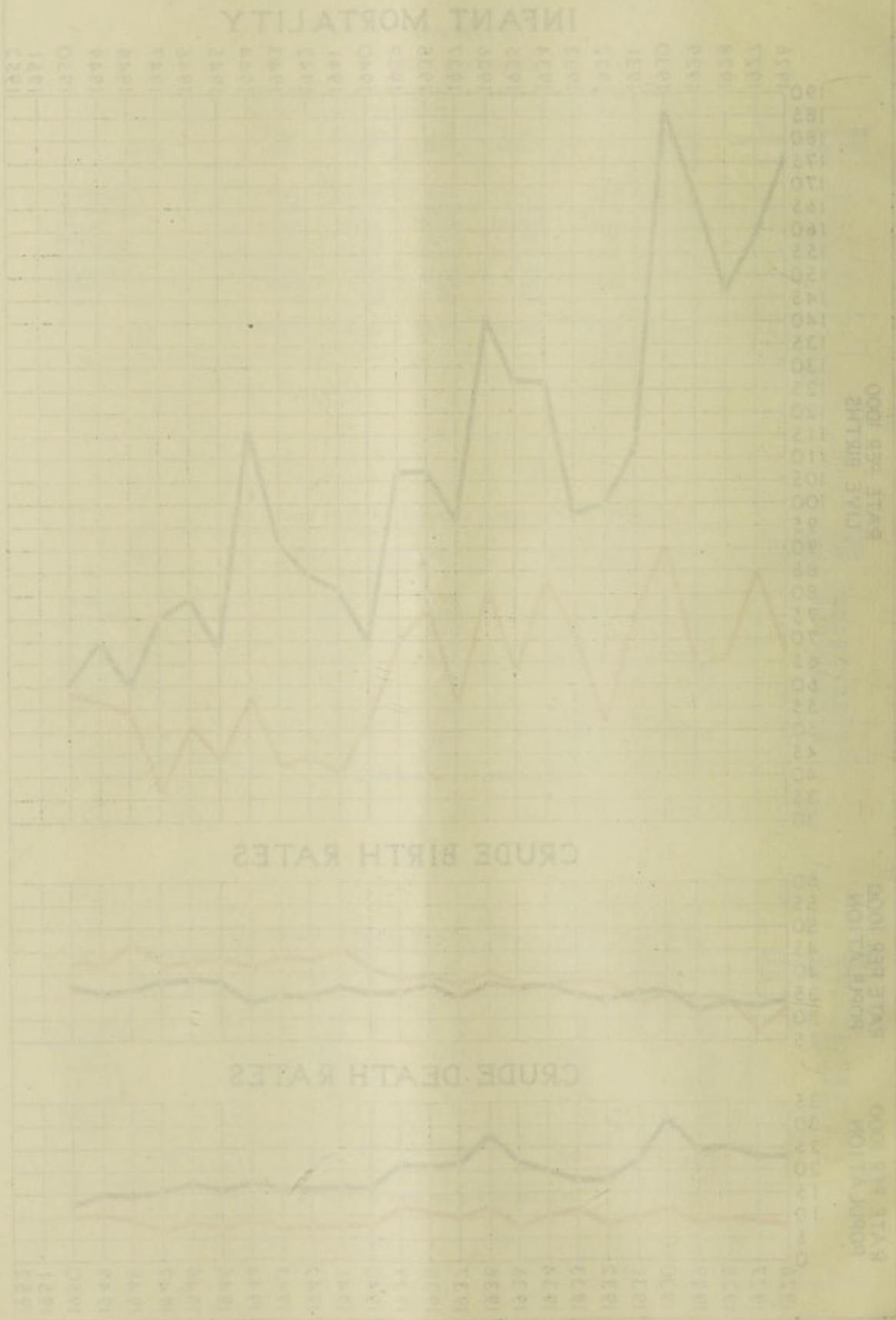
## CRUDE BIRTH RATES



## CRUDE DEATH RATES



INFANT MORTALITY, CRUDE BIRTH & DEATH RATES  
 FIJIANS AND INDIANS  
 From 1926



## THE MARRIAGES, BIRTHS, DEATHS AND NATURAL INCREASE FOR 1950.

Race	Marriages	Births	Deaths	Increase	Increase per 1,000.
Europeans .. .. .	41	131	32	99	16.16
Euronesians . . . .	45	232	42	190	28.31
Fijians .. .. .	844	4,821	1,599	3,222	25.44
Rotumans .. .. .	45	150	68	82	22.90
East Indians .. .. .	1,156	5,882	1,383	4,499	33.59
Polynesians . . . .	26	161	81	80	19.26
Chinese .. .. .	20	137	24	113	35.90
Others .. .. .	....	3	1	2	3.11
Total .. .. .	2,177	11,517	3,230	8,287	29.08

## TABLE OF INFANT AND CHILD DEATHS, 1950.

Race	Years					Total
	Under 1 year	1 and under 2	2 and under 3	3 and under 3	4 and under 5	
Fijians .. .. .	291	153	61	34	23	562
Indians .. .. .	340	35	43	11	3	432

## INFANTILE MORTALITY.

Race	No. of births	No. of deaths under 1 year	Rate per 1,000 births
Fijians .. .. .	4,821	291	60.36
Indians .. .. .	5,882	340	57.80



APPENDIX VI.  
OUT-PATIENTS, 1950.

Race	Hospitals				Dispensaries	
	C.W.M.H.	3 District Hospitals	14 Rural Hospitals	Tamavua	Rural Dispensaries	Totals 1950
Europeans and P.M.E.N.D.* .. ..	6,231	1,057	1,198	296	6,548	15,330
Fijians .. .. .	28,101	11,789	62,874	2,071	107,601	212,436
Indians .. .. .	30,897	22,876	35,462	1,224	27,462	117,921
Chinese and Others .. .. .	5,863	4,355	2,076	27	2,841	15,162
Total .. .. .	71,092	40,077	101,610	3,618	144,452	360,849

\* Persons of Mixed European and Native Descent.

APPENDIX VII.

DISPOSITION OF MEDICAL UNITS.

General Hospitals, Suva—3		Rural Dispensaries—41
Colonial War Memorial Hospital, including Maternity Annexe .. ..	275 beds	Nanukuloa
Tuberculosis Hospital, Tamavua .. ..	250 "	Mokani
Mental Hospital .. .. .	100 "	Nausori
District Hospitals—4		Korovou, Tailevu
Lautoka .. .. .	150 "	Lodoni
Levuka .. .. .	24 "	Lomanikoro
Labasa .. .. .	50 "	Beqa
Fiji Leprosy Hospital, Makogai .. ..	740 "	Viria
Subsidized Hospitals—3		Namarai
Methodist Mission Hospital, Ba .. ..	24 "	Tavua
Cottage Hospital, Waiyevo, Taveuni ..	3 "	Nadarivatu
Nurse Morrison's Maternity Hospital, Suva .. .. .	8 "	Nasau
Privately-owned Hospital—		Vatukoula (Gold Mines)
Colonial Sugar Refining Co., Rarawai, Ba .. .. .	6 "	Vitogo (Lautoka)
Rural Hospitals—14		Naviti, Yasawas
Waiyevo, Taveuni .. .. .	40 "	Momi
Wainibokasi .. .. .	45 "	Natuatuacoko
Vunidawa .. .. .	28 "	Koro-levu-i-wai
Penang, Ra .. .. .	25 "	Serua
Nailaga, Ba .. .. .	22 "	Navua
Nadi .. .. .	25 "	Namosi
Koromumu (Sigatoka) .. .. .	27 "	Nakasaleka, Kadavu
Nabouwalu .. .. .	14 "	Gau
Vunisea, Kadavu .. .. .	16 "	Koro
Savu Savu .. .. .	20 "	Lekutu
Loma Loma .. .. .	16 "	Wainunu
Lakeba .. .. .	8 "	Naduri
Matuku .. .. .	6 "	Dreketi
Rotuma .. .. .	12 "	Visoqo, Macuata
		Udu
		Natewa
		Saqani
		Moala
		Rabi
		Kabara
		Wainikoro, Macuata
		Samabula
		Kioa
		Nadi Airport
		Suva Gaol

APPENDIX VIII.

HOSPITALS AND DISPENSARIES—BEDS AND ADMISSIONS, 1950.  
IN-PATIENTS—RACIAL DISTRIBUTION.

Hospitals	Beds	Occupied beds, daily average	Admissions, 1950	Race	C.W. M.H.	Lau-toka	Le-vuka	La-basa	Tama-vua	Total
General Hospital, C.W.M.H. Suva .. .. .	274	249.5	3,613	Europeans and P.M.E.N.D.* ..	252	241	19	30	15	557
Tamavua Tuberculosis Hospital, Suva .. .. .	256	192	338	Fijians .. .. .	1,231	747	451	234	230	2,893
Three District Hospitals .. .. .	210	168.2	5,678	Indians .. .. .	1,777	2,516	46	995	68	5,402
				Chinese and Others	353	245	92	62	25	777
Fourteen Rural Hospitals .. .. .	365	278.5	9,629							
			8,321							
Total .. .. .	1,105	888.2	17,951	Total ..	3,613	3,749	608	1,321	338	9,629

\* Persons of Mixed European and Native Descent.

## APPENDIX IX.

Return of Diseases and Deaths for the year 1950, at the Colonial War Memorial Hospital, Labasa, Lautoka, Levuka and Tamavua Hospitals.

NOTE.—This classification is based on the International List of Causes of Death, 1929.

Diseases.	Europeans.	Fijians.	Indians.	Others.	Total.	Deaths.	Diseases.	Europeans.	Fijians.	Indians.	Others.	Total.	Deaths.
<b>I—INFECTIOUS AND PARASITIC DISEASES.</b>													
Typhoid Fever .. .. .	..	22	29	11	62	5	Brought forward .. .. .	56	707	626	122	1511	182
Paratyphoid Fever .. .. .	5	41	27	4	77	2	Other Diseases due to Protozoa—						
Typhus .. .. .	..	..	..	..	..	..	(a) Frambœsia (Yaws) .. .. .	58	2	7	67	..	
Relapsing Fever .. .. .	..	..	..	..	..	..	(b) Spirochaetosis Ictero-hæmorrhagica .. .. .	..	..	..	..	..	..
Undulant Fever .. .. .	2	..	2	..	4	..	Ankylostomiasis .. .. .	12	17	1	30	..	
Smallpox (Variola) .. .. .	..	..	..	..	..	..	Hydatid cysts .. .. .	..	..	..	..	..	..
Measles .. .. .	..	3	2	6	11	..	Other diseases due to Helminths—						
Scarlet Fever .. .. .	..	..	..	..	..	..	(a) Ascariasis .. .. .	1	3	3	2	9	..
Whooping Cough .. .. .	1	..	1	..	2	..	(b) Filariasis .. .. .	1	32	3	..	36	..
Diphtheria .. .. .	1	2	4	1	8	1	(c) Taeniasis .. .. .	12	1	..	13	..	
Influenza .. .. .	10	135	161	20	326	..	(d) Oxyuris Vermicularis .. .. .	3	1	1	5	..	
Cholera .. .. .	..	..	..	..	..	..	(e) Others .. .. .	..	1	..	1	..	
Dysentery—							Mycoses (excluding purely dermal mycoses)—						
(a) Amœbic .. .. .	10	15	45	8	78	1	(a) Actinomycosis .. .. .	..	..	..	..	..	..
(b) Bacillary .. .. .	5	27	77	8	117	16	(b) Others including sprue .. .. .	..	..	..	..	..	
(c) Mixed .. .. .	..	..	..	..	..	..	Other infectious or parasitic diseases—						
(d) Undefined or due to other causes .. .. .	1	7	7	8	23	1	(a) Vaccinia (Cowpox) .. .. .	..	..	1	..	1	..
Plague .. .. .	..	..	..	..	..	..	(b) Other sequelae of vaccination .. .. .	..	..	..	..	..	..
Erysipelas .. .. .	..	..	..	..	..	..	(c) German measles (Rubella) .. .. .	3	..	..	..	3	..
Acute Poliomyelitis or polioencephalitis .. .. .	..	..	..	..	..	..	(d) Chicken-pox (Varicella) .. .. .	3	2	1	6	..	
Encephalitis Lethargica .. .. .	..	..	..	..	..	..	(e) Mumps and its complications .. .. .	4	3	2	9	..	
Cerebro-spinal Fever .. .. .	..	..	2	..	2	1	(f) Dengue .. .. .	3	7	8	4	22	..
Glanders .. .. .	..	1	..	..	1	..	(g) Glandular Fever .. .. .	..	..	8	..	8	..
Anthrax .. .. .	..	1	..	..	1	..	(h) Others .. .. .	..	..	..	..	..	..
Rabies .. .. .	..	..	..	..	..	..	Total .. .. .	61	844	676	140	1721	182
Tetanus—							<b>II—CANCER AND OTHER TUMOURS.</b>						
(a) Of the new born .. .. .	4	6	1	11	6	..	Cancer or other malignant diseases of the buccal cavity, pharynx and œsophagus .. .. .	2	..	..	..	2	..
(b) Other forms .. .. .	1	9	9	1	20	10	Cancer or other malignant tumours of the digestive organs and peritoneum—						
Tuberculosis of the Respiratory system .. .. .	15	308	133	31	487	104	(a) Stomach .. .. .	1	1	5	2	9	1
Tuberculosis of the Central Nervous system .. .. .	..	14	3	..	17	10	(b) Liver and biliary passages .. .. .	2	3	1	6	3	..
Tuberculosis of the Intestines or Peritoneum .. .. .	..	6	6	1	13	2	(c) Rectum .. .. .	2	6	..	8	..	
Tuberculosis of the Vertebral column .. .. .	..	15	9	4	28	4	(d) Others .. .. .	1	1	8	1	11	2
Tuberculosis of other Bones and Joints .. .. .	..	18	8	1	27	3	Cancer or other malignant tumours of the respiratory organs .. .. .	..	1	1	1	2	2
Tuberculosis of the Skin or Subcutaneous tissue (Lupus) .. .. .	..	1	1	..	2	..	Cancer or other malignant tumours of the uterus .. .. .	..	4	8	5	17	2
Tuberculosis of the Lymphatic system .. .. .	..	28	13	4	45	..	Cancer or other malignant tumours of other female genital organs .. .. .	..	2	2	2	6	..
Tuberculosis of the Genito-urinary system .. .. .	..	4	2	1	7	..	Cancer or other malignant tumours of the breast .. .. .	1	2	..	..	3	..
Tuberculosis of other organs .. .. .	..	5	..	..	5	..	Cancer or other malignant tumours of the male genito-urinary organs .. .. .	1	..	1	1	3	1
Tuberculosis disseminated .. .. .	..	10	1	..	11	6	Cancer or other malignant tumours of the skin .. .. .	12	1	2	..	15	3
Leprosy .. .. .	..	1	2	9	3	15	Cancer or other malignant tumours of organs not specified .. .. .	..	..	3	3	6	2
Syphilis—							Non-malignant tumours—						
(a) Primary .. .. .	..	1	11	..	12	..	(a) Female genital organs .. .. .	..	..	9	2	11	..
(b) Secondary .. .. .	..	6	..	..	6	..	(b) Other sites .. .. .	..	11	14	..	25	2
(c) Tertiary .. .. .	..	2	4	1	7	..	Tumours of undetermined nature—						
(d) Congenital .. .. .	..	..	3	..	3	2	(a) Female genital organs .. .. .	..	1	..	..	1	..
Other Venereal Diseases—							(b) Other sites .. .. .	..	2	2	..	4	..
(a) Soft Chancre .. .. .	3	..	1	..	4	..	Total .. .. .	18	30	64	17	129	18
(b) Gonorrhœa .. .. .	..	7	30	4	41	..	<b>III—RHEUMATISM, DISEASES OF NUTRITION AND OF ENDOCRINE GLANDS AND OTHER GENERAL DISEASES.</b>						
(c) Gonorrhœal Ophthalmia .. .. .	..	..	1	2	3	..	Rheumatic Fever—						
(d) Other Gonorrhœal complications .. .. .	..	2	10	..	12	..	(a) With cardiac involvement .. .. .	1	3	40	4	48	5
(e) Granuloma Venereum .. .. .	..	..	..	..	..	..	(b) Without cardiac involvement .. .. .	..	2	14	..	16	..
(f) Tropical bubo (Lymphogranuloma Inguinale) .. .. .	..	..	..	..	..	..	(c) Subacute Rheumatism .. .. .	..	2	4	1	7	..
(g) Mixed Venereal infections .. .. .	..	..	2	..	2	..	Carried forward .. .. .	1	7	58	5	71	5
Purulent Infection—													
(a) Septicæmia .. .. .	..	5	4	1	10	7							
(b) Pyæmia .. .. .	..	2	1	..	3	..							
(c) Gas Gangrene .. .. .	..	..	2	1	3	1							
Yellow Fever .. .. .	..	..	..	..	..	..							
Malaria—													
(a) Benign Tertian .. .. .	..	4	..	..	4	..							
(b) Quartan .. .. .	..	..	..	..	..	..							
(c) Sub-Tertian .. .. .	..	..	..	..	..	..							
(d) Mixed .. .. .	..	1	..	..	1	..							
Carried forward .. .. .	56	707	626	122	1511	182							

