REFRESHER COURSE ON INTEGRATED RURAL HEALTH
for Assistant Medical Officers in the South Pacific

Apia, Western Samoa
2 November to 11 December 1961
This report has been prepared by Dr. W. Norman-Taylor, M.D., D.P.H., Course Director and Public Health Officer, South Pacific Commission, for Governments of Member countries in the South Pacific area and for those who participated in the Refresher Course on Integrated Rural Health, Apia, 1961. A limited number of copies are available on request to persons officially or professionally concerned in this field of study.
REPORT OF THE
REFRESHER COURSE ON INTEGRATED RURAL HEALTH
FOR ASSISTANT MEDICAL OFFICERS
IN THE SOUTH PACIFIC

APIA, WESTERN SAMOA
2 NOVEMBER TO 11 DECEMBER 1961

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## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Staff</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Participants</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Planning the Course</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Course Content and Method</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Evaluation</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Accommodation</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Acknowledgements</td>
<td>10</td>
</tr>
</tbody>
</table>

### Appendix A - Summaries of Lectures

- **Rural Health Services** - W. Norman-Taylor, C.N. Derek Taylor and A. Levestam | 15-24
- **Surveying Public Health** - A.C. Reyes and T. Fa'aluaso | 25-50
- **Maternal and Child Health** - A. E. Wilmot | 51-74
- **Nutrition** - A. E. Wilmot | 75-90
- **Control Measures in a Tuberculosis Programme** - E. S. Han | 91-96
- **Leprosy** - D. W. Beckett | 97-104
- **Environmental Sanitation** - B. L. Adam and R. L. Hall | 105-120
- **Principles and Planning in Health Education** - L. J. Martin | 121-128
- **Agriculture and Health** - P. Newell | 129-132

### Appendix B - Report on the Falealili Health Survey | 133-152
### Appendix C - Programme of Studies | 153-162
### Appendix D - "Half-Way" Evaluation Sheet | 163-166
### Appendix E - Final Evaluation Sheet | 167-170
1. INTRODUCTION

The Assistant Medical Officers of the South Pacific form a rather unique body of medical practitioners. They are, with one or two exceptions, all graduates of the Fiji School of Medicine, Suva, where they received a three-year, or in the case of those qualifying in recent years, a five-year course of training. For seventy-five years they have been serving the islands, many of them working single-handed on remote atolls, often far from all specialist help, and they have, for the most part, a fine record to their credit.

Public health has always formed an important part of their work. They have taken an active part for example in the various campaigns against such diseases as yaws, tuberculosis and leprosy. As has been the case all over the world, increasing attention has been given to the teaching of public health in the curriculum. In 1958 the Nuffield Department of Social and Preventive Medicine was added and full-time lecturers in this subject and in sanitation were appointed. A post-graduate course lasting six months, leading to the Certificate of Public Health, is now given in the school. This is principally intended for those who will specialise in some aspect of public health.

The large majority of assistant medical officers are working in rural districts. Usually there is a hospital or dispensary of which they are in charge, and one or two nurses, midwives or nurse/aids to help them. There may or may not be a sanitary inspector. The assistant medical officer is responsible for all curative work in the area, and for such public health activities as fall to his lot.

For the older assistant medical officers, those qualifying before public health received its present emphasis, there appeared to be an urgent need to provide an opportunity of acquiring more of a public health outlook. For others there was, in any case, a need to keep up to date with the changing aspects of public health, the domiciliary treatment of leprosy or the modern views on infant nutrition, to give but two examples.

A refresher course of this nature was arranged by the World Health Organization in 1957, which was attended by 22 practitioners in two sessions each of six weeks. It was the success of this course, and the interest aroused, which led to the decision to arrange a similar course in 1961. The present course was organised by the World Health Organization jointly with the South Pacific Commission.

2. STAFF

The Public Health Officer of the South Pacific Commission, Dr. W. Norman-Taylor, was Course Director. The WHO Regional Education and Training Adviser attached to the Manila Office, Dr. A. C. Reyes, attended for the first three weeks as Operations Officer. As full-time consultant
we were fortunate in obtaining the services of Dr. A. Elizabeth Wilmot, Head of the Maternal and Child Welfare Branch of the Department of Health of the State of Victoria, Australia. Other staff who attended the course in a part-time capacity were Miss L.J. Martin, South Pacific Commission Health Education Officer, Mr. B. Adan, WHO Public Health Engineer, and Dr. C.N.D. Taylor whose services were generously loaned by the Government of New Zealand to assist the Government of Western Samoa which had offered to act as host country for the course.

Organising Staff

Dr. W. Norman-Taylor (Course Director)
South Pacific Commission
Nouméa, New Caledonia

Dr. A. C. Reyes (Operational Officer)
WHO Regional Office for the
Western Pacific
P.O. Box 2932
Manila, Philippines

Dr. A. Elizabeth Wilmot ¹ (WHO Consultant on Maternal & Child Welfare)

Visiting Lecturers

Dr. Eung Soo Han
WHO Tuberculosis Adviser
Apia, Western Samoa

Mr. B. L. Adan
WHO Public Health Engineer
Nuku’alofa, Tonga

Miss L. J. Martin
South Pacific Commission
Nouméa, New Caledonia

Dr. C. N. Derek Taylor
Department of Health
Box 5013
Wellington, New Zealand

¹Seconded from the State Department of Health, Melbourne, Victoria, Australia.
Health Department Staff

SMP Tapeni T. Fa'ai'usaso (Liaison Officer)
Health Education Officer

Miss Momoi Kuresa
Senior District Nurse

Mr. R. A. Hall
Chief Health Inspector

Mr. P. Rasmussen
Bacteriologist

Other Local Lecturers

Mr. D. Collins
Dental Officer

Mr. A. Levestam
Secretary to the Prime Minister's Department

Mr. P. Newall
Agriculture Department

Mrs. M. Mata'afa
President
Central Women's Committee

SMP Tautasi Leota
Public Health Officer

3. PARTICIPANTS

Fellowships which enabled the following persons to attend the Course were provided by the World Health Organization. It is regretted that the distribution was not more representative of the area as a whole. The difficult, uncertain and costly methods of travel made timing of arrival and departure difficult in some cases. The following persons participated:

AMO Henry K. Carlo
Health Department, New Hebrides

SMP Lakepe Esera
Health Department, Motootua, Apia, Western Samoa

SMP S. Leutala Levi
Health Department, Apia, Western Samoa

SMP Afa T. Malau'ulu
Medical Services, Box 66, American Samoa
The participants divided themselves, for study and social purposes, as follows:

Working Committee

AMO Ganga Ram
MO Mumui Tatola (Convener)
SMP Iakopo Esera
AMO Harry Nemaia
4. PLANNING THE COURSE

The amount of public health work undertaken by assistant medical officers, and its nature, varies from territory to territory. In some islands there appears to be little in the way of a planned public health programme to follow. In others, such as New Guinea where there are the interesting health centre projects near Rabaul, detailed comprehensive promotive health programmes have been evolved. Nor is there any uniformity with regard to the responsibilities for public health as between central and local government.

In planning a course to meet the varied needs of the participants it was first necessary to define what we mean by "integrated rural health". In the WHO Report on "Methodology and Planning of Integrated Rural Health Services,"¹ which was used as the background material for the whole course,

¹WHO Tech. rep. Ser. (1954), 83
integrated rural health is defined as "the service necessary for the health protection of a given area and provided either under a single administration, or under several agencies with proper provision for the co-ordination of their services."

For the purposes of this course, rural public health was taken to be divisible into three main components: (1) preventive medicine, the control of communicable or preventable diseases; (2) promotive health, particularly maternal, infant, and school health, nutrition and social medicine; and (3) environmental sanitation. These three aspects need to be integrated with each other, on the one hand, and with the curative and hospital programme on the other. It was felt that each of these three aspects would need to be in the hands of separate staff members. Health education, as an important ingredient in all three aspects, was felt to be an essential additional subject. Finally, in the realization that district medical officers are not only physicians in the technical sense but are also government officials with certain duties to perform, it was felt that aspects of public health administration should also be added to the syllabus.

5. COURSE CONTENT AND METHOD

5.1 Purpose of the course

To help the participants to undertake with confidence and efficiency an integrated rural health programme.

5.2 Objectives

5.2.1 General objectives

To introduce the concept of integrated rural health services, to give a knowledge and understanding of the principal duties in this respect and to give an opportunity for acquiring the experience and skills necessary for the efficient execution of those duties.