## APPENDIX IX—continued.

Diseases.	Europeans.	Fijians.	Indians.	Others.	Total.	Deaths.	Diseases.	Europeans.	Fijians.	Indians.	Others.	Total.	Deaths.
Brought forward .. ..	1	7	58	5	71	5	Brought forward .. ..	4	8	4	16	7	
Rheumatism and non-Suppurative arthritis—							Other Diseases of the Spinal Cord—						
(a) Chronic Rheumatism .. ..	1	9	24	..	34	..	(a) Progressive muscular atrophy .. ..	1	2	..	3	..	
(b) Rheumatoid Arthritis .. ..	1	8	34	..	43	..	(b) Subacute combined sclerosis .. ..	..	..	..	..	..	
(c) Osteo-arthritis .. ..	..	6	8	..	14	..	(c) Myelitis of unstated organ .. ..	..	2	..	2	..	
Gout .. ..	..	..	1	..	1	..	(d) Others .. ..	1	1	..	2	..	
Diabetes Mellitus .. ..	4	4	84	6	98	3	Cerebral hæmorrhage, Apoplexy, etc.—						
Scurvy .. ..	..	..	..	..	..	..	(a) Cerebral hæmorrhage .. ..	2	8	23	2	35	16
Beri-beri including epidemic dropsy .. ..	..	..	..	..	..	..	(b) Cerebral embolism & thrombosis .. ..	..	6	1	7	4	
Pellagra .. ..	..	..	..	..	..	..	(c) Hemiplegia and other paralyzes of unstated origin .. ..	..	2	..	2	..	
Rickets .. ..	..	..	..	..	..	..	General Paralysis of the Insane .. ..	10	..	..	10	..	
Other diseases due to hypovitaminosis .. ..	1	6	1	..	8	2	Other forms of insanity—						
Diseases of the pituitary gland .. ..	1	..	..	..	1	..	(a) Dementia Præcox .. ..	..	..	..	..	..	
Diseases of the thyroid and parathyroid glands—							(b) Others .. ..	5	17	1	23	3	
(a) Simple goitre .. ..	..	..	11	1	12	..	Epilepsy—						
(b) Exophthalmic goitre .. ..	..	..	8	..	8	1	(a) Major .. ..	6	2	3	11	1	
(c) Myxœdema, cretinism .. ..	..	..	2	..	2	..	(b) Minor .. ..	2	..	..	2	..	
(d) Tetany .. ..	..	..	..	..	..	..	Infantile convulsions (under 5 yrs.) .. ..	1	5	5	3	14	..
(e) Others .. ..	..	..	1	..	1	..	Other diseases of the Nervous System—						
Diseases of the Thymus .. ..	1	1	..	..	2	1	(a) Chorea .. ..	1	7	..	8	..	
Diseases of the adrenal glands excluding tuberculosis .. ..	..	..	..	..	..	..	(b) Neuritis, neuralgia .. ..	4	5	11	..	20	..
Other general diseases .. ..	1	..	2	..	3	..	(c) Paralysis Agitans .. ..	1	..	..	1	..	
Total .. ..	9	36	240	13	298	12	(d) Disseminated Sclerosis .. ..	1	..	..	1	..	
IV—DISEASES OF BLOOD AND BLOOD-FORMING ORGANS.							(e) Neurasthenia .. ..	2	1	8	1	12	..
Hæmorrhagic conditions—							(f) Hysteria .. ..	4	10	32	1	47	..
(a) Purpura .. ..	..	..	..	..	..	..	(g) Others .. ..	2	3	10	..	15	1
(b) Hæmophilia .. ..	..	..	..	..	..	..	Diseases of the eye—						
Anæmia—							(a) Conjunctivitis .. ..	19	18	3	40	..	
(a) Pernicious anæmia .. ..	3	2	41	19	65	2	(b) Trachoma .. ..	..	2	1	3	1	
(b) Splenic anæmia .. ..	..	..	1	..	1	..	(c) Corneal Ulcer .. ..	1	6	10	1	18	..
(c) Chlorosis .. ..	..	..	1	..	1	..	(d) Cataract .. ..	4	53	1	58	..	
(d) Secondary anæmia .. ..	11	86	4	101	5	5	(e) Iritis .. ..	1	9	1	11	..	
(e) Others .. ..	6	151	1	158	10	10	(f) Glaucoma .. ..	2	2	2	2	8	..
Lukæmia, Leukæmia—							(g) Others .. ..	5	22	29	13	69	1
(a) Chronic myeloid leukæmia .. ..	1	..	1	2	1	1	Diseases of the Ear and Mastoid Sinus—						
(b) Chronic lymphatic leukæmia .. ..	..	..	..	..	..	..	(a) Otitis externa .. ..	2	6	17	1	26	..
(c) Acute leukæmia .. ..	1	1	..	2	1	1	(b) Otitis media .. ..	2	7	20	1	30	..
(d) Multiple myeloma .. ..	..	..	..	..	..	..	(c) Mastoiditis .. ..	1	2	11	..	14	..
(e) Aleukæmia (lymphadenoma or Hodgkin's Disease) .. ..	1	..	..	1	1	1	(d) Others .. ..	1	..	1	..	2	..
Diseases of the spleen not elsewhere mentioned .. ..	..	1	1	..	2	..	Total .. ..	30	122	318	40	510	34
Other diseases of the blood and blood-forming organs .. ..	..	1	1	..	2	..	VII—DISEASES OF THE CIRCULATORY SYSTEM.						
Total .. ..	3	24	283	25	335	20	Pericarditis .. ..	1	..	1	2	..	
V—CHRONIC POISONING.							Acute endocarditis—						
Alcoholism acute or chronic .. ..	9	1	..	..	10	..	(a) Malignant .. ..	..	1	..	1	1	
Poisoning by other organic substances (not by violence)—							(b) Others not included elsewhere .. ..	1	1	..	2	..	
(a) Opium habit .. ..	..	..	..	1	1	..	Chronic endocarditis, valvular disease (except specific cause elsewhere stated)—						
(b) Morphine habit .. ..	..	..	..	1	1	..	(a) Aortic valve .. ..	1	12	..	13	2	
(c) Others .. ..	..	..	..	..	..	..	(b) Mitral valve .. ..	..	8	1	9	4	
Poisoning by mineral substances (not by violence)—							(c) Aortic and mitral valve .. ..	..	..	..	..	..	
(a) Lead .. ..	..	..	..	1	1	..	(d) Endocarditis not returned as acute or chronic .. ..	1	1	..	2	..	
(b) Others .. ..	..	..	2	..	2	1	(e) Other or unspecified valve disease .. ..	..	1	1	2	..	
Total .. ..	9	1	2	3	15	1	Diseases of the myocardium (except due to specified cause stated elsewhere)—						
VI—DISEASES OF THE NERVOUS SYSTEM AND SENSE ORGANS.							(a) Acute myocarditis .. ..	1	..	8	..	9	2
Encephalitis (not including encephalitis lethargica)—							(b) Myocardial Degeneration .. ..	3	4	61	12	80	28
(a) Cerebral abscess .. ..	..	..	..	..	..	..	Diseases of the coronary arteries—						
(b) Others .. ..	2	5	1	8	2	2	(a) Angina Pectoris .. ..	1	..	4	..	5	..
Meningitis (not including tuberculosis or meningococcal) .. ..	2	3	2	7	5	5	(b) Coronary sclerosis and thrombosis and embolism .. ..	1	..	15	..	16	5
Tabes Dorsalis (locomotor ataxia) .. ..	..	..	1	1	..	..	Other diseases of the heart (except due to specified cause stated elsewhere)—						
Carried forward .. ..	4	8	4	16	7	7	(a) Auricular fibrillation .. ..	1	1	7	..	9	..
							(b) Heart block .. ..	..	..	1	..	1	..
							(c) Disordered action of the heart .. ..	..	..	8	..	8	1
							(d) Others .. ..	6	25	3	34	3	
							Carried forward .. ..	7	15	153	18	193	46



## APPENDIX IX—continued.

Diseases.	Europeans.	Fijians.	Indians.	Others.	Total.	Deaths.	Diseases.	Europeans.	Fijians.	Indians.	Others.	Total.	Deaths.
Brought forward .. ..	18	50	142	24	234	15	XII—DISEASES OF THE SKIN AND CELLULAR TISSUES.						
Diseases of the urethra, urinary abscess, etc.—							Carbuncle, boil .. ..	4	22	16	4	46	..
(a) Stricture .. ..	..	..	8	..	8	..	Cellulitis, acute abscess (except due to cause given elsewhere)—						
(b) Others .. ..	..	..	1	8	9	..	(a) Cellulitis .. ..	13	73	57	14	157	..
Diseases of the prostate .. ..	..	5	29	1	35	..	(b) Acute abscess .. ..	11	157	128	33	329	..
Diseases of the male genital organs—							Other diseases of the skin, hair and nails—						
(a) Phimosis .. ..	..	3	6	..	9	..	(a) Ulcers .. ..	3	23	19	5	50	..
(b) Epididymitis (excluding tuberculosis) .. ..	1	4	9	..	14	..	(b) Dermal mycoses .. ..	3	6	4	1	14	..
(c) Orchitis .. ..	1	9	4	..	14	..	(c) Herpes including Zoster .. ..	..	2	1	1	4	..
(d) Hydrocele .. ..	..	21	18	1	40	..	(d) Scabies .. ..	..	7	7	3	17	..
(e) Elephantiasis of the scrotum .. ..	..	1	..	1	2	..	(e) Others .. ..	12	30	48	9	99	..
(f) Others .. ..	..	..	2	..	2	..	Total .. ..	46	320	280	70	716	..
Diseases of the female genital organs—							XIII—DISEASES OF THE BONES AND ORGANS OF LOCOMOTION.						
(a) Diseases of the ovary .. ..	1	3	13	1	18	1	Acute or chronic infective osteomyelitis and periostitis except due to cause given elsewhere—						
(b) Diseases of the Fallopian tube .. ..	..	8	24	5	37	..	(a) Acute Osteomyelitis .. ..	..	12	10	3	25	..
(c) Diseases of the parametrium .. ..	..	..	5	..	5	..	(b) Chronic Osteomyelitis .. ..	2	23	20	5	50	..
(d) Diseases of the uterus including menorrhagia and dysmenorrhœa .. ..	5	22	78	9	114	..	(c) Periostitis, acute or chronic .. ..	1	4	4	1	10	..
(e) Diseases of the breast .. ..	2	4	9	1	16	..	Other diseases of the bones .. ..	..	..	9	1	10	..
(f) Others, e.g. prolapse .. ..	4	3	39	6	52	..	Diseases of the joints and other organs of locomotion—						
Total .. ..	32	134	394	49	609	16	(a) Diseases of the joints (other than elsewhere stated) .. ..	2	11	33	2	48	..
XI—DISEASES OF PREGNANCY, CHILDBIRTH AND THE PUERPERAL STATE.							(b) Diseases of the other organs of locomotion .. ..	1	6	1	..	8	..
Post-abortive sepsis .. ..	..	2	1	2	5	..	Total .. ..	6	86	77	12	151	..
Abortion not returned as septic .. ..	11	24	78	12	125	..	XIV—CONGENITAL MALFORMATIONS.						
Ectopic gestation .. ..	1	7	7	1	16	1	Congenital malformations—						
Other accidents of pregnancy .. ..	1	3	7	1	12	..	(a) Congenital hydrocephalus .. ..	..	4	6	3	13	1
Hæmorrhage connected with childbirth—							(b) Spina Bifida and Meningocele .. ..	..	3	8	..	11	..
(a) Placenta prævia .. ..	..	1	1	..	2	1	(c) Congenital malformation of the heart .. ..	..	2	1	..	3	..
(b) Others .. ..	1	2	7	..	10	..	(d) Monstrosities .. ..	..	..	..	..	..	
Puerperal Sepsis—							(e) Congenital hypertrophic pyloric stenosis .. ..	..	..	1	..	1	..
(a) Puerperal septicaemia .. ..	..	2	3	..	5	1	(f) Cleft palate, harelip .. ..	..	2	6	2	10	..
(b) Puerperal sepsis not including septicaemia .. ..	..	2	3	..	5	..	(g) Imperforate anus .. ..	..	..	4	..	4	2
Puerperal albuminuria and convulsions—							(h) Other congenital malformations .. ..	..	1	8	2	11	..
(a) Eclampsia .. ..	..	1	7	1	9	2	Total .. ..	..	12	34	7	53	3
(b) Albuminuria of pregnancy .. ..	..	2	7	..	9	..	XV—DISEASES OF EARLY INFANCY.						
(c) Pyelitis of pregnancy .. ..	..	..	..	1	1	..	Congenital debility including marasmus of unknown cause .. ..	..	15	10	1	26	4
(d) Others .. ..	..	1	6	..	7	..	Premature birth .. ..	..	5	14	..	19	10
Other Toxaemia of Pregnancy—							Injury at birth .. ..	..	..	2	..	2	1
(a) Hyperemesis Gravidarum .. ..	..	3	13	..	16	..	Other diseases peculiar to early infancy—						
(b) Others .. ..	..	..	4	..	4	..	(a) Atelectasis Pulmonum .. ..	..	..	..	..	..	..
Puerperal phlegmasia, embolism and sudden death—							(b) Icterus neonatorum—						
(a) Puerperal phlegmasia alba dolens not returned as septic .. ..	..	..	..	..	..	..	(1) Mild .. ..	..	..	1	..	1	1
(b) Puerperal embolism and sudden death .. ..	..	..	1	..	1	..	(2) Grave .. ..	..	2	2	..	4	1
Conditions associated with labour—							(c) Affections of the umbilicus .. ..	..	..	1	..	1	..
(a) Normal labour .. ..	27	98	255	37	417	..	(d) Pemphigus neonatorum .. ..	..	1	4	..	5	..
(b) Abnormal labour, e.g. needing instrumental interference .. ..	8	8	16	3	35	1	(e) Others .. ..	..	..	..	..	..	..
(c) False labour .. ..	1	1	..	..	2	..	Total .. ..	..	23	34	1	58	17
(d) Labour complicated by intercurrent disease .. ..	..	..	1	..	1	..	XVI—CONDITIONS ASSOCIATED WITH OLD AGE.						
(e) Accidents of childbirth including still-births .. ..	..	5	14	..	19	6	Old age—						
Other or unspecified conditions of the puerperal state—							(a) Senile Dementia .. ..	1	2	2	..	5	..
(a) Puerperal insanity .. ..	..	1	2	..	3	..	(b) Other forms of senile decay .. ..	..	2	4	1	7	2
(b) Puerperal diseases of the breast .. ..	..	1	2	..	3	..	Total .. ..	1	4	6	1	12	2
(c) Not in labour .. ..	3	5	85	1	94	..							
(d) Others .. ..	1	1	5	..	7	..							
Total .. ..	54	170	525	59	808	12							

## APPENDIX IX—continued.

Diseases.	Europeans.	Fijians.	Indians.	Others.	Total	Deaths.	Diseases.	Europeans.	Fijians.	Indians.	Others.	Total	Deaths.
<b>XVII—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.</b>							<b>Brought forward .. ..</b>						
Suicide or attempted suicide by poisoning (including corrosive poisoning) .. .. .	..	4	2	..	6	..	Cataclysm (Tidal waves, cyclones, volcanoes, etc.) .. .. .	..	..	..	..	..	..
Suicide or attempted suicide by hanging or strangulation .. .. .	..	..	4	..	4	1	Injury by animals (except bites or stings of venomous reptiles or insects) .. .. .	1	4	12	4	21	..
Suicide or attempted suicide by drowning .. .. .	..	..	..	..	..	..	Hunger or thirst .. .. .	..	1	1	..	2	..
Suicide or attempted suicide by firearms .. .. .	..	..	..	..	..	..	Excessive cold .. .. .	..	..	..	..	..	..
Suicide or attempted suicide by cutting or piercing instruments .. .. .	..	..	..	..	..	..	Excessive heat .. .. .	..	..	..	1	1	..
Suicide or attempted suicide by jumping from a height .. .. .	..	..	..	..	..	..	Lightning .. .. .	..	..	..	2	2	..
Suicide or attempted suicide by crushing .. .. .	..	..	..	..	..	..	Electricity .. .. .	..	1	3	..	4	..
Suicide or attempted suicide by other means .. .. .	..	..	..	..	..	..	Other un stated forms of violence—	..	..	..	..	..	..
Infanticide .. .. .	..	..	..	..	..	..	(a) Inattention at birth .. .. .	..	..	1	..	1	..
Assault or homicide by firearms .. .. .	..	..	..	..	..	..	(b) Others, e.g. foreign body swallowed .. .. .	..	..	1	..	1	..
Assault or homicide by cutting or piercing instruments .. .. .	2	..	4	..	6	..	Violence of an un stated nature, i.e. suicidal, accidental homicidal by poisoning or other means .. .. .	..	..	2	..	2	..
Assault or homicide by other means .. .. .	2	4	31	3	40	..	Wounds or other injuries of war .. .. .	..	..	..	..	..	..
Attacks by venomous animals .. .. .	..	..	..	..	..	..	Execution of civilians by belligerent armies .. .. .	..	..	..	..	..	..
Food poisoning .. .. .	..	3	..	2	5	..	Execution .. .. .	..	..	..	..	..	..
Accidental absorption of irrespirable or poisonous gases .. .. .	..	1	..	1	2	..	<b>Total .. .. .</b>	<b>64</b>	<b>311</b>	<b>445</b>	<b>88</b>	<b>908</b>	<b>17</b>
Other acute accidental poisoning .. .. .	1	..	6	..	7	..	<b>XVIII—ILL-DEFINED CONDITIONS.</b>						
Injuries due to conflagration .. .. .	..	..	1	..	1	..	Sudden death, cause unknown .. .. .	1	25	29	6	61	61
Accidental burns, conflagration excepted—	..	..	..	..	..	..	Cause of illness un stated or ill-defined .. .. .	26	45	112	16	199	1
(a) Burns by fire .. .. .	1	3	17	4	25	5	Diseases not included in this classification elsewhere .. .. .	1	..	4	..	5	..
(b) Scalds .. .. .	1	6	11	3	21	1	Malingering .. .. .	..	..	..	..	..	..
(c) Burns by corrosive substances, external or internal .. .. .	..	1	1	..	2	..	Cases admitted to hospital for observation as to mental condition .. .. .	1	3	5	..	9	..
(d) Dermatitis due to exposure to sun .. .. .	..	..	..	1	1	..	Cases admitted for observation not mental .. .. .	35	122	285	27	469	..
(e) Dermatitis due to exposure to other forms of radiation .. .. .	1	..	1	1	3	..	Persons accompanying patients .. .. .	31	130	271	46	478	..
Accidental mechanical suffocation .. .. .	..	..	2	..	2	..	Orphans .. .. .	..	..	..	..	..	..
Accidental immersion or drowning .. .. .	..	1	..	1	2	..	<b>Total .. .. .</b>	<b>95</b>	<b>325</b>	<b>706</b>	<b>95</b>	<b>1221</b>	<b>62</b>
Accidental injury by firearms .. .. .	..	8	4	3	15	..	<b>Grand Total .. .. .</b>	<b>557</b>	<b>2892</b>	<b>5402</b>	<b>777</b>	<b>9628</b>	<b>488</b>
Accidental injury by cutting or piercing instruments .. .. .	4	49	48	10	111	1							
Accidental injury by fall, crushing, etc.—													
(a) By falling .. .. .	41	131	180	36	388	8							
(b) By machinery .. .. .	2	15	10	3	30	..							
(c) By motor vehicles .. .. .	1	25	33	5	64	..							
(d) By railway vehicles .. .. .	..	..	11	..	11	..							
(e) By other means .. .. .	7	54	57	10	128	1							
Carried forward .. .. .	63	305	423	83	869	17							

## APPENDIX X.

## (A) ENUMERATION OF PROCEDURES CARRIED OUT AT THE LABORATORIES IN SUVA, 1950.

A—HISTOLOGY—		Brought forward .. ..	21,511
Materials received .. ..	749		
Blocks cut .. ..	.....		
Sections prepared .. ..	.....		
	749		
B—MORBID ANATOMY—		Faeces for Bacillary dysentery and	
Post-mortem examinations—		Typhoid .. ..	1,148
Medicolegal .. ..	32	Throat Swabbings .. ..	287
for C.W.M. Hospital .. ..	115	Conjunctival .. ..	53
for Tamavua .. ..	3	Prostatic .. ..	8
for Private Practitioners .. ..	2	Miscellaneous exudates .. ..	201
	152		2,220
		AGGLUTINATION TESTS—	
C—HAEMATOLOGY—		Typhoid .. ..	746
White cells counts .. ..	1,244	Br. abortus .. ..	95
Red cells counts .. ..	1,540		841
Haematocrit .. ..	233	DARK GROUND ILLUMINATION—	
Haemoglobin estimation .. ..	4,958	For Spirochaetes .. ..	40
Estimation of Sedimentation rate .. ..	500	F—VACCINE PREPARED—	
C.S.F. Cytology .. ..	295	T.A.B. .. ..	1,414
Blood groupings .. ..	583	Staphylococcal .. ..	19
Pre-transfusion cross matching .. ..	119	Autogenous .. ..	29
Rh cell testing .. ..	28		1,462
Reticulocytes count .. ..	1,553	G—BIOCHEMISTRY—	
Price Jones curves .. ..	3	Blood—	
Donors bled .. ..	119	Sugar estimation .. ..	127
Sternal marrow-cytology .. ..	312	T.N.P.N. } Estimations .. ..	70
Bleeding time .. ..	7	Urea .. ..	4
Coagulation time .. ..	7	Cholesterol estimations .. ..	3
	11,501	Chlorides .. ..	3
			204
D—PARASITOLOGY—		BLOOD SERUM—	
Faeces—		Van den Berghs .. ..	93
Ova and Cysts .. ..	3,724	Icterus Index estimations .. ..	82
Amoebic parasites .. ..	586	Calcium estimations .. ..	4
	4,310	Proteins estimations .. ..	68
Blood—			247
Malarial parasites .. ..	27	URINES—	
Microfilarial parasites .. ..	102	Pregnancy tests .. ..	30
	129	Urea concentrations .. ..	2
		Diastatic Index .. ..	2
E—BACTERIOLOGY—			34
Urinalysis—		C.S.F.—	
Qual. Chemical analysis and		Proteins estimations .. ..	260
Cytology .. ..	1,399	Sugar estimations .. ..	2
Cultures .. ..	338	Chlorides .. ..	20
Smears for M. tuberculosis .. ..	50	Colloidal Gold curve .. ..	7
	1,787		289
Smears—		FAECES—	
Spermatozoa .. ..	6	Occult blood .. ..	47
Vaginal } for gonococci .. ..	945	Fat estimations .. ..	14
Urethral } .. ..			61
Cervical } .. ..		Fractional test meals .. ..	23
Sputa for M. tuberculosis .. ..	745	Urea clearance tests .. ..	.....
Stool for M. tuberculosis .. ..	396	Glucose tolerance tests .. ..	41
Lesions for M. leprae .. ..	151		
K.L.B. .. ..	27	H—FOOD AND WATER ANALYSIS—	
Prostatic .. ..	9	Waters .. ..	208
Skin scales—fungi .. ..	15	Milks .. ..	10
Skin testing for allergy .. ..	2	Aerated waters .. ..	2
C.S.F. .. ..	386	Others .. ..	10
Miscellaneous exudates .. ..	201	Ice creams .. ..	24
	2,883		254
CULTURES—		I—MEDICOLEGAL (other than autopsies) .. ..	2
Vaginal } for gonococci .. ..	6	J—RAT AUTOPSIES FOR PLAGUE .. ..	79
Urethral } .. ..		K—ANIMAL INOCULATIONS .. ..	4
Cervical } .. ..		L—SEROLOGY—KAHN TESTS .. ..	2,430
Sputa for M. tuberculosis .. ..	18		
Gastric contents for M. tuberculosis .. ..	255		
C.S.F. .. ..	244		
		Grand Total .. ..	29,742
Carried forward .. ..	21,511		





## APPENDIX XI.

## THE CENTRAL MEDICAL SCHOOL

FROM THE MEDICAL OFFICER IN CHARGE, COLONIAL WAR MEMORIAL HOSPITAL, SUVA.