5.2.2 Contributory objectives

(1) To study the principal health needs of people living in rural areas, particularly fields in which assistant medical officers can help to improve their health, protect them from ill-health and restore them to full health where health has been impaired.

(2) To study methods by which such assistance can be given.

(3) To acquire the necessary knowledge and skills to enable this assistance to be given.

5.3 Syllabus

(1) Principles of integrated community health practice, including health surveys.
(2) Maternal and child health, including infant welfare and the child of school age.

(3) Principles of nutrition, recognition of nutritional deficiencies and the study of dietary patterns.

(4) Communicable diseases, their recognition and control.
   (a) general, including common infectious diseases
   (b) tuberculosis
   (c) filariasis
   (d) leprosy
   (e) yaws

(5) Rural sanitation
   (a) water
   (b) latrines
   (c) refuse
   (d) control of common vectors (flies, mosquitoes)
   (e) home and food sanitation.

(6) The application of the principles of health education in each of these fields.

(7) Administrative procedures, records and basic statistics.

The basic theme in the course was the concept that the community can be regarded as our patient and that the basic medical principles of examination, diagnosis and remedy are equally applicable as in every day medical practice. Stress was therefore laid on health survey work and statistics as an essential part of public diagnosis, the preliminary to applying the remedies available to us under the headings of public health and preventive medicine.

Throughout the course too, every endeavour was made to provide opportunities for acquiring practice in the necessary skills and procedures. Field demonstrations were given in environmental sanitation, demonstration and practice clinics were arranged for the study of maternal and child health, and exercises in epidemiology were provided. (An outbreak of food poisoning which affected 14 out of 22 staff and students also provided an unlocked-for opportunity for an epidemiological investigation). One of the major aspects of the course was a field exercise lasting a week during which an attempt was made to make a complete health survey and analysis of health needs in a rural district.

Summary of lectures

It is felt that much of the work that has been put into preparing the lectures for this course deserves to be preserved for the benefit of a wider circle than the seventeen actual participants. During the course all
lectures, and most of the practical work, were issued to the participants as duplicated documents. Some 85 documents were issued in all, including notices and announcements, amounting to over 350 pages of typescript. It is not possible to reproduce this quantity of material, but Appendix A is a synopsis of the strictly practical or applicable content of the lectures, which, it is hoped, will make interesting and useful reading for others. The subject matter has been classified as follows:

(1) Rural health services
(2) Surveying public health
(3) Maternal and child health
(4) Nutrition
(5) Tuberculosis
(6) Leprosy
(7) Environmental sanitation
(8) Health education
(9) Agriculture and health

In addition the following documentation was issued to the participants:

1. WAGNER, E. G. & LANOIX, J. N.
   Excreta disposal for rural areas and small communities.
   WHO Monograph Series No. 39.

2. WAGNER, E. G. & LANOIX, J. N.
   Water supply for rural areas and small communities.
   WHO Monograph Series No. 42.

3. AMERICAN PUBLIC HEALTH ASSOCIATION.
   Control of communicable diseases in man. 9th ed.

4. WORLD HEALTH ORGANIZATION.
   International standards for drinking-water.

5. DATTA, S.P. & GUPTA, S.R.
   Development of an urban health centre and practice field for training undergraduates in preventive and social medicine.
   (unpublished)
   Issued by WHO SEARO, New Delhi.
In Appendix B will be found the Report on the Falealuli Health Survey, which is the combined report of the four groups which took part.

Appendix C is a copy of the Programme of Studies which was given to each participant at the beginning of the course. This was the course time-table, and, like most time-tables, it was not exactly followed as written.

5.5 Comments

5.5.1 When teaching public health sooner or later one comes up against the question: What is the legal status of the medical officer in this connection? During the course the assumption was made that the medical officer (or assistant medical officer) is the official health officer (medical officer of health) for his district, and has the powers and responsibilities attached to such a post. In fact, for many participants this was not, and could not be, the case in their own territories.

5.5.2 In studies on the work of auxiliary personnel, or the lower ranks of medical personnel, the importance of central supervision ("encouragement" would be a better word) is continually being stressed. The vital importance of this, as an essential part of the implementation of this course, became apparent during discussions. Territorial health directors are asked therefore to pay particular attention to an intelligent follow-up of the participants. They should not simply send the assistant medical officer out to the district and expect him to "get on with it." There must be a centrally decided public health programme, preferably a uniform one for all districts, though with provision for local modifications if it were necessary, under the direction of a central medical officer. All that this course can hope to have accomplished is to equip the participants to carry out their public health duties more effectively.

5.5.3 In discussions it also was clear that, in some cases, there was an urgent need for a refresher course in general medicine. Some of the participants had been left out in remote district stations literally for years, with never a visit from anyone in higher authority except perhaps for accounting purposes. Since curative medicine is an essential part of "integrated" rural health, the writer may be permitted to trespass on the clinical field and urge directors to ensure that adequate opportunities for keeping up to date in clinical medicine are provided, either by rotation at a central hospital or by teaching by senior medical officers on special tours of the rural areas.

6. EVALUATION

Evaluation questionnaires were given out midway through the course and at the end. The discussions accompanying the first evaluation revealed
a high degree appreciation of the points being made and an acceptance of the public health outlook. Copies of the questionnaires are given in Appendices D and E.

It was of interest to note that while there was general agreement in the half-way questionnaire that the course was too short and though this was still the view stated in the final evaluation, it was evident to the staff that interest was beginning to flag after five to six weeks and it is the opinion of the Director that six weeks is as much as can be taken in a concentrated course of this nature.

No formal examination was held, but each participant was asked to write an account of what he had learnt on one of four topics. The quality of the resulting exercises was not up to expectations in many cases. It is difficult to determine whether this is due to the inability of the participants to grasp the subject matter, thus indirectly reflecting on the manner some of the courses were presented, or to the fact that the exercise was unannounced, hence the participants were notable to organize their thoughts properly.

A "Certificate of Attendance" was given to each participant at the conclusion of the course.

7. ACCOMMODATION

Participants and male staff members were accommodated, by courtesy of the Nelson Estate, Tuaefu, Apia. Lectures, etc., were held in the ground floor rooms, where there was also ample provision for staff offices, workshops, etc. The fact that the participants and some consultants stayed under the same roof provided ample opportunities for informal exchange of ideas. The arrangement also facilitated the giving of extra sessions and tutorials during the evenings upon request of the participants. Film showings were given at night followed by group discussions.

8. ACKNOWLEDGEMENTS

The success of a course such as this depends primarily upon the co-operation of all concerned with the course.

The participants one and all showed a keenness to learn and a capacity for work which made teaching and working with them a pleasure. It is expected that the knowledge and experience they have gained will be passed on to the peoples of the various territories in which they serve.

Grateful acknowledgement is given to the Government of Western Samoa for so generously providing staff and other facilities and making
all the necessary arrangements which made the course possible.

Acknowledgement is also extended to the owners of Nelson Estate for their kindness in making available Nelson Residence as the site of the course.

Finally we wish to express our thanks and appreciation to the Samoan people in general for all the hospitalities and courtesies they have extended to the participants and staff.
APPENDIX A

Summaries of Lectures
# RURAL HEALTH SERVICES

(Synthesis of lectures by Dr. W. Norman-Taylor, Dr. C.N. Derek Taylor, and Mr. A. Levestam)

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOCAL GOVERNMENT</td>
<td>17</td>
</tr>
<tr>
<td>1.1</td>
<td>Some general observations</td>
<td>17</td>
</tr>
<tr>
<td>1.2</td>
<td>Position in under-developed territories</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>LOCAL GOVERNMENT HEALTH SERVICES</td>
<td>17</td>
</tr>
<tr>
<td>2.1</td>
<td>Introduction</td>
<td>17</td>
</tr>
<tr>
<td>2.2</td>
<td>Organisation and administration of Local Council Services</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>DISTRICT HEALTH UNITS</td>
<td>21</td>
</tr>
<tr>
<td>3.1</td>
<td>Activities of a district health unit</td>
<td>21</td>
</tr>
<tr>
<td>3.2</td>
<td>Premises required</td>
<td>22</td>
</tr>
<tr>
<td>3.3</td>
<td>Staffing of a district health unit</td>
<td>22</td>
</tr>
<tr>
<td>3.4</td>
<td>Duties of District Medical Officer</td>
<td>22</td>
</tr>
<tr>
<td>3.5</td>
<td>Aims of a district health centre</td>
<td>23</td>
</tr>
</tbody>
</table>
1. LOCAL GOVERNMENT

Local Government means authority to determine and execute measures within a restricted area smaller than the whole state. The authority must be given by the Central Government and would normally be by means of statute.