I assumed charge of the Central Medical School when Dr. Frater proceeded on leave at the end of January. A considerable increase in numbers was taking place when I took over and eventually, instead of 44 students in the school, there was a total of 97, 11 of this number being non-medical. Quite a number of the new boys arrived only three weeks before the end of the first term and extra attention had to be given to them in order to bring them up to the same stage in the curriculum as the rest of the class. Amongst these late comers were four final year students and two third year students from Eastern Samoa, all of whom had been attending the American Medical School for A.M.Ps. in Guam.

2. Arrangements were also made for final year students from overseas territories to visit Makogai for practical instruction in the recognition and treatment of leprosy. Students were sent three at a time and their stay on the island was approximately three weeks in each case.

3. The standard of work by the students during the year varied. The final year students worked consistently well throughout the year and the standard attained was fairly high. As this year included students from the Gilbert and Ellice Islands and the Solomons this high standard was particularly gratifying. There were three failures in the final examination and these were quite unexpected; one was one of the Eastern Samoan boys, who failed in Surgery; another was a Niue boy who failed in Medicine; and the third was a Fijian who also failed in Medicine. They will sit supplementary examinations in the subjects in which they failed in March, 1951. The third year class was considerably below the standard of the finalists and the second year standard was, if anything, somewhat lower still, and two boys had to be transferred to the Medical Officer of Health for training as Health Inspectors as it was considered they were too far below the standard to enable them to obtain their medical diploma. There were originally in the first year 39 students but seven of these proved to be unsuitable to continue the medical course and were either sent back to their territories or passed to the Medical Officer of Health for training as Sanitary Inspectors or in Mosquito Control. During the course of each term several instructional films were shown on various subjects. These proved very popular and helpful and were largely attended by the students.

4. The existing system of prefects and monitors was extended and only such offences as were too serious for the prefects to deal with were referred to the Principal. The system worked very well indeed and no case requiring disciplinary action had to be referred during the whole of the year. In addition a school sick parade was held at 7 o'clock each morning, conducted by one of the final year students who was detailed for duty in rotation under the direction of the senior prefect. The sick parade dealt with all minor ailments and only cases of a more serious nature were seen by the Principal at the request of the student conducting the sick parade. No case requiring more qualified attention was missed and all minor ailments were dealt with most satisfactorily.

5. As in previous years the football season was eagerly prepared for and a very good team was put into the field for the season's Tournament, winning the Tournament with ease. They did not lose a single match throughout the Tournament and also tied with the Teachers' Training College for the Shield presented to the team with the best defence. Apart from football the boys showed themselves keen on athletics, cricket and boxing. A high standard of table tennis was also attained.

6. During the long winter vacation the island of Makuluva was reserved for the Central Medical School and all students who remained in Suva were taken over there for a stay varying from five to twelve days. This made a welcome break from Suva and the boys were most enthusiastic.

7. The Graduation Ceremony for the successful finalists was held on the 14th December at 6 o'clock in the evening in the Legislative Council Chamber. His Excellency the Governor presented the diplomas and gold medals. The ceremony was very well attended, the Council Chamber being full to capacity. The graduates on this occasion were fairly representative of the territories served by the school and were as follows:—

Fiji .. .. .	4
Western Samoa .. .. .	3
Eastern Samoa .. .. .	3
Ellice Island . . . . .	2
Rotuma .. .. .	1
Solomon Island .. .. .	1
Niue .. .. .	1
Cook Island .. .. .	1

With the departure of these graduates the following remained at the School:—

	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.
16 Fijians .. .. .	8	4	3	1
6 Fiji Indians .. .. .	2	1	3	.
4 Gilbert and Ellice Islands .. .. .	2	2	.	.
1 Niue Island .. .. .	.	.	.	1
2 Cook Island .. .. .	2	.	.	.
13 Western Samoa .. .. .	9	.	4	.
3 Eastern Samoa .. .. .	.	.	2	1
2 Nauru .. .. .	.	2	.	.
6 Papua-New Guinea .. .. .	1	3	2	.
4 Tonga .. .. .	2	1	1	.
3 New Hebrides .. .. .	3	.	.	.
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
60	29	13	15	3

8. In addition the following were also receiving instruction:—

Public Health—

Sanitary Inspectors ..	New Guinea..	..	..	..	2
	Niue ..	..	..	..	1

Dental—

Fiji ..	..	..	..	..	1
Gilbert and Ellice Islands ..	..	..	..	..	1

Pharmacy—

Fiji ..	..	..	..	..	2
Cook Islands .	..	..	..	..	1
Niue ..	..	..	..	..	1
Tonga .	..	..	..	..	1

9. At the end of November an inquiry was received from the United States Department of the Interior in Washington as to whether the students under training at the Guam Medical School could complete their training here. This was agreed and preparations for the accommodation of the boys were taken in hand at once. It appears that the strength of the school will rise from 88 to 176 in 1951.

T. A. DORAN,

Medical Officer in Charge, C.W.M. Hospital,

## APPENDIX XII.

THE TUBERCULOSIS CONTROL OFFICER AND MEDICAL OFFICER IN CHARGE, TAMAVUA HOSPITAL, to THE DIRECTOR OF MEDICAL SERVICES.

PART I—A REPORT ON THE MANTOUX RESULTS OF THE POPULATION OF FIJI OBTAINED DURING THE YEAR 1950.

INTRODUCTION AND PRIMARY OBJECT IN OBTAINING THE REACTIONS.

The Mantoux surveys have been made in Fiji in the past but in all reports the examinations have been confined to the Fijian race alone.

2. The Mantoux tests performed during 1950 were made with the primary intention of obtaining negative reactors to tuberculin for B.C.G. vaccination. With this object in view and from previous knowledge of the Fijian results the plan decided upon was to concentrate on children below the age of 15 years. This decision placed the individuals into two groups—

- (a) those children attending schools; and
- (b) others of pre-school age.

3. In order to reach the second group it was necessary to visit villages and settlements and as many of these could be reached only on foot or horseback it was decided that little time would be lost and may be some valuable information gathered, if adults were mantoux tested at the time of the visit. The information obtained would complete the gap in our knowledge concerning adult mantoux reactions of races other than Fijian and might "pin point" likely places apparently heavily infected with tuberculosis from which to commence a mass miniature survey when the mobile X-ray apparatus is received.

POPULATION BY RACIAL DESCENT.

4. The population of Fiji comprises two main racial groups, Fijian and Indian. The minority groups include Europeans, Polynesians, Chinese, people of mixed descent and other races.

5. The population can therefore be divided into three groups of different continental racial origins, namely, European, Melanesian and Asiatic (Indian and Chinese) with a group of mixed descent, viz., Euronesian. The Melanesian race is thought to have originated and migrated from the shores of Lake Tanganyika in Africa, travelling via the islands of the Indian Ocean and New Guinea to Fiji.

6. The statistics for the different races, typed herewith, are taken from the report "The Results of the Census of the Population of Fiji" which was made in 1946. They are as follows:—

Chinese .. .. .	2,105
European .. .. .	4,594
Euronesian (European-Melanesian mixed descent) .. .. .	6,142
Fijian .. .. .	117,488
Indian .. .. .	120,063
Other Races .. .. .	9,246
Total .. .. .	259,638

GEOGRAPHY AND CLIMATE.

7. The Colony of Fiji is situated between Lat. 15° and 22° South and Long. 177° West and 175° East. It comprises some 280 islands of which about 100 are populated. The total area is 7,083 square miles. The five largest islands are Viti Levu (4,010 square miles), Vanua Levu (2,137 square miles), Taveuni (167 square miles), Kadavu (157 square miles) and Ovalau (39 square miles).

8. The land owes its origin mainly to volcanic upheaval although there are a few atolls of coral formation. Mountains rise to over 4,000 feet while the main islands are well watered by rivers which, until recent times, formed the chief and in many cases, the only means of transportation. There is now a circular road around Viti Levu but in many places it is necessary to travel by foot or on horseback over tracks.

9. Rainfall varies in different parts of the group and even on different parts of the same island. The annual rainfall at Suva is 120 inches of rain but in 1949 it was 220 inches. On the opposite side of Viti Levu at Lautoka the average rainfall is about 65 inches.

INVESTIGATIONS TO ASCERTAIN THE MOST SUITABLE TIME FOR READING THE MANTOUX REACTION.

10. Prior to 1950 mantoux surveys had been made but these concerned the Fijian race only; the reactions had all been read at 48 hours.

11. In view of the fact that B.C.G. was to be given to the negative reactors it was decided that a series of examinations would be made to ascertain the optimum time for reading the results.

12. This investigation can be divided into two groups. The first group was in Suva township where there are many schools which could be reached without difficulty and this group was examined by Assistant Medical Practitioner B. Lomaloma. Assistant Medical Practitioner Macu Salato undertook the investigation in the second group, reading the reactions in a number of small district schools in the Bau area. Readings were to be made at 48, 72 and 96 hours.

13. The following is a list of the schools chosen showing number of pupils examined and the positive results obtained at 48, 72 and 96 hours.

	Total Examined	+ve 48 hours	+ve 72 hours	+ve 96 hours
Suva—				
Samabula Seventh Day Adventist ..	82	37	42	46
Chinese Primary .. .. .	99	25	32	32
Suvavou Seventh Day Adventist ..	38	8	12	12
Islamia .. .. .	87	15	20	20
Samabula Government .. .. .	509	118	132	132
Boys Grammar .. .. .	150	42	53	57
Ballantine Memorial .. .. .	133	81	85	85
Vatuwaqa Indian .. .. .	261	48	68	68
Bau District Schools .. .. .	571	196	208	209
Total .. .. .	1,930	570	652	661
Arya Samaj .. .. .	323	61	73	....
Wesley, Toorak .. .. .	68	26	28	....
St. Annes and St. Filomena .. .. .	327	130	153	....
Marist Brothers' High School .. .. .	113	72	85	....
Total .. .. .	831	289	339	....
St. Joseph de Cluny .. .. .	94	....	17	17
Bau District .. .. .	571	186	208	209
Kuku District School .. .. .				
Nausori District School .. .. .				
Dravo District School .. .. .				
Cautata District School .. .. .				

The results obtained were:

PERCENTAGE INCREASE AT 72 HOURS COMPARED WITH 48 HOURS.

Suva (a) .. .. .	14.4 per cent
(b) .. .. .	14.3 „
Bau .. .. .	6.1 „

14. The percentages were entirely different as regards Suva and Bau. They were unexpected and further investigation showed the following facts:—

- (1) Assistant Medical Practitioner Lomaloma was investigating in an area where most of the Fijians had been mantoux tested in the previous year and his examinations were made on a mixed group of races.
- (2) Assistant Medical Practitioner Macu's findings had been obtained by examination of Fijian school children only.

15. In order to verify the above percentages it became necessary to sort all mantoux tests into racial groups and see if any connexion could be obtained.

16. The Fijian results showing the percentage increase at 72 hours compared with 48 hours are:—

	Total Examined	+ve 48 hours	+ve 72 hours	+ve Per cent
Suva .. .. .	241	104	109	4.8
Bau .. .. .	571	186	208	6.1

17. In case there might have been an age relationship the figures were divided into age groups but unfortunately the numbers were small and the age groups varied slightly, i.e. the Bau children were younger than the Suva children. In spite of the fact that the numbers are small the tables are shown below:—

	Total Examined	+ve 48 hours	+ve 72 hours	Percentage
Fijian Race—				
5-9 Age Group—				
Suva .. .. .	40	5	7	20
Bau .. .. .	260	51	55	7.8
Totals .. .. .	300	56	62	10.7
10-14 Age Group—				
Suva .. .. .	120	48	50	4.2
Bau .. .. .	278	119	127	6.7
Totals .. .. .	398	167	177	5.9
15-19 Age Group—				
Suva .. .. .	79	55	57	3.7
Bau .. .. .	28	23	23	0
Totals .. .. .	107	78	80	2.8

18. The age groups are not comparable and no conclusions are made. In the case of Suva there were only seven positives at 72 hours. A further difference is that most of the pupils from Suva were girls who lived in boarding schools while the Bau children were of both sexes and day pupils living in their villages.

19. Both operators appear to agree on one point, and that is that the delayed reactors were higher in the younger age groups and that the percentage of accelerated reactors decreased with the rising age groups. Whether this is of significance it is not possible to say with the small figures available.

PERCENTAGE INCREASE AT 96 HOURS COMPARED WITH 72 HOURS (FIJIAN RACE ONLY).

20. The figures obtained were:—

	Total Examined	+ve 72 hours	+ve 96 hours	Percentage
Suva (a) .. .. .	.....	652	661	1.4
(b) .. .. .	94	17	17	.....
Bau .. .. .	571	208	209	0.5

21. Both operators again agree that there is a percentage increase but that it is smaller than the increase between 72 and 48 hours.

22. In view of the fact that the increases were Suva nine and Bau one, there was no information to be obtained by dividing the figures into age groups.

23. The figures for the Fijian race having been analysed the rest of the pupils were divided into races for comparisons with the Fijian results. The analysis for reading between 48 and 72 hours showed the following figures:—

Race	Total Examined	+ve 48 hours	+ve 72 hours	Percentage
European .. .. .	292	46	55	19.5
Indian .. .. .	1,786	424	504	18.7
Chinese .. .. .	170	50	59	18
Euronesian .. .. .	399	105	118	12.4
Fijian .. .. .	812	300	317	5.7

24. These figures are from Suva and Bau. It appears that the European, Indian and Chinese races give a higher percentage of delayed reactors compared to the Fijian people at the age groups concerned. The Euronesians, being a mixed group mainly of European and Fijian origin, gave a result about midway between the above two races, which was to be expected.

25. As was attempted with the Fijian statistics, it was thought that information might be obtained by dividing the figures into age groups and the following tables are obtained:—

	Total Examined	+ve 48 hours	+ve 72 hours	Percentage
<b>Euronesian—</b>				
5-9 years .. .. .	156	20	21	5
10-14 years .. .. .	191	62	71	14.5
15-19 years .. .. .	61	23	26	13.0
<b>European—</b>				
5-9 years .. .. .	136	15	17	13.3
10-14 years .. .. .	121	24	28	16.6
15-19 years .. .. .	34	6	10	66.6
<b>Chinese—</b>				
5-9 years .. .. .	53	6	7	16.6
10-14 years .. .. .	84	32	37	15.6
15-19 years .. .. .	33	13	18	38.5
<b>Indian—</b>				
5-9 years .. .. .	768	130	157	20.8
10-14 years .. .. .	829	198	235	18.7
15-19 years .. .. .	167	80	97	21.3
<b>Fijian—</b>				
5-9 years .. .. .	300	56	62	10.7
10-14 years .. .. .	398	167	177	5.9
15-19 years .. .. .	107	78	80	2.6

26. The figures obtained are too small to analyse by age groups except in the case of the Indians and Fijians. The results obtained give the impression that age has no relationship to an accelerated mantoux reaction in the case of the Indians in the age groups between 5/19 years.

27. As regards the Fijians it appears that age might make a difference in the 5-19 age brackets in that both operators, although their percentages differ widely, obtained results which show that the Fijians as they rise in age (5-19 years) give fewer delayed reactions.

D.—PERCENTAGE INCREASE IN MANTOUX REACTIONS BETWEEN 72 AND 96 HOURS IN THE DIFFERENT RACES OF FIJI.

Race	Total Examined	+ve 72 hours	+ve 96 hours	Percentage
European .. .. .	170	59	59	.....
Chinese .. .. .	1,786	504	509	0.9
Indian .. .. .	399	118	119	0.8
Euronesian .. .. .	812	317	321	1.2

28. These observations proved that there is an increase in most races at 96 hours compared with readings at 72 hours but that it is very small being about one per cent only.

E.—PERSONAL OBSERVATIONS NOT SHOWN BY ABOVE STATISTICAL RESULTS.

29. The above statistics do not show some further observations which were made. I personally checked many of the results in the Suva area and observed the following:—

- (1) In comparing the results at 72 and 48 hours it was noticed that the doubtful reactors (i.e. 1-5 mm.) were reduced in number, many becoming positive and others negative at 72 hours.
- (2) That the positive reactions at 72 hours gave better definition and were easier to measure.
- (3) That the increase in positive reactors at 96 hours compared with 72 hours besides being only about one per cent were very small, the measurements being between 5 to 8 mm.
- (4) That a few results which appeared positive at 48 were negative at 72 hours. The numbers examined were too small for a statistical table but the result was about 1.56 per cent.
- (5) That there were a few positive reactors at 72 hours, which became negative at 96 hours. The percentage was less than 1 per cent (0.8 per cent).

30. Both Assistant Medical Practitioners Macu Salato and B. Lomaloma agreed with these observations. A third Assistant Medical Practitioner, M. Begg, who was operating on the dry side of Viti Levu, was given instructions to make all his readings at 72 hours. He agrees that the oedema was more obvious and easier to measure and that the doubtful reactors were fewer in number at the above time.

SUMMARY.

- (1) An investigation was undertaken amongst the school children between the ages of 5 and 19 years of Suva and Bau to ascertain the most suitable time for reading the mantoux reaction (for B.C.G. inoculation) in the peoples of Fiji. A total of 3,459 pupils were examined.
- (2) A definite percentage increase in positive reactors occurred between 48 and 72 hours in all races, but that the actual percentage varied between the different races. The Fijian percentage was 5.66 compared with the European 19.5, Chinese 18 and Indian 18.7 per cent. The Euronesian group was in between the European and Fijian at 12.4 per cent.
- (3) Definition was more marked at 72 hours.
- (4) Three out of four races tested for reactions between 72 and 96 hours showed a small increase.
- (5) That the size of the reactions, positive for the first time at 96 hours, were small registering between 5 and 8 mm.

CONCLUSION.

- (1) In view of the size of the reactions and the small percentage obtained, it would be detrimental to the B.C.G. campaign to take reading at 96 hours as it would mean only one day per week for B.C.G. inoculations.
- (2) That the best time for reading was 72 hours, when the reactions were well defined and more accurate than readings at 48 hours, and that 72 hour readings would mean that B.C.G. vaccine could be given on two days per week, i.e. old Tuberculin could be injected on Mondays and Tuesdays, the reactions could be read and B.C.G. given on Thursdays and Fridays respectively.
- (3) That further investigation should be undertaken to ascertain if the mantoux reaction in the Fijian adult gives a very small percentage increase at 72 hours compared with 48 hours and these figures to be compared with those for other races.

PART II—OBSERVATIONS ON THE PREPARATION, DOSAGE AND DILUTION OF OLD TUBERCULIN AS USED IN FIJI.

DOSAGE.

In the tuberculin survey which had been made in Fiji prior to 1950 the individuals had, in many cases, been first tried with 1/10cc of 1/10,000 old Tuberculin and the negative reactors were re-injected with 1/10 cc. of 1/1,000 old Tuberculin. The primary object of this present investigation was to obtain negative reactors for inoculation with B.C.G. and it was thought that if two inoculations, i.e. 1/10,000 and 1/1,000 were given, much time would be consumed in travelling and making three or four visits to a village before B.C.G. could be given. Experience has shown that:—

- (1) many individuals who were negative at 1/10 cc. of 1/10,000 were positive when inoculated with 1/10 cc. of 1/1,000 old Tuberculin;
- (2) the operators were forced to leave the main roads and travel by foot or on horseback and would be liable, in the wet season, to be marooned in some villages for days at a time;
- (3) when the B.C.G. campaign spread to the smaller islands much valuable time would be wasted waiting between the first and second readings; and
- (4) people would be very co-operative on the day of inoculation and in attendance at the first reading but—
  - (a) might lose interest and fail to return on the second occasion;
  - (b) be unlikely to attend owing to loss of their working time; or
  - (c) be prevented from attending due to the elements making travelling difficult.

2. Because of the above difficulties it was decided that only one inoculation would be given and that would be 1/10 cc. of 1/1,000 dilution of old Tuberculin. All results were to be marked on the individuals' cards for analysis at the end of the year and all cards must show as accurately as possible the racial origin.

PREPARATION OF OLD TUBERCULIN TO BE USED.

3. A mantoux survey had been undertaken in the Naitasiri province in 1948 using C.S.L. Old Tuberculin which had been obtained already diluted to 1/1,000. The vials had been kept in cold storage at the main Pharmacy for a long period and when issued they had to be taken without refrigeration over long distances and retained for days, in some cases weeks, before they could be used. Also the period of storage had been so long that the date of expiration had very nearly been reached. The results obtained with this series of ready made preparation had been poor giving much fewer positive reactors than in any other areas.

RECOMMENDED PROCEDURAE TO BE ADOPTED IN THE PRESENT SURVEY.

4. The procedure which is being used at the present time is that the old Tuberculin is bought in concentrated form in 1 cc. vials and that it is stored in cold storage at the bases from which the operators are working. Prior to use a dilution of 1/10 is made and this dilution is stored in a refrigerator for a maximum period of 10 days only. The dilution of 1/1,000 is made on the morning that the mantoux tests are to be done and any not used at the end of the day is destroyed. This is a far cheaper method and has given more accurate results than those obtained by using ready made diluted Tuberculin which has been stored for long periods.

FURTHER INVESTIGATION.

5. Dr. Guillermin, Medical Officer in Charge of the Tuberculosis Research Team of the South Pacific Commission, arrived in Fiji in the latter half of the year and I was very happy to have many conferences with him. One of his investigations was to undertake a tuberculin survey with the object of finding the optimum dosage and the most suitable preparation of Tuberculin for use amongst the indigenous people of diverse racial origins which populated the numerous South Pacific Island territories. The results he had obtained in New Guinea, Niue Island and New Caledonia had shown that an extemporaneous dilution of 1/40 of a cc. of 1/100 old Tuberculin gave a higher percentage of positive reactors than did a dilution of 1/10 cc. of 1/1,000 old Tuberculin. At Dr. Guillermin's request and in order to verify his results a series of investigations was undertaken on the north coast of Viti Levu. A total of 118 Fijians and 525 Indians were mantoux tested in the left forearm with 1/10 cc. of a dilution of 1/1,000 old Tuberculin and at the same time they were given on the right forearm 1/40 cc. of 1/100 dilution of old Tuberculin. The results were read at 72 hours and they are tabulated below.

COMPARISONS OF MANTOUX REACTIONS.

<i>Fijians.</i>									
Males: 61—									
+ 1/1000:	17	..	..	..	+ 1/100 of	17:	17		
					±	"	—		
					—	"	—		
± 1/1000:	5	..	..	..	+ 1/100 of	5:	4		
					±	"	1		
					—	"	—		
— 1/1000:	39	..	..	..	+ 1/100 of	39:	5		
					±	"	5		
					—	"	29		
Females: 57—									
+ 1/1000:	10	..	..	..	+ 1/100 of	10:	10		
					±	"	—		
					—	"	—		
± 1/1000:	6	..	..	..	+ 1/100 of	6:	5		
					±	"	1		
					—	"	—		
— 1/100:	41	..	..	..	+ 1/100 of	41:	4		
					±	"	12		
					—	"	25		
<i>Indians.</i>									
Males: 347—									
+ 1/1000:	69	..	..	..	+ 1/100 of	69:	69		
					±	"	—		
					—	"	—		
± 1/1000:	65	..	..	..	+ 1/100 of	65:	55		
					±	"	9		
					—	"	1		
— 1/1000:	213	..	..	..	+ 1/100 of	213:	39		
					±	"	62		
					—	"	112		
Females: 178—									
+ 1/1000:	26	..	..	..	+ 1/100 of	26:	26		
					±	"	—		
					—	"	—		
± 1/1000:	27	..	..	..	+ 1/100 of	27:	22		
					±	"	4		
					—	"	1		
— 1/1000:	125	..	..	..	+ 1/100 of	125:	24		
					±	"	35		
					—	"	66		

6. These results verified Dr. Guillermin's findings and called for further analysis of the observations so far observed in Fiji. At that time the plan in Fiji was to use 1/10 cc. of 1/1,000 dilution and to read the results in all races at 72 hours. A closer observation was made on the early specific reactions (Koch's phenomena) observed between the sixth and eighth day after B.C.G. inoculation. No untoward effects in the way of ulcerations were observed, although there had been a few Koch's phenomena in the Indian school pupils in January and February when readings were made at 48 hours.

7. It is to be noted here that there was a difference in the objects of the surveys in that Dr. Guillermin was attempting to establish a suitable dilution and dosage for a Tuberculin index satisfactory to all races in the South Pacific Islands while we in Fiji were attempting to find a suitable dosage and dilution, not for survey purposes, but with the primary intention of obtaining the maximum number of people, as shown by inoculations of B.C.G. vaccine.

CONCLUSION.

8. It is agreed that a higher Tuberculin index can be obtained by using more concentration dilutions but as the primary effect in Fiji is to obtain negative reactors and give as much protection as possible via B.C.G. vaccine to the peoples in Fiji, the present programme of using 1/10 cc. of 1/1,000 dilution of old Tuberculin and reading the reactions at 72 hours would be continued until the end of the year. Exceedingly early stages had been noticed so far following B.C.G. but it had been noticed that the Fijian race was showing more hypersensitive skin reactions to 1/10 cc. of 1/1,000 old Tuberculin than the rest of the community.



PART III—ANALYSIS OF MANTOUX RESULTS OBTAINED BY USING A DOSAGE OF 1/10 CC. OF 1/1,000 DILUTION OF OLD TUBERCULIN DURING THE YEAR 1950.

PERSONNEL.

As stated previously the primary object in making the mantoux test was not a survey but to obtain subjects suitable for B.C.G. inoculation. Personnel involved were Assistant Medical Practitioner Macu Salato and Assistant Medical Practitioner M. Beg who were employed on this campaign as full time operators. Assistant Medical Practitioner B. Lomaloma who was stationed at the Tamavua Tuberculosis Hospital made about 3,000 examinations and Assistant Medical Practitioner Peni Vuiyale, also stationed at Tamavua Hospital, reported on about 600 Mantoux results.

DISTRIBUTION OF POPULATION.

2. More than half of the population of Fiji resides on the main island of Viti Levu; Suva town and its surrounding rural areas support a population of more than 25,000. Apart from the main towns of Suva, Lautoka and the gold mining area of Vatukoula, the majority of the community tends to lead a rural life. The Fijians live in villages in the coastal areas and river banks with other villages close to the main highways. A smaller percentage of the Fijian community lives in the mountainous area in the centre of the island.

3. The rural Indians on the other hand are tenant farmers who, in the main, live in family groups on their own farms, with a much smaller percentage living in settlements in the various areas. This different type of life required a different technique, in order to obtain sufficient numbers for examinations, i.e. in the case of the Fijians a village usually contained sufficient people for the operators to visit it but it was necessary with the Indians to send out messages to the individuals requesting them to come to a central place where the examinations would be made. The campaign was on voluntary basis but on the whole was well supported. People who failed to appear for reading of the mantoux reaction numbered only a few hundreds and were mainly Indian, who could have been prevented by the elements or requirements of their work from travelling to the central meeting place.

AREA OF OPERATIONS.

4. The capital of Suva and villages and community groups close to the highways within a hundred miles of the capital were chosen.

5. Assistant Medical Practitioner Macu's area of operations was in the north-east portion of the island of Viti Levu and he made his base at Vunidawa. Assistant Medical Practitioner M. Beg visited the different communities in Nadroga and Navosa province on the south coast. He probably had the more difficult area as it contained a large number of Indian tenant farmers. His base was made at Sigatoka. To facilitate the work of Macu and Beg both these operators were supplied with vehicles (viz. Landrovers) which were very suitable for the type of roads and which had been bought from Anti-Tuberculosis Memorial funds, as subscribed by all the communities of Fiji. Assistant Medical Practitioner B. Lomaloma obtained his results from the school children in the Suva area; transport was supplied from Tamavua Hospital as required. Assistant Medical Practitioner Peni Vuiyale visited the small island of Moturiki and remained there for two weeks. His only means of travel was on foot while on the island.

RESULTS OBTAINED.

6. It might be as well to state here that an area of oedema 5 mm. and over at the site of the inoculation of the diluted old Tuberculin was considered a positive result and that inoculations were standardized at 1/10 cc. of 1/1,000 dilution of old Tuberculin.

7. A total of 18,631 mantoux tests were made. Table 1 below shows racial distribution of the examinations and compares with total racial population as given in the 1946 census.

Race	Total Population	Total Examination
Chinese .. .. .	2,105	220
European .. .. .	4,594	386
Euronesian .. .. .	6,142	559
Fijian . . . . .	117,488	10,790
Indian . . . . .	120,063	6,501
Others . . . . .	9,246	179
	<hr/> 259,638	<hr/> 18,635

8. Below is a key to the attached tables:—

Table 2—Total European Mantoux Index.

3—Total Fijian Mantoux Index.

4—Total Indian Mantoux Index.

5—Total Euronesian Mantoux Index.

6—Total Chinese Mantoux Index.

7—Total Other Races Mantoux Index.

8—Compares percentages of positive mantoux results by races and ages.





TABLE No. 6—CHINESE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	5	0	0	.....	.....	.....	.....	.....	.....
5-9	67	10	14.93	.....	.....	.....	.....	.....	.....
10-14	99	44	44.44	.....	.....	.....	.....	.....	.....
15-19	37	22	59.46	.....	.....	.....	.....	.....	.....
20-24	2	2	100	.....	.....	.....	.....	.....	.....
25-29	.....	.....	.....	.....	.....	.....	.....	.....	.....
30-34	1	1	100	.....	.....	.....	.....	.....	.....
35-39	1	1	100	.....	.....	.....	.....	.....	.....
40-44	2	2	100	.....	.....	.....	.....	.....	.....
45-49	2	2	100	.....	.....	.....	.....	.....	.....
50-54	2	2	100	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	1	1	100	.....	.....	.....	.....	.....	.....
65+	1	1	100	.....	.....	.....	.....	.....	.....
Total	220	88	.....	.....	.....	.....	.....	.....	.....

TABLE No. 7—OTHER RACES.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	13	2	15.38	.....	.....	.....	.....	.....	.....
5-9	49	14	28.57	.....	.....	.....	.....	.....	.....
10-14	76	43	56.58	.....	.....	.....	.....	.....	.....
15-19	45	32	71.11	.....	.....	.....	.....	.....	.....
20-24	8	6	75	.....	.....	.....	.....	.....	.....
25-29	4	4	100	.....	.....	.....	.....	.....	.....
30-34	1	1	100	.....	.....	.....	.....	.....	.....
35-39	1	1	100	.....	.....	.....	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	197	103	.....	.....	.....	.....	.....	.....	.....

TABLE No. 8—COMPARISON OF MANTOUX POSITIVE PERCENTAGES OBTAINED IN THE DIFFERENT RACES.

Age Group	European	Fijian	Indian	Part European	Chinese	Other Races
	Percentage Positive	Percentage Positive	Percentage Positive	Percentage Positive	Percentage Positive	Percentage Positive
0-4	0	8.22	13.97	12	0	15.38
5-9	11.11	27.74	24.49	12.33	14.93	28.57
10-14	25.95	51.95	32.15	39.75	44.44	56.58
15-19	28.94	76.29	65.53	58.57	59.46	71.11
20-24	0	90.73	75.21	50	100	75
25-29	75	91.17	79.26	100	.....	100
30-34	50	95.98	81.05	.....	100	100
35-39	36.37	97.46	86.67	50	100	100
40-44	33.33	96.87	87.81	100	100	.....
45-49	66.67	97.66	87.81	.....	100	.....
50-54	100	97.15	92.31	.....	100	.....
55-59	.....	94.66	100	.....	.....	.....
60-64	.....	97.75	93.94	.....	100	.....
65+	.....	95.65	96.55	.....	100	.....



TABLE 8 (d)—CHINESE RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
Below 1	.....	.....	.....						
1-2	2	.....	.....						
2-3	1	.....	.....						
3-4	1	.....	.....						
4-5	1	.....	.....						
5-6	.....	.....	.....						
6-7	12	1	8.33						
7-8	13	3	23.03						
8-9	18	3	16.66						
9-10	24	3	12.5						
10-11	15	3	20						
11-12	21	7	33.33						
12-13	18	10	55.56						
13-14	26	11	42.3						
Total	152	41	.....	.....	.....	.....	.....	.....	.....

Figures too small for statistics

TABLE No. 8 (e)—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
Below 1	159	4	2.52	76	1	2.76	83	2	.....
1-2	323	15	4.64	160	9	5.63	163	6	.....
2-3	293	21	7.16	152	11	7.24	141	10	.....
3-4	431	36	8.35	251	21	8.37	180	15	.....
4-5	327	50	15.29	164	24	14.63	163	26	.....
5-6	312	54	17.31	140	21	15	172	33	.....
6-7	449	105	23.39	224	55	24.55	225	50	.....
7-8	499	126	25.25	258	69	26.74	241	57	.....
8-9	528	152	28.79	287	77	26.64	241	75	.....
9-10	469	189	40.3	238	105	44.12	231	84	.....
10-11	551	231	41.92	282	109	38.65	269	122	.....
11-12	511	243	47.55	265	134	50.56	246	109	.....
12-13	508	260	51.18	282	150	53.19	226	110	.....
13-14	492	283	57.52	266	167	62.78	226	116	.....
Total	5,852	1,769	.....	3,045	953	.....	2,807	815	.....

TABLE No. 8 (f)—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
Below 1	43	0	0	16	0	0	27	0	0
1-2	90	14	15.56	51	8	15.69	39	6	15.39
2-3	111	14	12.61	54	7	12.96	57	7	12.28
3-4	164	32	19.51	74	12	16.22	90	20	22.22
4-5	136	16	11.77	63	9	14.29	73	7	9.59
5-6	130	30	23.8	71	11	15.49	59	19	32.20
6-7	435	108	24.83	204	41	20.10	231	67	29
7-8	592	135	22.8	293	67	22.87	299	68	22.74
8-9	596	149	25	271	62	22.88	325	87	26.71
9-10	619	159	25.85	301	82	27.24	318	77	24.21
10-11	665	182	27.37	368	103	27.99	297	79	26.60
11-12	441	136	30.84	251	72	28.69	190	64	33.68
12-13	410	153	37.32	222	85	38.29	188	68	36.17
13-14	305	132	43.28	189	82	43.39	116	50	43.10
Total	4,738	1,260	.....	2,428	641	.....	2,309	619	.....

TABLE No. 9 TAILEVU PROVINCE—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	738	45	6.10	389	22	5.66	349	23	6.59
5-9	1,125	324	28.80	588	167	28.40	537	157	29.24
10-14	1,242	710	57.17	712	431	60.53	530	279	52.64
15-19	572	445	77.80	337	270	80.12	235	175	74.47
20-24	284	265	93.31	87	82	94.25	197	183	92.89
25-29	290	270	93.10	103	97	94.18	187	173	92.51
30-34	255	248	97.26	102	100	98.04	153	148	96.73
35-39	217	205	94.47	101	96	95.05	116	109	93.97
40-44	183	177	96.72	72	69	95.83	111	108	97.30
45-49	139	136	97.84	81	80	98.77	58	56	96.55
50-54	150	145	96.67	51	49	96.08	99	96	96.96
55-59	67	63	94.03	44	43	97.73	23	20	86.96
60-64	131	127	96.95	84	81	96.43	47	46	98.72
65+	199	113	96.95	90	85	94.44	29	28	96.55
Total	5,512	3,275	....	2,841	1,672	....	2,671	1,601	....

TABLE No. 10 BAU TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	3	0	0	1	0	....	2	0	....
5-9	260	73	28.08	136	43	31.62	124	30	24.19
10-14	278	161	57.91	154	96	62.34	124	65	52.42
15-19	28	25	89.29	20	18	90	8	7	87.5
20-24	4	4	100	....	....	....	4	4	100
25-29	....	....	....	....	....	....	....	....	....
30-34	....	....	....	....	....	....	....	....	....
35-39	....	....	....	....	....	....	....	....	....
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	573	263	....	311	157	....	262	106	....

TABLE No. 11 WAINIBUKA TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	220	25	11.36	117	13	11.11	103	12	11.65
5-9	285	80	28.07	153	40	26.14	132	40	30.08
10-14	246	123	50.00	120	70	58.33	126	53	42.06
15-19	99	73	73.74	35	27	77.14	64	46	71.88
20-24	77	74	96.10	26	24	92.31	51	50	98.04
25-29	72	67	93.06	22	22	100	50	45	90
30-34	78	76	97.44	36	35	97.22	42	41	97.62
35-39	75	72	96.00	29	28	96.55	46	44	95.65
40-44	51	47	92.16	20	18	90	31	29	93.1
45-49	43	42	97.67	25	25	100	18	17	94.44
50-54	56	52	92.86	18	17	94.44	38	35	92.11
55-59	11	10	90.91	9	9	100	2	1	50
60-64	43	43	100	27	27	100	16	16	100
65+	42	39	92.86	33	30	90.91	9	9	100
Total	1,398	823	....	670	385	....	728	438	....

TABLE No. 12 WAIMARO TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	32	3	9.38	12	1	8.33	20	2	10
5-9	24	5	20.83	12	2	16.67	12	3	25
10-14	16	10	62.50	6	2	33.33	10	8	80
15-19	.....	.....	.....	.....	.....	.....	.....	.....	.....
20-24	10	9	90.00	.....	.....	.....	10	9	90
25-29	3	3	100	.....	.....	.....	3	3	100
30-34	1	1	100	.....	.....	.....	1	1	100
35-39	1	1	100	.....	.....	.....	1	1	100
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	87	32	.....	30	5	.....	57	27	.....

TABLE No. 13 SAWAKASA BOARDING SCHOOLS—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5-9	.....	.....	.....	37	12	32.43	.....	.....	.....
10-14	.....	.....	.....	243	157	64.61	.....	.....	.....
15-19	.....	.....	.....	146	111	79.26	.....	.....	.....
20-24	.....	.....	.....	5	4	80	.....	.....	.....
25-29	.....	.....	.....	3	3	100	.....	.....	.....
30-34	.....	.....	.....	2	2	100	.....	.....	.....
35-39	.....	.....	.....	2	2	100	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	438	291	.....	.....	.....	.....

TABLE No. 14 SAWAKASA TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	105	5	4.76	51	2	3.92	54	3	7.55
5-9	132	50	37.88	52	16	30.76	80	34	42.5
10-14	118	69	58.48	31	16	50	87	53	60.92
15-19	43	31	72.09	20	14	70	23	17	73.91
20-24	60	58	96.67	24	23	95.83	36	35	97.22
25-29	53	51	96.23	14	14	100	39	37	94.87
30-34	27	27	100	11	11	100	16	16	100
35-39	41	39	95.12	17	16	94.12	24	23	95.83
40-44	32	32	100	14	14	100	18	18	100
45-49	35	34	97.14	15	15	100	20	19	95
50-54	27	27	100	8	8	100	19	19	100
55-59	13	12	92.31	9	9	100	4	3	75
60-64	19	19	100	11	11	100	8	8	100
65+	22	21	95.46	17	16	94.12	5	5	100
Total	727	475	.....	293	185	.....	434	290	.....



TABLE No. 15 VERATA TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	378	12	3.18	208	6	2.88	170	6	3.75
5-9	387	104	26.87	198	54	27.27	189	50	26.46
10-14	344	190	55.23	158	90	56.96	186	100	53.76
15-19	262	205	78.24	122	100	81.97	140	105	75
20-24	128	116	90.63	32	31	96.88	96	85	88.54
25-29	159	146	91.82	64	58	92.06	95	88	92.63
30-34	147	142	96.60	53	52	98.11	94	90	95.74
35-39	98	91	92.86	53	50	94.34	45	41	91.11
40-44	100	98	98.00	38	37	97.37	62	61	98.39
45-49	61	60	98.36	41	40	97.56	20	20	100
50-54	67	66	98.51	25	24	96.00	42	42	100
55-59	43	41	95.35	26	25	96.15	17	16	93.75
60-64	69	65	94.20	46	43	93.48	23	22	95.83
65+	55	53	96.36	40	39	97.50	15	14	93.33
Total	2,298	1,389	.....	1,104	649	.....	1,194	740	.....

TABLE No. 16 NAITASIRI PROVINCE—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	101	10	9.90	60	7	11.67	41	3	7.32
5-9	190	57	30.00	113	33	29.20	77	24	31.17
10-14	202	95	47.03	108	54	50	94	42	43.61
15-19	47	32	68.09	15	9	60	32	23	71.88
20-24	27	26	96.30	6	6	100	21	20	95.24
25-29	32	29	90.63	9	8	88.89	23	21	91.30
30-34	24	22	91.67	5	5	100	19	17	89.47
35-49	22	21	95.46	10	10	100	12	11	91.67
40-44	18	18	100	5	5	100	13	13	100
45-49	11	11	100	5	5	100	6	6	100
50-54	20	20	100	9	9	100	11	11	100
55-59	8	6	75	4	3	75	4	3	75
60-64	19	19	100	3	3	100	16	16	100
65+	19	19	100	12	12	100	7	7	100
Total	740	385	.....	364	169	.....	376	216	.....