1.1 Some general observations

(1) Under local government the people can have a closer and more direct interest in providing services for themselves;

(2) by contributing to the local authority for local work people can see that their money is spent on useful things for the good of the community;

(3) local government prevents the accumulation of too much power in the central government where it is not exercised as sympathetically.

(4) local government helps the political and social education of the people.

Generally speaking, functions of predominantly local interest within the financial and administrative ability of a local authority are best done by a local authority and not by the central government.

1.2 Position in under-developed territories

There is a strong argument for promoting local government in under-developed territories as part of the social and political education of the people. Local government is, however, often limited by lack of competent staff and finance for which local and central government compete. Some take the view that in countries with limited education facilities, few trained personnel, and limited financial resources, it is better to concentrate the resources available, both financial and human, in building first a strong central government. Even where there is no formal structure of local government the people in the districts should be encouraged to participate in and assist central government projects through traditional or informal bodies. At a later stage these could be replaced by formal statutory local authorities.

2. LOCAL GOVERNMENT HEALTH SERVICES

2.1 Introduction

The basic health services required by any local community can be briefly summarized as follows:
(i) medical care, and transport of specialist care;
(ii) maternal, child and school health;
(iii) environmental sanitation, including pure water and food supplies.

In developing countries it is usually neither essential nor financially possible to provide fully trained staff to man these services. Partially trained auxiliary staff are therefore usually employed instead.

There is a limit to the extent of direct activities in rural health which can be undertaken by the central government. Expansion should not only be financed at a local level, but responsibility for maintenance and execution should be also shouldered at a local level.

Auxiliary staff engaged in rural health work are:

dressers, who have received an old style training now discontinued;
medical assistants, who have received the full nursing training;
assistant health inspectors, locally trained, or sanitary aids;
nurses, who have received the full nursing training, including midwifery and child health;
midwives, usually partially trained.

Local staff are usually recruited locally, and paid out of local funds.

The intention is that medical assistants and nurses should work together as a team, assisting and supplementing each other's work.

Where no health inspectors are employed by local councils, the district health inspector should advise local councils, give technical advice and carry out inspections on their behalf. Where local councils wish to employ their own sanitary aids they may be encouraged to do so, if the extent of local sanitary problems warrants it.

Supervision of local government rural health centres is carried out by district medical officers or assistant medical officers. Missions supervise their own outstations, keeping the district medical officer informed.

2.2 Organisation and administration of Local Council Services

(1) Local councils should be asked to ensure that in each community the following facilities are provided:

(a) Medical care, at rural health clinic level. This includes the rural clinic building (which should
be up to government specification), feeding of patients and the recruitment and salary of the dresser or medical assistant. Drugs and equipment are usually provided free of charge by the central government.

(b) Transport, particularly between rural health clinics and hospital.

(c) Midwifery, at a domestic level or by the provision of a maternity centre, and child and school health care.

(d) Environmental sanitation

(i) pure water supplies,
(ii) cleanliness of public places,
(iii) provision for the hygienic disposal of refuse,
(iv) public latrines,
(v) the enforcement of certain aspects of domestic hygiene, e.g. house siting, design and construction, overcrowding, cleanliness, private latrines, etc.,
(vi) inspection of food stores, bakehouses, etc.

(2) Model by-laws should be drawn up by the Central Government Health Adviser. These may be adopted in part or in whole by local councils.

(3) Where necessary local councils should receive grants or subsidies towards capital expenditure and/or salaries. These would be conditional upon conformity with previously agreed conditions.

(4) Government officers supervising rural health services would be:

(a) district medical officer, in his capacity as district medical officer of health or his deputy: overall supervision including clinical supervision;

(b) district sister: maternal, child and school health services;

(c) district health inspector: environmental sanitation activities on behalf of local councils (not on behalf of the central government, since environmental sanitation is to be a local government function);

(d) district administrative officers: advice to local councils on environmental sanitation.