TABLE No. 17 LOMAIVUNA TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	24	3	12.50	11	3	27.27	13	0	7.14
5-9	53	13	24.53	28	6	21.43	25	7	28.00
10-14	35	15	42.86	17	7	41.18	18	8	44.44
15-19	13	11	84.62	3	2	66.67	10	9	90
20-24	6	6	100	1	1	100	5	5	100
25-29	7	7	100	2	2	100	5	5	100
30-34	8	7	87.50	2	2	100	6	5	83.33
35-39	7	7	100	4	4	100	3	3	100
40-44	3	3	100	1	1	100	2	2	100
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	5	5	100	1	1	100	4	4	100
55-59	0	0	0	0	0	0	0	0	0
50-64	2	2	100	.....	.....	.....	2	2	100
65+	3	3	100	2	2	100	1	1	100
Total	166	82	.....	72	31	.....	94	51	.....

TABLE No. 18 MATAILOBAU TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	76	6	7.90	49	4	8.16	27	2	7.41
5-9	118	35	29.66	74	21	28.38	44	14	31.82
10-14	118	60	50.85	65	36	55.38	53	24	45.28
15-19	30	18	60.00	10	6	60	20	12	60
20-24	20	19	95.00	5	5	100	15	14	93.33
25-29	25	22	88.00	7	6	85.71	18	16	88.89
30-34	15	14	93.33	3	3	100	12	11	91.67
35-39	15	14	93.33	6	6	100	9	8	83.89
40-44	15	15	100	4	4	100	11	11	100
45-49	11	11	100	5	5	100	6	6	100
50-54	15	15	100	8	8	100	7	7	100
55-59	8	6	75.00	4	3	75	4	3	75
60-64	17	17	100	3	3	100	14	14	100
65+	16	16	100	10	10	100	6	6	100
Total	499	268	....	253	120	....	246	148	....

TABLE No. 19 WAINIMALA TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	1	0	0	....	....	....	1	0	0
5-9	19	9	47.37	11	6	54.55	8	3	37.5
10-14	49	20	40.32	26	11	46.67	23	9	37.5
15-19	4	3	75.00	2	1	50	2	2	100
20-24	1	1	100	....	....	....	1	1	100
25-29	....	....	....	....	....	....	....	....	....
30-34	1	1	100	....	....	....	1	1	100
35-39	....	....	....	....	....	....	....	....	....
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	75	34	....	39	18	....	36	16	....

TABLE No. 20 NADROGA PROVINCE—FIJIAN RACE (Beg.)

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	373	29	7.78	183	15	8.20	190	14	7.37
5-9	507	131	25.84	235	62	26.38	272	69	25.37
10-14	555	257	46.31	279	122	43.73	276	135	48.91
15-19	214	153	71.50	86	63	73.26	128	90	70.31
20-24	164	138	84.15	65	57	87.69	99	81	81.81
25-29	191	166	86.91	73	68	93.15	118	98	83.05
30-34	180	171	95.00	70	68	97.14	110	103	93.64
35-39	163	156	95.71	86	79	91.86	77	77	100
40-44	97	93	95.88	50	49	98	47	44	93.62
45-49	127	123	96.85	62	60	96.77	65	63	96.92
50-54	96	94	97.92	48	47	97.92	48	47	97.92
55-59	48	47	97.92	27	27	100	21	20	95.24
60-64	54	53	98.15	34	33	97.06	20	20	100
65+	56	53	94.64	45	43	95.56	11	10	90.91
Total	2,825	1,664	....	1,343	793	....	1,482	871	....

TABLE No. 21 CUVU TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	75	9	12.00	35	3	8.57	40	6	15
5-9	101	24	23.76	48	9	18.75	53	15	28.3
10-14	135	60	44.44	61	23	37.7	74	37	50
15-19	52	35	67.31	17	11	64.71	35	24	68.57
20-24	25	20	80.00	5	5	100	20	15	75
25-29	31	26	83.87	11	10	90.91	20	16	80
30-34	25	25	100	11	11	100	14	14	100
35-39	20	20	100	11	11	100	9	9	100
40-44	13	12	92.31	3	3	100	10	9	90
45-49	21	20	95.24	9	8	88.89	12	12	100
50-54	10	10	100	3	3	100	7	7	100
55-59	17	17	100	9	9	100	8	8	100
60-64	3	3	100	1	1	100	2	2	100
65+	10	10	100	7	7	100	3	3	100
Total	538	291	....	231	114	....	307	177	....

TABLE No. 22 NASIGATOKA TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	108	7	6.48	58	3	5.36	50	4	8
5-9	135	43	31.85	61	19	31.15	74	24	32.43
10-14	150	80	53.33	74	38	51.35	76	42	55.26
15-19	40	36	90.00	10	8	80	30	28	93.55
20-24	39	37	94.87	17	17	100	22	20	90.91
25-29	42	40	95.24	16	15	93.75	26	25	96.15
30-34	49	47	95.92	17	17	100	32	30	93.75
35-39	43	41	95.35	19	17	89.47	24	24	100
40-44	14	13	92.86	8	7	87.5	6	6	100
45-49	34	33	97.58	19	19	100	15	14	93.33
50-54	30	29	96.67	12	11	91.67	18	18	100
55-59	10	10	100	6	6	100	4	4	100
60-64	14	14	100	12	12	100	2	2	100
65+	13	13	100	12	12	100	1	1	100
Total	721	443	....	341	201	....	380	242	....

TABLE No. 23 MALOMALO TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	....	....	....	....	....	....	....	....	....
5-9	29	13	44.83	14	8	57.14	15	5	33.33
10-14	29	23	79.31	14	11	78.57	15	12	80
15-19	....	....	....	....	....	....	....	....	....
20-24	3	3	100	3	3	100	....	....	....
25-29	1	1	100	....	....	....	1	1	100
30-34	....	....	....	....	....	....	....	....	....
35-39	1	1	100	....	....	....	1	1	100
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	63	41	....	31	22	....	32	19	....

TABLE No. 24 BARAVI TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	114	7	4.86	59	6	10.53	55	1	1.82
5-9	128	32	25.00	63	16	25.14	65	16	24.62
10-14	120	64	53.33	63	35	55.56	57	29	50.88
15-19	68	55	80.88	36	30	83.33	32	25	78.13
20-24	55	50	90.91	23	21	91.3	32	29	90.63
25-29	72	66	91.67	23	22	95.65	49	44	89.8
30-34	69	65	94.20	30	28	93.33	39	37	94.87
35-39	66	64	96.97	37	35	94.59	29	29	100
40-44	45	44	97.78	25	25	100	20	19	95
45-49	40	39	97.50	18	17	94.44	22	22	100
50-54	41	40	97.56	24	24	100	17	16	94.12
55-59	17	16	94.12	8	8	100	9	8	88.89
60-64	25	24	96.00	11	10	90.91	14	14	100
65+	23	20	86.96	17	15	88.24	6	5	83.33
Total	883	586	....	437	292	....	446	294	....

TABLE No. 25 RUWAILEVU TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	26	6	23.08	10	3	30	16	3	17.65
5-9	27	3	11.11	5	1	20	22	2	9.09
10-14	27	7	25.93	14	2	14.29	13	5	38.46
15-19	21	16	76.19	11	10	90.91	10	6	60
20-24	13	11	84.62	5	4	80	8	7	87.5
25-29	11	8	72.73	5	4	80	6	4	66.67
30-34	13	13	100	4	4	100	9	9	100
35-39	9	7	77.73	4	2	50	5	5	100
40-44	6	6	100	4	4	100	2	2	100
45-49	11	11	100	4	4	100	7	7	100
50-54	6	6	100	3	3	100	3	3	100
55-59	1	1	100	1	1	100	....	....	....
60-64	7	7	100	6	6	100	....	....	....
65+	5	5	100	5	5	....	....	....	....
Total	183	107	....	81	53	....	102	54	....

TABLE No. 26 VATULELE TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	43	0	0	18	0	0	25	0	0
5-9	46	7	15.22	25	4	16	21	3	11.54
10-14	50	8	16.00	28	5	17.86	22	3	13.64
15-19	25	9	36.00	6	3	50	19	6	31.58
20-24	18	10	55.56	7	3	42.86	11	7	63.63
25-29	28	19	67.86	14	13	93.33	14	6	42.86
30-34	21	18	85.71	7	7	100	14	11	78.57
35-39	18	17	94.44	9	8	88.89	9	9	100
40-44	17	16	94.12	8	8	100	9	8	88.89
45-49	15	14	93.33	9	9	100	6	5	83.33
50-54	4	4	100	3	3	100	1	1	100
55-59	1	1	100	1	1	100	0	0	0
60-64	4	4	100	3	3	100	1	1	100
65+	4	4	100	3	3	100	1	1	100
Total	294	131	....	141	70	....	153	61	....

TABLE No. 27 MALOLO TIKINA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	7	1	14.29	3	1	33.33	4	0	0
5-9	44	9	20.46	19	5	26.32	25	4	16
10-14	44	15	34.09	25	8	32	19	7	36.84
15-19	8	2	25.00	6	1	16.67	2	1	50
20-24	11	7	63.64	5	4	80	6	3	50
25-29	6	6	100	4	4	100	2	2	100
30-34	3	3	100	1	1	100	2	2	100
35-39	6	6	100	6	6	100	0	0	0
40-44	2	2	100	2	2	100	0	0	0
45-49	6	6	100	3	3	100	3	3	100
50-54	5	5	100	3	3	100	2	2	100
55-59	2	2	100	2	2	100	0	0	0
60-64	1	1	100	1	1	100	0	0	0
65+	1	1	100	1	1	100	0	0	0
Total	146	66	....	81	42	....	65	24	....

TABLE No. 28 MOTURIKI ISLAND, LOMAIVITI PROVINCE—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	92	27	29.35	51	13	25.49	41	14	34.15
5-9	83	31	37.35	44	17	38.64	39	14	37.84
10-14	64	47	73.44	34	27	79.41	30	20	66.67
15-19	72	65	90.28	36	32	88.89	36	33	91.67
20-24	38	36	94.74	15	13	86.67	23	23	100
25-29	38	37	97.37	19	18	94.74	19	19	100
30-34	33	32	96.97	19	19	100	14	13	92.86
35-39	26	26	100	14	14	100	12	12	100
40-44	21	21	100	8	8	100	13	13	100
45-49	22	22	100	10	10	100	12	12	100
50-54	15	14	93.33	11	10	90.91	4	4	100
55-59	8	8	100	6	6	100	2	2	100
60-64	19	19	100	8	8	100	11	11	100
65+	13	13	100	5	5	100	8	8	100
Total	544	398	....	280	200	....	264	198	....

TABLE No. 29 TAVUA TIKINA, BA PROVINCE—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	225	15	6.67	120	9	7.5	105	6	5.71
5-9	258	68	26.36	141	43	30.5	117	25	21.37
10-14	241	122	50.62	147	68	46.26	94	54	58.06
15-19	62	44	70.97	45	34	75.56	17	10	58.82
20-24	4	4	100	2	2	100	2	2	100
25-29	3	3	100	1	1	100	2	2	100
30-34	5	4	80	4	3	75	1	1	100
35-39	4	4	100	3	3	100	1	1	100
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	802	264	....	463	163	....	339	101	....

TABLE No. 30 RAKIRAKI TIKINA, RA PROVINCE—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	....	....	....	....	....	....	....	....	....
5-9	51	8	15.69	26	5	19.23	25	3	12
10-14	67	19	28.36	37	12	32.43	30	7	23.33
15-19	....	....	....	....	....	....	....	....	....
20-24	....	....	....	....	....	....	....	....	....
25-29	....	....	....	....	....	....	....	....	....
30-34	....	....	....	....	....	....	....	....	....
35-39	....	....	....	....	....	....	....	....	....
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	118	27	....	63	17	....	55	10	....

TABLE No. 31 SUVA—FIJIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	4	0	0	....	....	....	4	0	0
5-9	40	7	17.50	....	....	....	40	7	17.50
10-14	120	54	45.00	....	....	....	120	54	45.00
15-19	79	59	74.68	....	....	....	79	59	74.68
20-24	1	1	100	....	....	....	1	1	100
25-29	1	1	100	....	....	....	1	1	100
30-34	....	....	....	....	....	....	....	....	....
35-39	1	0	0	....	....	....	1	0	0
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	246	121	....	....	....	....	246	121	....

TABLE No. 32 TAILEVU PROVINCE. INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	107	7	6.54	49	5	10.2	58	2	3.45
5-9	155	41	26.45	101	25	24.75	54	16	29.63
10-14	129	50	38.76	62	27	43.55	67	23	34.33
15-19	73	50	68.49	48	39	81.25	25	11	44
20-24	41	31	75.61	17	16	94.12	24	15	62.5
25-29	31	26	83.87	15	14	93.34	16	12	75
30-34	34	23	67.65	19	14	73.68	15	9	60
35-39	26	18	69.23	15	8	53.33	11	10	90.91
40-44	21	16	76.19	14	11	78.57	7	5	71.43
45-49	9	9	100	7	7	100	2	2	100
50-54	11	11	100	10	10	100	1	1	100
55-59	7	7	100	5	5	100	2	2	100
60-64	22	20	90.91	16	14	87.5	6	6	100
65+	10	10	100	8	8	100	2	2	100
Total	676	319	....	386	203	....	290	116	....

TABLE No. 33 SAWAKASA TIKINA—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	95	4	4.21	42	2	4.76	53	2	3.77
5-9	116	32	27.59	74	21	27.03	43	11	26.19
10-14	102	41	40.20	46	20	43.48	56	21	37.5
15-19	47	31	65.96	25	21	84	22	10	45.45
20-24	37	29	78.38	16	15	93.75	21	14	66.67
25-29	24	19	79.17	10	9	90	14	10	71.43
30-34	28	19	67.36	14	11	78.57	14	8	57.14
35-39	25	17	68.00	14	7	50	11	10	90.91
40-44	18	13	72.22	13	10	76.92	5	3	60
45-49	9	9	100	7	7	100	2	2	100
50-54	11	11	100	10	10	100	1	1	100
55-59	6	6	100	4	4	100	2	2	100
60-64	19	17	89.47	14	12	85.71	5	5	100
65+	9	9	100	8	8	100	1	1	100
Total	546	257	....	297	157	....	249	100	....

TABLE No. 34 VERATA TIKINA, TAILEVU PROVINCE—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	12	3	25.00	7	3	42.88	5	0	0
5-9	39	9	23.08	27	4	14.82	12	5	41.67
10-14	27	9	33.33	16	7	43.75	11	2	18.18
15-19	26	19	73.08	23	18	78.26	3	1	33.33
20-24	4	2	50.00	1	1	100	3	1	33.33
25-29	7	7	100	5	5	100	2	2	100
30-34	6	4	66.67	5	3	60	1	1	100
35-39	1	1	100	1	1	100	....	....	....
40-44	3	3	100	1	1	100	2	2	100
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	1	1	100	1	1	100	....	....	....
60-64	3	3	100	2	2	100	1	1	100
65+	1	1	100	....	....	....	1	1	100
Total	130	62	....	89	46	....	41	16	....

TABLE No. 35 MATAILOBAU TIKINA, NAITASIRI PROVINCE—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	24	1	4.17	13	1	7.69	11	0	0
5-9	28	3	10.71	17	2	11.76	11	1	9.09
10-14	34	8	23.53	20	5	25	14	3	20
15-19	6	2	33.33	2	0	0	4	2	50
20-24	3	2	66.67	1	1	100	2	1	50
25-29	8	7	87.50	3	3	100	5	4	80
30-34	12	8	66.67	5	5	100	7	3	42.86
35-39	5	5	100	5	5	100	....	....	....
40-44	3	3	100	3	3	100	....	....	....
45-49	2	2	100	1	1	100	1	1	100
50-54	3	1	33.33	2	1	50	1	0	0
55-59	2	2	100	1	1	100	1	1	100
60-64	1	1	100	1	1	100	....	....	....
65+	2	1	50	1	1	100	1	0	0
Total	133	46	....	75	30	....	58	16	....

TABLE No. 36 NADROGA PROVINCE—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	378	67	17.73	180	30	16.67	198	37	18.69
5-9	869	260	29.92	438	123	28.08	431	137	31.78
10-14	641	295	46.02	393	175	44.53	248	120	48.39
15-19	200	143	71.50	94	76	80.85	106	67	63.21
20-24	172	130	75.58	90	76	84.44	82	54	65.85
25-29	128	103	80.47	64	55	85.94	64	48	70.60
30-34	120	105	87.50	53	51	96.22	67	54	80.60
35-39	98	89	90.82	56	50	89.29	42	39	92.86
40-44	57	52	91.23	27	25	92.59	30	27	90
45-49	29	25	86.21	15	14	93.33	14	11	78.57
50-54	35	33	94.29	18	17	94.44	17	16	94.12
55-59	34	34	100	23	23	100	11	11	100
60-64	42	40	95.24	34	32	94.12	8	8	100
65+	14	14	100	10	10	100	4	4	100
Total	2,317	1,390	....	1,495	757	....	1,322	633	....

TABLE No. 37 CUVU TIKINA—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	29	2	6.90	21	1	4.76	8	1	12.5
5-9	225	51	22.67	124	28	22.58	101	23	22.77
10-14	165	41	24.85	110	36	32.73	55	5	14.29
15-19	18	10	55.56	9	5	55.55	9	5	55.55
20-24	10	5	50.00	6	5	83.33	4	0	0
25-29	11	7	63.65	5	4	80	6	3	50
30-34	7	5	71.43	4	4	100	3	1	33.33
35-39	4	2	50.00	4	2	50.00	....	....	....
40-44	5	3	60.00	4	2	50.00	1	1	100
45-49	1	0	0	....	....	....	1	0	0
50-54	1	1	100	1	1	100	....	....	....
55-59	1	1	100	....	....	....	1	1	100
60-64	1	0	0	1	0	0	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	478	128	....	289	88	....	189	40	....

TABLE No. 38 MALOMALO TIKINA—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	157	40	25.48	74	18	24.32	83	22	26.51
5-9	197	94	47.72	104	46	44.76	93	48	51.61
10-14	154	100	64.94	84	51	54.76	70	49	70
15-19	79	69	87.34	43	40	93.02	36	29	80.56
20-24	76	66	86.84	44	40	90.91	32	26	81.25
25-29	52	44	84.62	34	29	85.29	18	15	83.33
30-34	52	45	86.54	23	22	95.65	29	23	79.31
35-39	52	47	90.39	27	24	88.89	25	23	92
40-44	26	25	96.15	13	13	100	13	12	92.31
45-49	9	8	88.88	6	5	83.33	3	3	100
50-54	16	16	100	8	8	100	7	7	100
55-59	7	7	100	5	5	100	2	2	100
60-64	27	27	100	22	22	100	1	1	100
65+	5	5	100	4	4	100	....	....	....
Total	909	593	....	492	328	....	417	265	....



TABLE No. 39 NASIGATOKA TIKINA—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	139	18	12.95	61	9	14.75	78	9	11.54
5-9	351	94	26.78	157	36	22.93	194	58	30.05
10-14	273	113	41.39	160	62	38.99	113	51	45.13
15-19	72	46	63.89	33	24	72.73	39	22	56.41
20-24	58	39	67.24	26	20	76.92	32	19	59.38
25-29	43	34	79.07	14	12	85.71	29	22	75.86
30-34	41	36	87.81	15	14	93.33	26	22	84.62
35-39	34	32	94.12	20	19	95	14	13	92.86
40-44	17	16	94.12	6	6	100	11	10	90.91
45-49	15	13	86.67	6	6	100	9	7	77.78
50-54	10	8	80.00	4	3	75	6	5	83.33
55-59	14	14	100	7	7	100	7	7	100
60-64	10	10	100	8	8	100	2	2	100
65+	7	7	100	6	6	100	1	1	100
Total	1,084	480	....	523	232	....	561	248	....

TABLE No. 40 BARAVI TIKINA, NADROGA PROVINCE—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	53	7	13.21	24	2	8.33	29	5	14.29
5-9	96	21	21.88	53	13	26.0	43	8	18.61
10-14	69	41	59.42	39	26	66.67	30	16	51.72
15-19	31	18	58.07	9	7	77.78	22	11	50
20-24	28	20	71.43	14	11	78.57	14	9	64.29
25-29	22	18	81.82	11	10	90.91	11	8	72.73
30-34	20	19	95.00	11	11	100	9	8	88.89
35-39	8	8	100	5	5	100	3	3	100
40-44	9	8	88.89	4	4	100	5	4	80
45-49	4	4	100	3	3	100	1	1	100
50-54	8	8	100	4	4	100	4	4	100
55-59	12	12	100	11	11	100	1	1	100
60-64	4	3	75	3	2	66.67	1	1	100
65+	2	2	100	....	....	....	2	2	100
Total	366	189	....	191	109	....	175	81	....

TABLE No. 41 RAKIRAKI—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	....	....	....	....	....	....	....	....	....
5-9	154	20	12.99	92	13	14.13	62	7	11.29
10-14	123	25	20.33	90	20	22.47	33	5	15.15
15-19	....	....	....	....	....	....	....	....	....
20-24	....	....	....	....	....	....	....	....	....
25-29	....	....	....	....	....	....	....	....	....
30-34	....	....	....	....	....	....	....	....	....
35-39	....	....	....	....	....	....	....	....	....
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	277	45	....	182	33	....	95	12	....

TABLE No. 42 TAVUA TIKINA, BA PROVINCE—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	6	0	0	3	0	0	3	0	0
5-9	385	66	17.14	213	31	22.77	172	35	19.44
10-14	299	78	26.09	199	52	26.13	100	26	26
15-19	17	10	58.82	14	9	64.29	3	1	33.33
20-24	2	2	100	2	2	100	.....	.....	.....
25-29	7	6	85.71	7	6	85.71	.....	.....	.....
30-34	7	4	57.14	6	4	66.67	1	0	0
35-39	4	3	75.00	4	3	75	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	727	169	.....	448	107	.....	279	62	.....

TABLE No. 43 SUVA—INDIAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	6	0	0	2	0	0	4	0	0
5-9	768	177	23.05	273	57	20.88	495	120	24.24
10-14	829	270	32.57	402	145	36.25	427	125	29.27
15-19	167	100	59.88	106	71	66.98	61	29	47.54
20-24	14	9	64.29	6	5	83.33	8	4	50
25-29	8	4	50.00	2	2	100	6	2	33.33
30-34	3	3	100	1	1	100	2	2	100
35-39	1	1	100	1	1	100	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,796	564	.....	793	282	.....	1,003	282	.....

TABLE No. 44 SUVA—CHINESE RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5-9	53	7	13.21	19	2	10.53	34	5	15.15
10-14	84	41	48.81	34	20	58.82	50	21	42
15-19	33	19	57.58	16	11	68.75	17	8	47.06
20-24	.....	.....	.....	.....	.....	.....	.....	.....	.....
25-29	.....	.....	.....	.....	.....	.....	.....	.....	.....
30-34	.....	.....	.....	.....	.....	.....	.....	.....	.....
35-39	.....	.....	.....	.....	.....	.....	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	170	67	.....	69	33	.....	101	34	.....

TABLE No. 45 SUVA—EUROPEAN RACE.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5-9	136	15	11.03	75	9	12	61	6	10.17
10-14	121	31	25.62	73	21	28.77	48	10	20.83
15-19	24	10	41.67	10	5	50	14	5	35.71
20-24	.....	.....	.....	.....	.....	.....	.....	.....	.....
25-29	1	1	100	.....	.....	.....	1	1	100
30-34	.....	.....	.....	.....	.....	.....	.....	.....	.....
35-39	1	0	0	.....	.....	.....	1	0	0
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	283	57	.....	158	35	.....	125	22	.....

TABLE No. 46 SUVA—EURONESIAN.

Age Group	Both Sexes			Males			Females		
	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve	Total Examined	Total +ve	Percentage +ve
0-4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5-9	156	21	13.46	49	8	16.33	107	13	12.15
10-14	191	76	39.79	67	29	43.28	124	47	37.9
15-19	61	36	59.02	40	25	62.5	21	11	52.39
20-24	1	0	0	1	0	0	0	0	0
25-29	.....	.....	.....	.....	.....	.....	.....	.....	.....
30-34	.....	.....	.....	.....	.....	.....	.....	.....	.....
35-39	.....	.....	.....	.....	.....	.....	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	409	133	.....	157	62	.....	252	71	.....



## COMMENTS.

9. It is suspected that the above percentages might be a little less than they should be as there was an influenza epidemic in Fiji in the last few months of 1950 and this is suspected of having converted some individuals from positive to negative mantoux.

10. Proof of this statement would be very difficult but for the following observations:—

Two 17 year old Fijian female pupils at a Suva Boarding School were mantoux tested in September. Their reactions read at 48, 72 and 96 hours were about 20 mm. Each of these girls had a severe attack of influenza in the latter half of October, necessitating rest in bed for seven days in one case and 12 days for the other. In November they both applied for entrance into the nursing service and were again mantoux tested before it was noticed that they had had the examination previously. Both were absolutely negative at 1/10 cc. of 1/100 and remained negative six weeks after receiving B.C.G. although the rest of the applicants who received B.C.G. from the same batch became positive.

The second case was that of an elderly Indian who developed interstitial pneumonia at the apex of the right lung following an influenza attack. X-rays taken previous to his illness had shown an old healed focus at the right apex and he stated that "he had received hospital treatment for his lungs while in India many years before". His Mantoux reaction was negative with a dose of 1/10 cc. at a dilution of 1/100 old Tuberculin. The reaction was positive at a similar dose six weeks later. I personally examined about 20 cases of interstitial pneumonia following influenza, not all were mantoux negative and, unfortunately, there were no previous mantoux records of those that were negative.

## SUMMARY.

11. Eighteen thousand six hundred and fifty-one mantoux results obtained during 1950 have been analysed by racial and age groups. Further subdivisions into provinces and tikinas are also reported.

## CONCLUSIONS.

- (1) That the European children give less positive mantoux percentage than children of comparable age in other racial groups in Fiji. This might be because the Europeans in Fiji are in the higher salary groups and are living under better housing conditions. (Housing index 1946 was 2.86 persons per household.)
- (2) The Fijian and Indian community show a very high mantoux index which is over 75 per cent positive in the 15-19 age groups. This is probably due to the majority of these races being in lower salary groups and also to their housing index (1946 census shows housing indexes as Fijian 6.16 persons and Indian 5.27 persons).
- (3) The other races were a mixed community of South Sea Island peoples. In most cases they were living under similar conditions to the Fijians and Indians with a housing index of 6.15 persons. Their mantoux conversion rate is similar to the Fijian and Indian.
- (4) The Euronesian group examined were mainly from Suva and Vatukoula where the adult males are mainly employed as skilled and semi skilled workmen. The mantoux index is between the European and Fijian.
- (5) That the influenza epidemic in the last few months of 1950 converted some people from positive to negative mantoux reactions.
- (6) That the mantoux index is similar for the rural and urban communities of both Fijian and Indian races and is a high index in both cases, i.e. the disease is probably widespread throughout both communities all over the country.
- (7) That the area of Nadroga province from Cuvu to its northern boundary, especially Malomalo, gives a much higher mantoux index for the age groups 0-9 in both Fijian and Indian races and that special investigations should be commenced to examine the whole community of this area.

## PART IV—OBSERVATIONS ON THE SIZE OF THE MANTOUX REACTIONS BY AGE AND RACIAL DISTRIBUTION.

While sorting the mantoux cards it was noticed that the Fijians appeared to give much larger reactions than the Indians and, in view of the fact that the Fijian race appeared to give a more accelerated reaction than other races, the positive reactors' cards were again sorted and grouped according to the size of the reactions.

2. In order to assess the value of these findings the following scale of measurement was used:—

- = negative no oedema.
  - ± = negative, an area of oedema below 5 mm.
  - +
  - ++ = positive, an area of oedema 5 mm. and below 10 mm.
  - +++ = positive, an area of oedema 10 mm. and below 20 mm.
  - ++++ = positive, an area of oedema 20 mm. and over.
  - +++++ = positive, oedema and vesication or ulceration.
- Redness alone did not constitute a positive reaction.

3. The tables show the results obtained:

TABLE No. 1—EUROPEAN RACE.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	0	0	0	0	0	0	0	0	0
5-9	18	6	33-33	10	55-56	2	11-11	.....	.....
10-14	34	11	32-35	21	61-76	2	5-88	.....	.....
15-19	11	4	36-37	7	63-64	.....	.....	.....	.....
20-24	.....	.....	.....	.....	.....	.....	.....	.....	.....
25-29	6	1	16-66	3	50	2	33	.....	.....
30-34	3	0	0	0	0	2	66-66	1	33-3
35-39	4	0	0	2	50	1	25	1	25
40-44	1	0	0	0	0	1	100	0	0
45-49	2	1	50	1	50	0	0	0	0
50-54	1	0	0	0	0	1	100	0	0
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	80	23	.....	.....	.....	.....	.....	.....	.....

TABLE No. 2—CHINESE RACE.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	0	0	0	0	0	0	0	0	0
5-9	10	5	50	3	30	2	20	.....	.....
10-14	44	6	13-64	16	36-36	18	40-91	4	9-09
15-19	22	6	27-27	10	45-46	5	22-73	1	4-55
20-24	2	1	50	1	50	.....	.....	.....	.....
25-29	.....	.....	.....	.....	.....	.....	.....	.....	.....
30-34	1	0	0	0	0	1	100	0	0
35-39	1	0	0	0	0	1	100	0	0
40-44	2	0	0	0	0	2	100	0	0
45-49	2	0	0	0	0	2	100	0	0
50-54	2	0	0	0	0	2	100	0	0
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	1	0	0	1	100	0	0	0	0
65+	1	0	0	0	0	1	100	0	0
Total	88	18	.....	31	.....	34	.....	5	.....

TABLE No. 3—OTHER RACES.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	2	0	0	0	0	1	50	1	50
5-9	14	3	21-43	3	21-43	8	57-14	.....	.....
10-14	43	7	16-28	10	23-26	25	58-14	1	2-33
15-19	32	5	15-63	11	34-38	14	43-75	2	6-25
20-24	6	.....	.....	5	83-33	1	16-67	.....	.....
25-29	4	1	25	.....	.....	2	50	1	25
30-34	1	.....	.....	.....	.....	1	100	.....	.....
35-39	1	1	100	.....	.....	.....	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	108	17	.....	29	.....	52	.....	5	.....

TABLE No. 4—PART-EUROPEAN RACE.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	3	0	0	100	....	....	....	....	....
5-9	27	9	33.33	13	48.15	4	14.82	1	3.7
10-14	95	31	32.63	43	45.26	18	18.95	3	3.16
15-19	41	15	36.59	20	48.78	6	14.63	....	....
20-24	1	....	....	1	100	....	....	....	....
25-29	1	....	....	1	100	....	....	....	....
30-34	....	....	....	....	....	....	....	....	....
35-39	1	....	....	....	....	1	100	....	....
40-44	1	....	....	....	....	1	100	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	170	55	....	81	....	30	....	4	....

TABLE No. 5—INDIAN RACE.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	76	27	35.53	38	50	13	17.12	0	0
5-9	581	161	27.71	281	48.37	129	22.20	10	1.72
10-14	726	153	21.07	370	50.96	192	26.45	9	1.24
15-19	306	60	19.61	144	47.06	97	31.70	5	1.63
20-24	179	13	7.26	99	55.31	66	36.87	1	0.56
25-29	149	8	5.37	65	43.62	74	49.66	2	1.34
30-34	150	6	4	65	43.33	78	52	1	0.67
35-39	117	10	8.55	35	29.92	70	59.83	1	1.71
40-44	72	2	2.78	22	30.56	43	59.66	5	6.94
45-49	36	1	2.78	6	16.67	28	77.78	....	....
50-54	48	4	8.33	15	31.25	29	60.42	....	....
55-59	44	3	6.82	16	36.36	25	56.82	....	....
60-64	62	3	4.84	20	32.26	37	59.68	2	3.23
65+	28	2	7.14	14	50	12	42.86	....	....
Total	2,573	452	....	1,190	....	905	....	37	....

TABLE No. 6—FIJIAN RACE.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	126	39	30.95	45	37.71	37	29.37	5	3.97
5-9	626	94	15.02	205	32.75	294	46.96	33	5.27
10-14	1,294	162	12.52	419	32.38	643	49.69	80	6.18
15-19	798	86	10.78	344	43.11	338	42.36	40	5.01
20-24	470	32	6.81	186	39.57	223	47.45	29	6.17
25-29	506	25	4.91	202	39.92	243	48.02	36	7.12
30-34	477	9	1.81	199	41.72	232	48.63	37	7.76
35-39	422	17	4.03	150	35.55	212	50.24	33	7.82
40-44	309	12	3.88	129	41.75	144	46.6	24	7.77
45-49	292	11	3.77	98	33.56	158	54.11	25	8.56
50-54	273	8	2.93	105	38.46	138	50.55	21	7.69
55-59	124	0	0	57	45.97	58	46.77	9	7.26
60-64	218	8	3.67	85	38.99	110	50.46	13	5.96
65+	198	9	4.55	85	42.93	70	35.35	14	7.07
Total	6,133	502	....	2,309	....	2,919	....	401	....

TABLE No. 7—INDIAN RACE (MALES).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	36	10	27.78	17	47.22	9	25	0	0
5-9	293	66	25.10	124	47.15	70	26.62	3	1.14
10-14	424	93	21.93	223	52.59	105	24.76	3	0.71
15-19	196	42	21.43	94	47.96	56	28.57	4	2.04
20-24	103	8	7.77	57	55.34	37	35.92	1	0.97
25-29	82	2	2.44	32	39.02	47	57.32	1	1.22
30-34	80	3	3.75	37	46.25	40	50	0	0
35-39	68	4	5.88	17	25	45	66.18	2	2.94
40-44	40	0	0	10	25	26	65	4	10
45-49	22	1	4.55	6	27.27	15	68.18	0	0
50-54	29	0	0	9	31.04	20	68.97	0	0
55-59	30	2	6.67	8	26.67	20	66.67	0	0
60-64	48	1	2.08	18	37.5	29	60.42	0	0
65+	22	1	4.55	11	50	10	45.56	0	0
Total	1,437	233	....	663	....	539	....	18	....

TABLE No. 8—INDIAN RACE (FEMALES).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	40	15	37.5	21	52.5	4	10	0	0
5-9	318	95	29.87	157	49.37	59	18.55	7	2.20
10-14	302	60	19.87	147	48.68	89	29.47	6	1.97
15-19	110	18	16.36	50	45.46	41	37.27	1	0.91
20-24	76	5	6.58	42	55.26	29	38.16	0	0
25-29	67	6	8.96	33	49.25	27	40.30	1	1.49
30-34	70	3	4.29	28	40	38	54.29	1	1.43
35-39	49	6	12.25	18	36.73	25	51.02	0	0
40-44	32	2	6.25	12	37.5	17	53.13	1	3.1
45-49	14	1	7.14	0	0	13	92.86	0	0
50-54	19	4	21.5	6	31.58	9	47.37	0	0
55-59	14	1	7.14	8	57.14	5	35.71	0	0
60-64	14	2	14.29	2	14.29	8	57.14	2	....
65+	6	1	16.67	3	50	2	33.33	0	....
Total	1,131	219	....	527	....	366	....	19	....

TABLE No. 9—FIJIAN FEMALES.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	59	19	32.2	16	27.12	19	32.2	4	6.78
5-9	299	51	17.06	98	32.78	130	43.48	22	7.38
10-14	580	78	13.45	204	35.17	261	45.00	47	8.10
15-19	390	35	8.97	171	43.85	164	42.05	20	5.13
20-24	310	25	8.07	114	36.77	153	49.36	18	5.80
25-29	314	20	6.37	112	35.67	154	49.05	28	8.92
30-34	282	6	2.13	112	39.72	137	48.58	26	9.22
35-39	210	12	5.71	62	29.52	119	56.67	17	8.10
40-44	178	9	5.06	69	38.76	80	44.94	20	11.24
45-49	137	7	5.11	40	29.20	75	54.75	15	10.95
50-54	158	5	3.17	51	32.28	86	54.43	16	10.13
55-59	45	0	0	14	31.11	28	62.22	3	6.67
60-64	93	4	4.30	31	33.33	49	52.69	9	9.68
65+	53	2	3.77	18	33.96	27	50.94	6	11.32
Total	3,119	271	....	1,112	....	1,482	....	252	....

TABLE No. 10—FIJIAN RACE (MALES).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	66	20	30.30	29	43.94	18	27.27	0	0
5-9	327	45	13.76	107	32.72	164	50.15	11	3.36
10-14	714	84	11.77	215	30.11	382	53.50	33	4.62
15-19	408	41	10.05	173	42.40	174	42.65	20	4.90
20-24	160	7	4.38	72	45.00	70	43.75	11	6.88
25-29	192	5	2.60	90	46.88	89	46.35	8	4.67
30-34	195	3	1.54	37	44.62	94	48.21	11	51.64
35-39	202	5	2.48	88	43.56	93	46.04	16	7.92
40-44	131	3	2.29	60	35.80	64	48.86	4	3.05
45-49	155	4	2.58	58	37.43	83	53.55	10	6.45
50-54	115	3	2.61	54	46.96	52	45.28	5	4.35
55-59	79	0	0	43	54.43	30	37.98	6	7.60
60-64	125	4	3.20	54	43.20	61	48.80	6	4.80
65+	145	7	4.83	67	46.21	63	43.45	8	5.52
Total	3,014	231	....	1,197	....	1,437	....	149	....

4. The figures obtained are too small for statistical purposes except in the case of the Fijians and Indians where both races show—

(1) A relatively high percentage of 5-10 mm. reactors at the young age groups but that the reactions become larger with advancing years.

(2) That most reactions can be placed in ++ (10-20 mm.) and +++ (over 20 mm.) in both races.

(3) The Fijian gives a larger percentage of reactors showing ulceration and vesication.

I have not yet had the opportunity to re-sort the cards but it would appear that the Fijian in the +++ division tended to give a larger sized reaction than the Indian.

5. At this stage of the report it would be as well to point out a few salient facts.

(1) Assistant Medical Practitioner Beg was working in an area with a large Indian community while Assistant Medical Practitioner Macu's area supported a very large Fijian community.



- (2) That the Assistant Medical Practitioners concerned made their own preparation of 1/1,000 dilution of old Tuberculin as required by the following method:—  
2/10 cc. of concentrated old Tuberculin was added to 1.8 cc. of saline.  
2/10 cc. of this 1/10 solution was added to 9.8 cc. of saline.

Although each Assistant Medical Practitioner took the greatest care the results obtained would probably vary as to exact concentration, due to the human element and the different syringes.

- (3) The actual injections were given by different Assistant Medical Practitioners and that although all were using tuberculin syringes, the latter could vary a little in their measurements.

6. For the above three reasons and also because the tables showed that the Fijians gave more marked reactions, the positive mantoux results were re-grouped according to the Assistant Medical Practitioner who made the examinations. The results were as follows:—

TABLE No. 11—FIJIAN MALES (Macu).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	38	4	10.53	19	50	15	39.47	0	0
5-9	248	22	8.87	77	31.05	140	56.45	0	3.63
10-14	565	42	7.43	157	27.79	336	59.47	30	5.31
15-19	313	21	6.71	120	38.34	154	49.20	18	5.75
20-24	90	5	5.56	33	36.67	42	46.67	10	11.11
25-29	106	1	0.94	49	46.23	48	45.28	8	7.55
30-34	108	0	0	40	37.04	61	56.48	7	6.48
35-39	109	1	0.92	41	36.62	53	48.62	14	12.84
40-44	74	1	1.35	32	43.24	39	52.7	2	2.70
45-49	85	2	2.35	28	32.94	50	58.82	5	5.88
50-54	58	1	1.73	26	44.83	28	48.28	2	3.45
55-59	46	0	0	22	47.83	18	39.13	6	13.04
60-64	84	1	1.19	36	42.86	42	50	5	5.95
65+	97	5	5.16	45	46.39	41	42.27	6	6.19
Total	2,021	106	....	725	....	1,067	....	122	....

TABLE No. 12—INDIAN MALES (Macu).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	6	1	16.66	0	0	5	83.33	0	0
5-9	81	21	25.92	35	43.21	25	30.86	0	0
10-14	104	23	22.12	53	50.96	27	25.96	1	0.96
15-19	48	5	10.42	24	50	18	37.5	1	2.08
20-24	19	2	10.53	13	68.42	4	21.05	0	0
25-29	23	0	0	8	34.78	14	60.87	1	4.35
30-34	23	2	8.70	10	43.48	11	47.83	0	0
35-39	16	2	12.5	3	18.75	9	56.25	2	12.5
40-44	14	0	0	4	28.57	8	57.14	2	14.29
45-49	8	0	0	3	37.5	5	62.5	0	0
50-54	11	0	0	4	36.36	7	63.63	0	0
55-59	6	0	0	0	0	6	100	0	0
60-64	15	0	0	8	53.32	7	41.18	0	0
65+	9	1	0	4	50	4	50	0	0
Total	383	57	....	169	....	150	....	7	....