(5) All supervisory officers should undertake health education, acting on the advice of the health education officer.
(6) Visits to rural health centres by supervising officers should ideally be made at regular and frequent intervals, e.g. once a month.

(7) Supervision of mission rural clinics should be undertaken by mission doctors only in regard to medical treatment and maternal and child health. If other public health activities in such areas are undertaken by missions it should be in collaboration with the government officer responsible.

(8) All advice given officially by medical department staff to local personages, headmen and others should be embodied in a report in writing through the district medical officer to the local council and district commissioner.

(9) No official action with a bearing on health should be taken by local councils without prior consultation with the district medical officer in his capacity as their medical officer of health. He should be invited to attend all council meetings and be given copies of agenda and minutes.

(10) The role of the central government medical service in respect of rural health would be confined to:

(a) ascertainment of local needs and making proposals for plans to meet the requirements;

(b) evaluation of the services provided;

(c) advising local councils and providing technical assistance in carrying them out;

(d) laying down standards of desirable practice and of recording;

(e) training and re-training of auxiliary staff;

(f) supervision of the activities of auxiliary staff and, where necessary, organising their work;

(g) provision of drugs and equipment according to a scale laid down by the Central Government;

(h) safeguarding the security of tenure of auxiliary staff;

(i) provision of financial assistance where necessary (subsidies).
3. DISTRICT HEALTH UNITS

3.1 Activities of a district health unit

The role of the central government is to supply advice, technical and/or financial assistance, and supervision. In order for this to be effective the officers concerned must not be too remote from the work actually going on in the field. Medical divisions should be organized as "District Health Units," where an integrated public health policy can be put into operation. Each district should be complete in itself, as far as public health is concerned, and the district medical officers would be in complete charge of public health administration in his district, acting on the advice of the Senior Medical Officer of Health of the Central Government.

The main activities of such a unit should consist of:

(1) hospital facilities for those requiring special medical care, including maternity cases. Diagnostic facilities also come under this heading;

(2) measures to combat the more important communicable diseases: yaws, leprosy, tuberculosis, whooping cough, filariasis;

(3) health education of the public;

(4) provision of expert technical advice to administrators and local councils;

(5) provision of technical assistance with certain local sanitation activities (e.g. latrines, wells, etc);

(6) regular periodic supervision of all rural health activities, clinical, maternal and child and school health, and sanitation;

(7) co-ordination of missionary work in public health.

It follows that the necessary supporting staff, a health sister, a health inspector and a clerk must be available and certain diagnostic facilities provided.

Equally essential is a supply of properly trained local auxiliary personnel who will actually carry out the work in the community.

Little can be achieved unless adequate transport is made available. Only in this way can the required degree of supervision be obtained.

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1 For a description of the scope and functions of a "Health Unit," see WHO Technical Report Series No. 83, "Methodology and Planning of an Integrated Health Programme for Rural Areas."
3.2 Premises required

Out-patient
Laboratory
Maternity ward
Ambulance
Sanitary office - statistics

3.3 Staffing of a district health unit

This will depend on the size of the district, but normally there should be at least:

One medical officer
One public health nurse/midwife
Sufficient hospital nurses and nurse aides
One sanitary assistant or inspector
Sufficient labourers, orderlies, etc.

3.4 Duties of District Medical Officer

(1) He is responsible, acting on the advice of his senior officers at headquarters, for conducting the total health service in his district.

(2) He is responsible for the medical care, including clinical and preventive care, of every inhabitant in his district. Patients sent for specialist advice remain his patients and he is responsible for supervising home treatment or rehabilitation after return from the central hospital.

(3) He should work to a regular time-table, so that the people learn the times and attend at those times. Time should be allotted for out-patient sessions; child health work, at his centre or in the villages; communicable disease control duties or clinics; tours of inspection.

(4) He will act as Medical Officer of Health to the local government councils in his area, and advise them on health measures.

(5) He will direct and supervise the work of his subordinate staff. Where his staff are working under the technical advice of headquarters, he is responsible for ensuring that they do so.

(6) He must organise health education programmes.

(7) He must keep full records and registers.
3.5 Aims of a district health centre

The aim is to endeavour to introduce the people to a better, happier and healthier way of living by combining treatment, preventive and promotive aspects of medicine into one integrated service and by practising these aspects in the villages and homes.