TABLE No. 13—FIJIAN FEMALES (Macu).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	32	5	15.63	7	21.88	17	53.12	3	9.38
5-9	209	17	8.13	60	28.71	110	52.63	22	10.53
10-14	371	38	10.24	82	22.10	208	56.07	43	11.59
15-19	208	10	4.81	77	37.02	105	50.48	16	7.69
20-24	205	10	4.88	68	33.17	113	55.12	14	6.83
25-29	196	11	5.61	54	27.27	107	54.04	24	12.12
30-34	166	4	2.41	58	34.94	85	51.21	18	10.84
35-39	131	6	4.58	28	21.37	74	56.49	13	9.92
40-44	121	1	0.83	40	33.06	63	52.07	17	14.05
45-49	62	0	0	10	16.13	43	69.36	9	14.52
50-54	107	5	2.80	28	26.17	65	60.75	11	10.28
55-59	23	0	0	5	21.74	16	69.57	2	8.70
60-64	62	1	1.62	15	24.19	39	62.9	7	11.29
65+	35	0	0	9	25.71	21	60	5	14.29
Total	1,928	105	....	551	....	1,066	....	204	....

TABLE No. 14—INDIAN FEMALES (MACU).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	2	1	50	1	50	0	0	0	0
5-9	59	19	32.2	22	37.29	18	30.51	0	0
10-14	57	12	21.05	28	49.12	17	29.83	0	0
15-19	14	1	7.14	7	50	6	42.86	0	0
20-24	16	0	0	12	75	4	25	0	0
25-29	16	2	12.5	10	62.5	4	25	0	0
30-34	12	0	0	3	25	9	75	0	0
35-39	10	0	0	3	30	7	70	0	0
40-44	5	0	0	2	40	3	60	0	0
45-49	3	0	0	0	0	3	100	0	0
50-54	1	0	0	0	0	1	100	0	0
55-59	3	0	0	1	33.33	2	66.67	0	0
60-64	6	1	16.67	1	16.67	4	66.67	0	0
65+	2	0	0	1	50	1	50	0	0
Total	206	36	....	92	....	78	....	....	....

TABLE No. 15—FIJIAN FEMALES, NADROGA (BEG).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	14	4	28.57	6	42.86	2	14.29	2	14.29
5-9	69	18	26.09	35	50.73	16	23.12	0	0
10-14	135	16	11.85	84	62.22	34	25.19	1	0.74
15-19	90	5	5.56	53	58.89	31	34.44	1	1.11
20-24	81	7	8.64	34	41.98	38	46.91	2	2.50
25-29	98	5	5.1	49	50	42.86	42.86	2	2.04
30-34	103	2	1.94	47	45.63	47	45.63	7	6.80
35-39	77	3	3.90	30	38.96	42	54.55	2	2.60
40-44	44	3	6.82	25	56.82	16	36.36	0	0
45-49	63	5	7.94	24	38.10	30	47.62	4	6.35
50-54	47	1	2.13	21	44.68	20	42.55	5	10.64
55-59	20	0	0	7	35	12	60	1	5
60-64	20	2	10	10	50	6	30	2	10
65+	11	1	10	6	60	3	30	0	0
Total	871	72	....	431	....	339	....	29	....

TABLE No. 16—INDIAN FEMALES, NADROGA.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	37	13	35.14	20	54.05	4	10.81	0	0
5-9	137	47	34.31	76	55.47	12	8.76	2	1.46
10-14	120	23	19.17	63	52.5	33	27.5	1	0.83
15-19	67	10	14.93	27	40.3	30	44.78	0	0
20-24	54	5	9.26	26	48.15	23	42.59	0	0
25-29	48	4	8.33	22	45.83	21	43.75	1	2.08
30-34	54	3	5.56	23	42.59	28	51.85	0	0
35-39	39	6	15.38	15	38.46	18	46.15	0	0
40-44	27	2	7.41	10	37.04	14	51.85	1	3.70
45-49	11	1	9.09	0	0	10	90.91	0	0
50-54	16	3	18.75	5	31.25	8	50	0	0
55-59	11	1	9.09	7	63.64	3	27.27	0	0
60-64	8	1	12.5	1	12.5	4	50	2	25
65+	4	1	50	2	50	1	25	0	0
Total	633	120	....	297	....	209	....	7	....

TABLE No. 17—INDIAN MALES, NADROGA (BEG).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	30	9	30.00	17	56.67	4	13.33	0	0
5-9	123	30	24.39	59	47.97	33	26.83	1	0.81
10-14	175	42	24	84	48	48	27.43	1	0.57
15-19	76	14	18.42	33	43.42	29	38.16	0	0
20-24	76	3	3.95	42	55.26	30	39.47	1	1.32
25-29	55	2	3.64	21	38.18	32	58.18	0	0
30-34	51	1	1.96	23	45.1	27	52.94	0	0
35-39	50	2	4	14	28	34	68	0	0
40-44	25	0	0	6	24	17	68	2	8
45-49	14	1	7.14	3	21.43	10	71.43	0	0
50-54	17	0	0	5	29.41	12	70.59	0	0
55-59	23	2	8.7	8	34.78	13	56.52	0	0
60-64	32	1	3.13	9	28.13	22	68.75	0	0
65+	10	0	0	6	60	4	40	0	0
Total	757	107	....	330	....	325	....	5	....

TABLE No. 18—FIJIAN MALES, NADROGA (BEG).

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	15	4	26.67	9	60	2	13.33	0	0
5-9	62	10	16.13	29	46.77	22	35.48	1	1.61
10-14	122	20	16.39	53	43.44	46	37.71	3	2.46
15-19	63	11	17.46	34	53.97	16	25.40	2	3.18
20-24	57	2	3.51	30	52.63	24	42.11	1	1.75
25-29	68	3	4.41	31	45.59	34	50	0	0
30-34	68	2	2.94	36	52.94	29	42.65	1	1.47
35-39	79	3	3.80	40	50.63	35	44.30	1	1.27
40-44	49	2	4.08	25	51.02	21	42.86	1	2.04
45-49	60	2	3.33	26	43.33	30	50	2	3.33
50-54	47	2	4.26	25	53.19	19	40.43	1	2.13
55-59	27	0	0	16	59.26	11	40.74	0	0
60-64	33	3	9.09	14	42.42	16	48.49	0	0
65+	43	2	4.65	21	48.84	19	44.17	1	2.33
Total	793	65	....	389	....	325	....	15	....

TABLE No. 19—FIJIAN MALES MOTURIKI.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	13	12	92.3	1	7.69	0	0	0	0
5-9	17	14	82.35	1	5.88	2	11.77	0	0
10-14	27	22	81.48	5	18.52	0	0	0	0
15-19	32	9	28.13	19	59.37	4	12.5	0	0
20-24	13	0	0	9	69.23	4	30.77	0	0
25-29	18	1	5.56	10	55.56	7	38.89	0	0
30-34	19	1	5.26	11	57.9	4	21.05	3	15.8
35-39	14	1	7.14	7	50	5	35.71	1	7.14
40-44	8	0	0	3	37.5	4	50	1	12.5
45-49	10	0	0	4	40	3	30	3	30
50-54	10	0	0	3	30	5	50	2	20
55-59	6	0	0	5	83.33	1	16.67	0	0
60-64	8	0	0	4	50	3	37.5	1	12.5
65+	5	0	0	1	20	3	60	1	20
Total	200	60	....	83	....	45	....	12	....

TABLE No. 20—FIJIAN FEMALES MOTURIKI.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	14	11	78.57	3	21.43	0	0	0	0
5-9	14	9	64.29	2	14.29	3	21.43	0	0
10-14	20	12	60	5	25	3	15	0	0
15-19	33	10	30.30	15	45.45	8	24.24	0	0
20-24	23	8	34.73	11	47.83	2	8.70	2	8.70
25-29	19	4	21.05	9	47.36	5	26.32	1	5.26
30-34	13	0	0	7	53.85	5	38.46	1	7.69
35-39	12	3	25	4	33.33	3	25	2	16.67
40-44	13	5	38.46	4	30.77	1	7.69	3	23.08
45-49	12	2	16.67	6	50	2	16.67	2	16.67
50-54	4	1	25	2	50	1	25	0	0
55-59	2	0	0	2	100	0	0	0	0
60-64	11	1	9.09	6	54.55	4	36.36	0	0
65+	8	1	12.5	3	37.5	3	37.5	0	0
Total	198	67	....	79	....	40	....	11	....

TABLE No. 21—INDIAN MALES, SUVA.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	0	0	0	0	0	0	0	0	0
5-9	57	14	24.56	30	52.63	11	19.30	2	3.51
10-14	145	28	19.31	86	59.31	30	20.69	1	0.69
15-19	71	23	32.39	36	50.70	9	12.68	3	4.23
20-24	5	3	60	1	20	1	20	0	0
25-29	....	....	....	....	....	....	....	....	....
30-34	....	....	....	....	....	....	....	....	....
35-39	....	....	....	....	....	....	....	....	....
40-44	....	....	....	....	....	....	....	....	....
45-49	....	....	....	....	....	....	....	....	....
50-54	....	....	....	....	....	....	....	....	....
55-59	....	....	....	....	....	....	....	....	....
60-64	....	....	....	....	....	....	....	....	....
65+	....	....	....	....	....	....	....	....	....
Total	278	68	....	153	....	51	....	6	....

TABLE No. 22—INDIAN FEMALES, SUVA.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	0	0	0	0	0	0	0	0	0
5-9	120	29	24.17	58	48.33	28	23.33	5	4.17
10-14	125	23	18.4	56	44.8	39	0	5	3.12
15-19	29	7	24.14	16	55.17	5	17.24	1	3.45
20-24	4	.....	.....	2	50	2	50	0	0
25-29	2	.....	.....	1	50	1	50	0	0
30-34	2	.....	.....	.....	.....	1	50	1	50
35-39	.....	.....	.....	.....	.....	.....	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	282	61	.....	133	.....	76	.....	12	.....

TABLE No. 23—FIJIAN FEMALES, SUVA.

Age group	Total Positive	Total +	Percentage +	Total ++	Percentage ++	Total +++	Percentage +++	Total ++++	Percentage ++++
0-4	0	0	0	0	0	0	0	0	0
5-9	7	5	71.43	1	14.29	1	14.29	0	0
10-14	54	12	22.22	23	42.59	16	29.63	3	5.56
15-19	59	10	16.95	26	44.07	20	33.90	3	5.09
20-24	1	0	0	1	100	0	0	0	0
25-29	1	0	0	0	0	0	0	1	100
30-34	.....	.....	.....	.....	.....	.....	.....	.....	.....
35-39	.....	.....	.....	.....	.....	.....	.....	.....	.....
40-44	.....	.....	.....	.....	.....	.....	.....	.....	.....
45-49	.....	.....	.....	.....	.....	.....	.....	.....	.....
50-54	.....	.....	.....	.....	.....	.....	.....	.....	.....
55-59	.....	.....	.....	.....	.....	.....	.....	.....	.....
60-64	.....	.....	.....	.....	.....	.....	.....	.....	.....
65+	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	122	27	.....	51	.....	37	.....	7	.....

## SUMMARY.

7. Percentage Tables have been made showing the size of the reaction of all positive mantoux results obtained during 1950. These tables are divided by racial and sex groups. The Fijians appear to give a higher percentage of ++++ reaction than the other races.

8. In case this higher percentage might have been due to the human element in preparing the dilution of old tuberculin required or due to differences in the actual amount delivered by the different syringes, results were re-sorted into racial groups, according to the Assistant Medical Practitioner making the examinations.

## CONCLUSIONS.

- (1) Four Assistant Medical Practitioners working separately agree that the mantoux result + (5-10 mm.) is quite common in the young age groups but that the percentage decreases with increasing age. This is common to all races.
- (2) The same Assistant Medical Practitioners agree that most mantoux positive results are in the two following sizes ++ (10-20 mm.) and +++ (over 20 mm.).
- (3) That the two Assistant Medical Practitioners (Macu Salato and Manzoor Beg) working solely on the B.C.G. campaign, agree that the Fijian race as a whole shows a larger number of positive results with vesication (++++) at all age brackets than the Indian race. A third Assistant Medical Practitioner (Peni Vuiyale), examining the Fijian race only, obtained similar percentages to Macu Salato. The fourth Assistant Medical Practitioner (B. Lomaloma) was working under different conditions to the other three in that his area was in the township of Suva where there were fewer Fijian children, as most Fijian schools had been examined in the previous year. His results agreed with the other workers in that the Fijians tended to give larger reactions to old Tuberculin than the Indians but the differences in the actual percentages were not as great.
- (4) All four Assistant Medical Practitioners agree that the Fijian race, as a whole, tends to give more severe reactions to 1/10 cc. of 1/1,000 dilution of old Tuberculin than the Indian race as domiciled in Fiji.

## PART V—REPORT ON THE B.C.G. INOCULATIONS IN FIJI, 1950.

## THE METHOD FOR B.C.G. INOCULATION.

A dose of 0.05 mg. of B.C.G. vaccine was given by intracutaneous inoculation to all persons who gave a negative result to a dose of 1/10 cc. of 1 dilution of 1/1,000 old Tuberculin. The site chosen was the insertion of the deltoid muscle on the left arm.

## THE PREPARATION OF B.C.G. USED.

2. Two separate preparations were used. Originally the fresh B.C.G. vaccine of the Commonwealth Serum Laboratories was obtained from Melbourne but this vaccine has two very great disadvantages in that it had to be used within 10 days of its manufacture and also that it was necessary to store under ideal conditions where the temperature was  $+5^{\circ}\text{C}$ . The Commonwealth Serum Laboratories requested a fortnight's notice before the B.C.G. could be forwarded. When prepared (it was always placed in ampoules on a Wednesday), the B.C.G. was flown from Melbourne to Sydney, Sydney to Nadi and then transported by road to Tamavua Hospital, reaching its destination late on the Sunday evening, i.e. it had not been stored under ideal conditions for the best part of five days.

## EARLY SPECIFIC REACTIONS.

3. During the first few months of the year, schools in Suva where B.C.G. vaccine had been given were re-visited the following week on the 7th or 8th day. Six cases of ulceration, Koch's phenomenon, were noted. These early specific reactions were unexpected as they do not occur in negative mantoux reactors and these pupils had been negative only the previous week. It is to be noticed that in each case where ulceration occurred the pupil was an Indian. No early specific reactions had been reported from the two vaccinators in the provinces.

4. These observations called for investigation as to the optimum time for reading the mantoux reaction. The result, reported in Part I of the report, showed the most suitable time as 72 hours after injection of 1/10 cc. of 1/1,000 dilution of old Tuberculin.

5. The total inoculations with fresh liquid Australian B.C.G. was 6,442. Racial distribution of the above was:—

Europeans	..	..	..	..	..	..	295
Euronesians	..	..	..	..	..	..	365
Other Races	..	..	..	..	..	..	87
Chinese	..	..	..	..	..	..	124
Fijian	..	..	..	..	..	..	3,427
Indian	..	..	..	..	..	..	2,144
						Total ..	6,442
Repeat inoculations	..	..	..	..	..	..	921
						Total ..	7,363

## REACTIONS FOLLOWING INOCULATION.

6. Apart from the few early specific reactions Koch's phenomena, already reported, no other untoward reactions due to the vaccine occurred except that the small ulcers which occurred about the 30th day continued to ooze for a lengthy period, in many cases over six weeks. Just before ulceration and after this ulcer occurred the vaccination site became itchy and some of the children, especially after bathing, scratched the arm with the results that a super-added infection, usually staphylococci and streptococci, took place. Where possible the schools were re-visited to treat any troublesome arms which might have occurred. At other places instructions for treatment were left with the teachers.

## CONVERSION RATE FROM NEGATIVE TO POSITIVE FOLLOWING B.C.G. INOCULATION.

7. During 1949, when B.C.G. was given on Tuesdays, the sixth day after preparation, in the town of Suva, the conversion rate had been found to be over 96 per cent and in many cases 100 per cent. As this programme would have required extra visits to villages, etc., the plan was changed to mantoux tests on Mondays and Tuesdays, read, and give B.C.G. to the negative reactors, on Thursdays and Fridays respectively.

8. Each batch of B.C.G. was divided into three separate lots, for use in Suva, the NE. area of Viti Levu and Nadroga respectively. Most of the batches in the capital area were checked by mantoux testing between 42 and 56 days. Results were very good, being near 100 per cent except for Wesley School where the returns were only 84 per cent. This batch of vaccine had missed the aeroplane in Sydney on the Saturday and did not arrive in Fiji until Wednesday. It was used on the Thursday, i.e. eight days after preparation, and it had not been kept in cold storage during this period, as had the previous batches of vaccine.

9. By this time the conversion rates for the vaccine used in the provinces, where only a few batches were being tested, were returned to Tamavua Hospital. The percentages obtained varied between 60 and 75 per cent and were not as good as Suva. These results were improved by increasing the dosage of vaccine as used in the provinces to 0.075 mg. and 0.1 mg. when rates approximating the 100 per cent were obtained.

## SUMMARY.

- (1) 0.05 mg. of fresh liquid Australian B.C.G., if kept under ideal conditions, produce in negative mantoux reactors a conversion rate to mantoux positive of 100 per cent, even when used on the 8th and 9th day after preparation.
- (2) If the vaccine could not be stored at 4° C. the rate deteriorated to 84 per cent in Suva and as low as 60 per cent in the outlying rural districts.
- (3) A conversion rate approximating 100 per cent could be obtained by increasing the dose in those places where the fresh Australian B.C.G. could not be stored under ideal conditions.

## CONCLUSION.

10. Fresh B.C.G., as supplied by the Commonwealth Serum Laboratories of Melbourne, Australia, was unsuitable, because of its short period of full potency (10 days) and also because it was necessary to store the ampoules at 5° C. for use in the outer districts of Fiji.

## DRY B.C.G. AS PREPARED BY THE PASTEUR INSTITUTE, PARIS.

11. It was known that, because of transport difficulties, the fresh Commonwealth Serum Laboratories' preparation of B.C.G. would be unsuitable for the people of the outer islands but the above observations made it more imperative than before that some other preparation was required for Fiji as a whole.

12. A sample of 25 ampoules of dry B.C.G. produced in the Pasteur Institute, Paris, was obtained from Dr. Massal of the South Pacific Commission. When it arrived in Fiji there were only three weeks left before its expiry date. As with all previous issues, the batch was divided into three for use in the Suva, Nadroga and Tailevu areas respectively. Each vial contained 150 mgs. of B.C.G. and the contents were to be suspended in 150 ccs. of sterile saline solution and used within 12 hours. The dosage to be given was 1/10 cc. which equals 0.1 mg. This was done and I personally, as on previous occasions, inspected the mantoux results following inoculations. They were extremely poor. The first batch, personally prepared and given in the Nadroga area and read 56 days later, gave only 84 per cent. The rest from Suva, Tailevu, and Moturiki read at 70, 80 and 90 days, were worse, averaging only 36 per cent. The bacillus present in the vaccine was definitely alive as cultures were grown from three separate vials.

13. The positive mantoux reactions were not as well defined and were extremely difficult to read compared with those 42 to 56 days after fresh Commonwealth Serum Laboratories B.C.G. Assistant Medical Practitioner Peni Vuiyale reported that on the island of Moturiki he used two separate vials and that while one gave about 90 per cent conversions the second resulted in only 15 per cent positive reactors. All operators reported that the saline appeared to have a sediment after the dry B.C.G. had been suspended in it, regardless of how much the bottle was shaken. Poor results appear to have been obtained in other countries as well as Fiji.

14. Further information has now been obtained and new technique will be used next year.

15. Total dry B.C.G. inoculations given were 1,981.

Euronesian .. .. .	18
Other Races .. .. .	6
Chinese .. .. .	6
Fijian .. .. .	730
Indian .. .. .	1,221
	1,981

A total of 921 people were re-inoculated with fresh Australian B.C.G.

## CONCLUSION.

16. It appears that the dry B.C.G. vaccine, as produced by the Pasteur Institute, Paris, is most suitable for use in the Colony of Fiji.

## REPORT ON MANTOUX TESTS MADE 12 MONTHS AFTER B.C.G. HAD BEEN GIVEN.

17. During 1950 a number of people who had been given B.C.G. in 1949 and who had been converted to mantoux positive six weeks after having the B.C.G. were re-mantoux tested twelve months later, i.e. during 1950.

*Fijians.*—Two small schools, Delainavesi and Draiba, in the Suva area were re-visited and a total of 39 individuals were mantoux tested with a dose of 1/10 cc. of a dilution of 1/1,000 old Tuberculin. Twenty-one individuals out of a total of 39 were still positive, i.e. 18 had reverted to a negative mantoux reaction, that is 46 per cent of the Fijians examined had reverted to mantoux negative. These people were re-vaccinated with B.C.G. without untoward effects, i.e. early specific reactions.