Thus the health centre staff are obliged to observe the following:

(i) Show by example in the way you live yourself.

(ii) Get into the homes of the people and teach them the right way to live.

(iii) Concentrate on health education all the time.

Thus broad principles are as follows:

(i) Obtain the faith and co-operation of the population by effective diagnosis and treatment, by the use of modern drugs and not merely by placebo treatment.

(ii) Utilize this faith to institute personal clinics, e.g., ante-natal and child welfare, and to explain the need for a "prevention is better than cure" policy.

(iii) Provide a domiciliary service for maternity and for sickness, especially communicable diseases; in this way the home can be entered; health education begins in the home with the children and their parents, particularly the mother.

(iv) Do not allow the purely sanitary services to become divorced from the therapeutic services, but co-ordinate them through the prevalence of communicable disease. Examples are:

(a) typhoid fever to explain the need for pure water supplies and latrines;

(b) meningitis to emphasize the need for proper ventilation in houses;

(c) tuberculosis to illustrate the dangers of overcrowding.

(v) Propagate health through education on all possible occasions and by all possible means; practical instruction and help is essential. Talks should be accompanied by every possible form of visual aid, emphasis being laid on cause, effects and prevention.
(vi) Use the health centre as a base from which to commence operations and then take the services to the people.

(vii) Staff must personally practise what they preach by maintaining a high standard of personal cleanliness and domestic hygiene; by the attractiveness and cleanliness of the centre and the gardens; by having a communal vegetable garden to demonstrate good feeding. "An ounce of example is worth a ton of advice."

(viii) Lastly, co-opt members of other departments whenever an opportunity occurs.
SURVEYING PUBLIC HEALTH
(Synopsis of lectures by Dr. A. C. Reyes and SMP Te'opio Fa'ai'ulasu)