18. A second school, this time Indian, namely, Dudley House, was also re-visited. A total of 100 Indian girls completed a full mantoux test. All the 100 school girls were found to be mantoux positive with a dose of 1/10 cc. of 1/1,000 dilution of old Tuberculin.

19. No comments are to be made on this but further investigations will be necessary in the future.

PART VI—RADIOLOGICAL TUBERCULOSIS SURVEY UNDERTAKEN  
IN SUVA DURING 1950.

X-RAY FACILITIES AT PRESENT IN THE COLONY.

*Suva Area.*—The Colonial War Memorial Hospital is the general hospital supplying Suva and the surrounding provinces with radiological facilities. In this hospital there are two X-ray units. The first is a Watvic KX500 500 m.a. 4 valve preselector unit fitted with a rotating anode. This unit is working at 200 m.a. This is a non mobile unit but has been adapted to work with 100 mm. camera and photo fluorographic stand. During the first part of the year a 35 mm. camera was used but it was found too costly to run, i.e. the number of people recalled for a second X-ray due to technical faults and whose fares had to be paid, was far too high. The second is a Mattern mobile unit U.S.A. 100 volts.

2. The Tamavua Hospital (tuberculous patients only), situated five miles from Suva, is supplied with a Dean single valve 100 m.a. unit. This is a very old unit and is not adequate for the present requirements of Tamavua hospital itself.

*Lautoka Hospital.*—1 Watvic SF. 2 unit operated at 10 m.a. This is a small mobile unit used as a fixed stationary unit.

*Labasa Hospital.*—1 Watvic D.3. unit operating at 20 m.a.

*Makogai Leprosarium.*—1 Watvic SF. 2 unit operated at 15 m.a. used for leper patients and staff on the island of Makogai only.

FACILITIES AVAILABLE FOR RADIOLOGICAL SURVEY.

3. Although there are five hospitals in Fiji which have X-ray units available there is only one X-ray unit which is suitable in any way for mass radiological survey, namely the one at the Colonial War Memorial Hospital, i.e. this is the only unit which has a photo fluorographic stand and 100 mm. camera.

4. This unit is not ideal in the respect that it is not mobile and it is necessary to bring the individuals, at times appointed, to the hospital. Other disadvantages are that this unit is working continually, supplying a general hospital of 250 beds plus all the outpatients from Suva and the surrounding area, with a population of about 50,000.

5. However, an attempt was made and the following arrangements were tried. First, as in the previous year, school children were transported *en masse* from the schools in the Suva area on a Thursday and Friday afternoon, for radiological examination. The numbers were limited to 50 on each afternoon. Another arrangement was made with the people in charge of the offices in the Government Buildings whereby offices would permit six officers per day, at 11 o'clock in the morning, to go to the Colonial War Memorial Hospital for X-ray (100 mm. film). Unfortunately, although all these arrangements were made and appeared to be working satisfactorily, the scheme could not be continued because the X-ray plant at Tamavua Hospital was out of commission from 23rd December, 1949, to 30th August, 1950, and from 7th November, 1950, to 18th April, 1951.

6. This unfortunate occurrence whereby the high tension coils of the Tamavua Hospital X-ray plant had to be sent to New Zealand upset the programme completely, in that the Colonial War Memorial Hospital X-ray Department took over the X-raying of Tamavua Hospital inpatients, outpatients and contacts. The Colonial War Memorial X-ray Department stated that they could not possibly cope any longer with the mass survey.

7. In spite of this shortage of radiological facilities, the following survey was made:—

- (1) School children—See Table 1.
- (2) Adults—See Table 2.

*Radiological Evidence of Tuberculosis.*

8. In the case of school children, evidence of a healed primary tuberculosis is placed in the arrested group. Healed primary tuberculosis is very seldom seen in the X-rays of adult Fijians and so is not included in the tables. Adhesions, tenting of the pleura, obliteration of the costo phrenic or cardio phrenic angles are very common in Fiji but are not always due to Tuberculosis. These have not been counted in the above statistics. The figures are obtained on purely active Tuberculosis and arrested Tuberculosis as shown by fibrosis in the parenchymatous tissue of the lungs.

9. The figures obtained for school children (all children X-rayed were mantoux positive at 1/10 cc. of 1/1,000 dilution old Tuberculin) when compared with the known mantoux reactions for the Colony, agree with the findings elsewhere in the world in that most children pass safely through the primary stage without developing active clinical Tuberculosis. Similar statistics can be expected for the rest of the group, urban or rural, on the evidence so far available.

10. The adult statistics obtained, viz, five active and eight arrested cases in 527 adults of all races, cannot be used for the rest of the population. This statement is made on the following facts:—

- (1) Three active cases of Tuberculosis from the group investigated were hospitalized before the survey began.
- (2) The percentage of Europeans was greater in the investigated group than in the rest of the community. Also the Europeans live under better conditions than the rest of the population. The mantoux index of European children is much less than that for the other communities.
- (3) The Fijians and Indians investigated were clerical groups in sedentary occupations and probably higher salaried than the unskilled workmen.
- (4) All people were town dwellers and their housing conditions are entirely different from those of the Fijian villagers and Indian tenant farmers.

## CONCLUSION.

11. An accurate radiological survey cannot be undertaken in Fiji until a mobile X-ray is obtained. The mass mobile and mobile diagnostic X-ray units now on order will complete this gap in diagnostic and survey facilities.

The figures obtained in Suva, viz.,

- (1) thirteen cases with evidence of Tuberculosis per 527;
- (2) five active cases of Tuberculosis per 527; and
- (3) eight arrested cases of Tuberculosis per 527,

are probably well below the actual statistics which will be obtained in the whole community.

## CLINICAL SURVEY.

12. The island of Moturiki is situated in the Lomaiviti group. It is within easy access of Suva but in order to obtain a radiological survey, the population would have to be transported by boat and road to the capital where the nearest X-ray machine is available.

13. The survey was finally arranged by Assistant Medical Practitioner Peni Vuiyale visiting the island and remaining there for two weeks. The results obtained can be grouped as follows:—

- (1) Mantoux index of whole population. These tables are supplied in the earlier part of this report.
- (2) Clinical examination of the whole population and radiological examination of suspects found.

There were 544 people, all Fijians, living on the island at that time. All were clinically examined and a total of 21 brought to Tamavua for radiological examination. Of these 21 people,

- one showed Chronic Fibroid Tuberculosis, sputum positive for M. Tuberculosis,
- two (Aunt and Niece) congenital cystic disease of right lower lobe,
- three Lung Fields Clear but clinical evidence of Bronchitis. Sputum negative on direct smear for M. tuberculosis,
- one Bronchiectasis,
- fourteen Lung Fields Clear.

14. The island of Moturiki is quite small. There are nine villages which are very close together and one district school which is attended by the children from all the villages. Seven villages are within one hour's walk of each other.

15. The one case of active tuberculosis discovered was chronic fibroid in type. His history was that he felt quite well, was not ill but had had a cough with a small amount of expectoration for many years.

16. Although only one active case of tuberculosis was found it does not mean that others could not be present. On the other hand, with such a small community, it is quite feasible for this man to have acted as "the old seeder" and be the cause of the high tuberculin index in the young children.

*Other Information Concerning Tuberculosis on Moturiki.*

17. Besides the local population of the island there were a number of native Government personnel normally resident there but these people were on leave at the time of the survey. Radiological examination of these people revealed—

One female school teacher with a healed focus at the right apex: previously unknown to us but who is a contact of her father (positive sputum case 1945). The latter is still alive.

One Male school teacher who had received treatment at Tamavua Hospital in 1947 and had been under observation at three monthly intervals since. At no time had this man been found to have a positive sputum by direct smear concentration or guinea pig inoculation.

One male agricultural officer whose lung fields were clear but who had had a spontaneous pneumothorax two years previously.

Four other members of the community showed no evidence of pulmonary tuberculosis.

18. At the time of the survey one member of this Government team, a Fijian Mosquito Control officer, was a patient in Tamavua Hospital suffering from Tuberculous Polyserositis. His sputum was positive for Tuberculosis.

*Comparison of Results of Survey and the Types of Tuberculosis as seen in Hospital Practice.*

19. As Medical Officer in Charge of Tamavua Tuberculosis Hospital since its opening in 1946 I have seen a few thousand X-rays of Pulmonary Tuberculosis. Most of these X-rays have been received from the general hospitals in Suva, Lautoka and Labasa and have been of all races. The impression gained has been that—

- (1) The Europeans tend to react to Tuberculosis as in temperate climates.
- (2) That the Fijians tend to give a greater percentage of Pulmonary Tuberculosis of an acute type with rapid liquefaction and caseation.
- (3) That the Indians tend to give a much higher percentage of Chronic Pulmonary Tuberculosis than the Fijians but probably less than the Europeans.
- (4) That the Chinese show Chronic Pulmonary Tuberculosis on most occasions and that caseation is less than in the Indians.

20. These observations, although still true for hospital practice, are altered in the field of survey in that all active cases discovered in Fijian adults have been of the chronic fibroid pulmonary tuberculosis type and that the patients have not been unduly inconvenienced or worried by a long standing chronic cough with expectoration. They have been living quite normal lives and are probably the old seeders who are the cause of the tuberculous infection in their compatriots who develop acute disease.



TABLE No. 1—SCHOOL CHILDREN.

School	Total Examination	Total showing evidence of tuberculosis	Total new cases active disease	Total new cases arrested disease.	Total known cases arrested disease	Total known cases re-activation of disease	Remarks
Methodist Boys ..	489	2	0	2	0	0	A school teacher with positive sputum.
Samabula Government	171	1	1	0	0	0	
St. Annes .. ..	371	2	1	1	0	0	
Total .. ..	1,031	5	2	3	0	0	

TABLE No. 2—ADULTS.

School Departments, etc.	Total Examined	Total showing evidence of tuberculosis	Total new cases active disease	Total new cases arrested disease	Total known cases arrested disease	Total known cases re-activation of disease	Remarks
Teachers' Training ..	97	0	0	0	0	0	New case sputum positive.
College	35	1	0	1	0	0	
Suva Food Handlers ..	75	2	1	1	0	0	
H.M. Gaol, Suva—							1 positive sputum
Warders .. ..	47	1	0	1	0	0	
Prisoners .. ..	44	2	2	0	0	0	2 tuberculosis patients with positive sputum were found before survey began.
Govt. Departments—							
Audit .. ..	9	0	0	0	0	0	1 tuberculosis patient found earlier in the year before survey began.
Lands .. ..	33	0	0	0	0	0	
Forestry .. ..	27	3	1	1	0	1	1 patient had been under treatment 2½ years before but had been living under different parts and had not been treated.
Secretariat .. ..	53	3	0	4	2	0	
Fijian Affairs Board	9	1	0	0	1	0	
Education .. ..	27	0	0	0	0	0	
Mosquito Control ..	19	0	0	0	0	0	
Medical .. ..	22	0	0	0	0	0	
Native Lands Com.	10	0	0	0	0	0	
Public Relations ..	14	0	0	0	0	0	
Legislature .. ..	2	0	0	0	0	0	
Cleaners .. ..	4	0	0	0	0	0	
Total .. ..	527	13	4	5	3	1	

## PART VII—COLONY REGISTRATION OF TUBERCULOSIS.

## HISTORY.

Prior to 1946 new cases of tuberculosis were registered with other infectious diseases registrations. No separate register was maintained.

2. In 1946 a separate register was organized at Tamavua and an attempt was made to register new cases notified in previous years. This was found well nigh impossible as the Colony infectious diseases registration books had been burnt accidentally.

3. The new register was made on the usual pattern, dividing notifications by race, sex, age, type of tuberculosis and date of first symptom. Difficulties arose in trying to obtain all these facts from the infectious diseases notification form in use at that time and separate forms were issued for the use of Medical Officers and Assistant Medical Practitioners. These forms have been successful in the towns of Suva, Lautoka and Labasa and also in the immediate areas surrounding these three towns.

4. Assistant Medical Practitioners in other outlying stations have found difficulty in sending patients to these centres for investigation. This has meant that our notifications are divided into two groups, i.e. firstly those in which full investigation has been made by X-ray, sputum and clinical examination and, secondly, those reported by the outlying Assistant Medical Practitioners on physical examination only. This has produced difficulties in making a complete register as it is quite likely that a number of cases notified as tuberculous on physical examination alone may not have been suffering from tuberculosis.

## NOTIFICATIONS OF DEATHS IN THE COLONY.

5. During 1950 an investigation was made into the notification of deaths register with the following results:—

66 per cent of Indian deaths were notified by death certificates signed by Medical Officers or Assistant Medical Practitioners. The rest of the notifications were by non medical men.

32.2 per cent of Fijian deaths only were notified by certificates of Medical Officers and Assistant Medical Practitioners. The rest came from the Buli, Turaga ni Koro and non medical men. This is quite understandable in a country which still relies mainly on waterways for means of travel and where the Indians, as a group, are living in or near the main towns, whereas the majority of Fijians live in scattered villages throughout the group of islands.

TABLE SHOWING NEW TUBERCULOSIS CASES REGISTERED BY RACES IN 1946 AND THE NUMBER OF THESE NOTIFICATIONS, WHICH HAVE DIED DURING SUCCEEDING YEARS.

Race	Registered in 1946	Number of Deaths					Total
		1946	1947	1948	1949	1950	
Fijian .. .. .	246	84	31	11	3	5	134
Indian .. .. .	95	26	6	3	2	3	40
Others .. .. .	33	6	1	1	1	....	9
Total .. .. .	374	116	38	15	6	8	183
Died in Tamavua Hospital .. .. .		21	17	14	4	5	52
Died elsewhere .. .. .		95	20	11	2	3	131

TABLE SHOWING NEW TUBERCULOSIS CASES REGISTERED BY RACES IN 1947 AND THE NUMBER OF THESE NOTIFICATIONS, WHICH HAVE DIED DURING SUCCEEDING YEARS.

Race	Registered in 1947	Number of Deaths				Total deaths
		1947	1948	1949	1950	
Fijian .. .. .	285	140	26	9	2	177
Indian .. .. .	87	31	6	4	1	42
Others .. .. .	65	36	4	2	1	43
Total .. .. .	437	207	36	15	4	262
Died in Tamavua Hospital .. .. .		18	18	10	4	50
Died elsewhere .. .. .		189	18	5	....	212

TABLE SHOWING NEW TUBERCULOSIS CASES REGISTERED BY RACES IN 1948 AND THE NUMBER OF THESE NOTIFICATIONS, WHICH HAVE DIED DURING SUCCEEDING YEARS.

Race	Registered in 1948	Number of Deaths			Total deaths
		1948	1949	1950	
Fijian .. .. .	334	99	39	6	144
Indian .. .. .	148	24	8	2	34
Others .. .. .	75	23	7	1	31
Total .. .. .	557	146	54	9	209
Died in Tamavua Hospital .. .. .		23	20	5	48
Died elsewhere .. .. .		123	34	4	161

TABLE SHOWING NEW TUBERCULOSIS CASES REGISTERED BY RACES IN 1949 AND THE NUMBER OF THESE NOTIFICATIONS, WHICH HAVE DIED DURING SUCCEEDING YEARS.

Race	Registered in 1949	Number of Deaths		Total deaths
		1949	1950	
Fijian .. .. .	290	66	38	104
Indian .. .. .	118	14	9	23
Others .. .. .	57	21	5	26
Total .. .. .	465	101	52	153
Died in Tamavua Hospital .. .. .		11	22	33
Died elsewhere .. .. .		41	79	120

TABLE SHOWING NEW TUBERCULOSIS CASES REGISTERED BY RACES IN 1950 AND THE NUMBER OF THESE NOTIFICATIONS, WHICH HAVE DIED DURING THE YEAR.

Race	Registered in 1950	Died in 1950	Total deaths
Fijian .. .. .	276	62	62
Indian .. .. .	105	8	8
Others .. .. .	45	9	9
Total .. .. .	426	79	79
Died in Tamavua Hospital .. . . .		22	....
Died elsewhere .. .. .		57	....

TABLE SHOWING NEW TUBERCULOSIS CASES REGISTERED AND THE NUMBER WHICH DIED IN 5 YEARS, 1946—1950.

Year	Number Registered	Fijian	Indian	Others	Number of Deaths			Total deaths	Place of death	
					Fijian	Indian	Others		Tamavua	Elsewhere
1946 .. .. .	374	246	95	33	84	26	6	116	21	95
1947 .. .. .	437	285	87	65	140	31	36	207	18	189
1948 .. .. .	557	334	148	75	99	24	23	146	23	123
1949 .. .. .	465	290	118	57	66	14	21	101	79	22
1950 .. .. .	426	276	105	45	62	8	9	79	22	57
Grand Total ..	2,259	1,431	553	275	451	103	95	649	163	486

6. Taking the above facts into consideration it will be seen that, although the figures supplied from the information obtained are accurate as far as possible, they do not give the full number of new cases of tuberculosis in any one year or the full number of deaths from tuberculosis in a year. The tables given above are accurate figures, so far as we have been able to ascertain, although the deaths are much lower than they should be and further information concerning deaths in any one year will probably be at hand at a later date. This information is obtained by sending letters to the Turaga ni Koro requesting information concerning people known to be suffering from tuberculosis. If they are stated to be dead further information is requested from the Provincial Scribe. Many replies are still awaited.

7. The above tables, obtained over the last few years show that—

- (1) The total notifications of new cases of tuberculosis in the Fijian race, in any one year, is greater than the combined total for the rest of the community in the same period.
- (2) That the Fijian deaths in the same year as notification are greater than the combined death total for the rest of the community.
- (3) That pulmonary tuberculosis appears to be a far greater menace to the Fijian race than to the Indian race.

8. Most of the X-rays and examinations observed in the Fijian people, seen in the out-patients and inpatients departments of Tamavua Hospital, tend to show acute types of pulmonary tuberculosis but, as stated previously, the preliminary survey has shown active chronic fibroid tuberculosis with reasonable health.

9. These tables of notifications and subsequent "follow up" agree with the findings of clinical mantoux and radiological surveys and also hospital practice.

L. G. POOLE,

Medical Officer in Charge, Tamavua Hospital.

## APPENDIX III

## Meteorological Reports for the year 1950.

## LAUCALA BAY.

Rainfall—
Total—127·91"
Normal—for . . . years
Departure from normal— . . .
Wet days (0·01 or more)—24·3
Wettest day—6·78" on January 15.
Temperatures—
Mean Maximum—82·5.
Highest recorded—91·1 on 3/2/50 and 12/2/50.
Mean minimum—72·0.
Lowest recorded—62·0 on 15/7/51.
Mean Temperature $\frac{1}{2}$ (Max. + Min.)—77·3
Departure from normal— . . .
Mean Temperature at 8 a.m.—76·8.
Humidity—
Mean Humidity at 8 a.m.—86·1 per cent.
Bright Sunshine—
Total Hours—1900·0.
Mean Daily—5·2.

## SUVA.

Rainfall—
Total—141·51".
Normal—123·43" for 63/64 years.
Departure from normal—18·08".
Wet days (0·01 or more)—241.
Wettest day—7·23" on January 15.
Temperatures—
Mean Maximum—83·3.
Highest recorded—93·2 on 18/2/50.
Mean Minimum—72·1.
Lowest recorded—63·0 on 15/7/50.
Mean Temperature $\frac{1}{2}$ (Ma. = Min.)—77·7
Departure from normal—0·6.
Mean Temperature at 8 a.m.—77·2.
Humidity—
Mean Humidity at 8 a.m.—84·2 per cent.

*Notes.*—The exceptionally wet conditions which persisted throughout 1949 continued into January, 1950, establishing a new record for 12 consecutive months, the total fall for the period (1st February to 31st January, 1950 being 226·48). Subsequently there was considerable improvement and some fair to fine periods occurred particularly in June, July, August, October and December. The total rainfall for the year, however, was well in excess of the normal.

The mean temperature (at Suva) was 0·6 degrees above the normal. February was the hottest month with December only half a degree cooler and July the coolest.

The prevailing wind direction was SE. but was mainly E. during the summer months and NE. in March. Gales occurred in February and March and the maximum wind velocity recorded was 59 m.p.h. from NE. on March 30th.

There were 75 days with thunderstorms. They occurred in the summer months, November and December having 15 days each. Some of them were severe and prolonged.

Tropical cyclones occurred in February and March there being two of moderate intensity in the former month and a rather more severe one, which reached hurricane force in the Western portions of the Group, on March 30th caused minor damage.