CONTENTS

<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. USES OF VITAL AND HEALTH STATISTICS IN PUBLIC HEALTH</td>
<td>27</td>
</tr>
<tr>
<td>1.1 Definitions</td>
<td>27</td>
</tr>
<tr>
<td>1.2 Public diagnosis</td>
<td>27</td>
</tr>
<tr>
<td>1.3 List of special uses of statistics</td>
<td>28</td>
</tr>
<tr>
<td>1.4 Other uses of statistics</td>
<td>28</td>
</tr>
<tr>
<td>1.5 Records for a local health unit</td>
<td>29</td>
</tr>
<tr>
<td>2. SOME INDICATORS FOR APPRAISING THE HEALTH OF THE POPULATION</td>
<td>30</td>
</tr>
<tr>
<td>2.1 Crude death rate</td>
<td>30</td>
</tr>
<tr>
<td>2.2 Infant mortality rate</td>
<td>31</td>
</tr>
<tr>
<td>2.3 Maternal mortality rate</td>
<td>31</td>
</tr>
<tr>
<td>2.4 Morbidity rates</td>
<td>32</td>
</tr>
<tr>
<td>2.5 Fertility rates</td>
<td>33</td>
</tr>
<tr>
<td>2.6 The collection of statistical data</td>
<td>33</td>
</tr>
<tr>
<td>3. ASSESSING HEALTH NEEDS</td>
<td>34</td>
</tr>
<tr>
<td>Establishing priorities</td>
<td>35</td>
</tr>
<tr>
<td>4. EPIDEMIOLOGICAL CASE RECORDS</td>
<td>36</td>
</tr>
<tr>
<td>4.1 Definition</td>
<td>36</td>
</tr>
<tr>
<td>4.2 Design of forms</td>
<td>36</td>
</tr>
<tr>
<td>5. OUTLINE OF HEALTH SURVEY OF A COMMUNITY</td>
<td>39</td>
</tr>
<tr>
<td>5.1 Background information</td>
<td>39</td>
</tr>
<tr>
<td>5.1.1 General description of the community</td>
<td>39</td>
</tr>
<tr>
<td>5.1.2 The local government</td>
<td>39</td>
</tr>
<tr>
<td>5.1.3 The local health department</td>
<td>39</td>
</tr>
<tr>
<td>5.1.4 Other agencies engaged in health work</td>
<td>40</td>
</tr>
<tr>
<td>5.1.5 Medical facilities</td>
<td>40</td>
</tr>
<tr>
<td>5.2 Vital statistics and demography</td>
<td>40</td>
</tr>
<tr>
<td>5.2.1 Population</td>
<td>40</td>
</tr>
<tr>
<td>5.2.2 Marriages</td>
<td>40</td>
</tr>
<tr>
<td>5.2.3 Births</td>
<td>40</td>
</tr>
<tr>
<td>5.2.4 Deaths</td>
<td>41</td>
</tr>
</tbody>
</table>
CONTENTS (continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3 Prevention and control of communicable diseases</td>
<td>41</td>
</tr>
<tr>
<td>5.3.1 Important notifiable diseases in the area</td>
<td>41</td>
</tr>
<tr>
<td>5.3.2 Record keeping of the above diseases</td>
<td>41</td>
</tr>
<tr>
<td>5.3.3 Preventive and control measures applied</td>
<td>41</td>
</tr>
<tr>
<td>5.4 Special disease problems</td>
<td>41</td>
</tr>
<tr>
<td>5.5 Maternal and child health</td>
<td>42</td>
</tr>
<tr>
<td>5.5.1 Total births and stillbirths</td>
<td>42</td>
</tr>
<tr>
<td>5.5.2 Infant and pre-school health</td>
<td>42</td>
</tr>
<tr>
<td>5.5.3 School health</td>
<td>42</td>
</tr>
<tr>
<td>5.6 Dental health</td>
<td>42</td>
</tr>
<tr>
<td>5.7 Environmental sanitation</td>
<td>42</td>
</tr>
<tr>
<td>5.8 Occupational hygiene</td>
<td>43</td>
</tr>
<tr>
<td>5.9 Health education</td>
<td>43</td>
</tr>
<tr>
<td>6 THE PREVENTION AND CONTROL OF COMMUNICABLE DISEASES</td>
<td>43</td>
</tr>
<tr>
<td>6.1 The agent</td>
<td>43</td>
</tr>
<tr>
<td>6.2 The host</td>
<td>44</td>
</tr>
<tr>
<td>6.3 The environment</td>
<td>45</td>
</tr>
<tr>
<td>6.4 Modes of transmission</td>
<td>45</td>
</tr>
<tr>
<td>6.4.1 Contact</td>
<td>45</td>
</tr>
<tr>
<td>6.4.2 Vehicle</td>
<td>46</td>
</tr>
<tr>
<td>6.4.3 Vector</td>
<td>46</td>
</tr>
<tr>
<td>6.4.4 Air-borne</td>
<td>46</td>
</tr>
<tr>
<td>6.5 Host-agent interaction</td>
<td>46</td>
</tr>
<tr>
<td>6.6 Community reactions to infectious agents</td>
<td>47</td>
</tr>
<tr>
<td>6.7 Principles of prevention and control of communicable diseases</td>
<td>47</td>
</tr>
<tr>
<td>6.8 Preventive and control measures</td>
<td>49</td>
</tr>
<tr>
<td>6.8.1 Measures against the agent</td>
<td>49</td>
</tr>
<tr>
<td>6.8.2 Measures directed towards the host</td>
<td>49</td>
</tr>
<tr>
<td>6.8.3 Measures directed towards the agent while it is in transit from</td>
<td>49</td>
</tr>
<tr>
<td>the source of infection to susceptibles</td>
<td>49</td>
</tr>
<tr>
<td>6.8.4 Choice of procedure</td>
<td>50</td>
</tr>
</tbody>
</table>
1. USES OF VITAL AND HEALTH STATISTICS
IN PUBLIC HEALTH

Vital and health statistics have become the foundation of public health activities, for records represent both knowledge and truth. It has been well said that "When you can measure what you are speaking about and express it in numbers, you know something about it; but when you cannot measure it or express it in numbers, your knowledge is of a meagre and unsatisfactory kind."

1.1 Definitions

In recent years the term "vital statistics" has been used to denote facts systematically collected and compiled in numerical form relating to or derived from records of vital events, namely live births, deaths, foetal death, marriage, divorce, adoption, legitimation, recognition, annulment or legal separation. These events may be required to be permanently registered with an authorised officer for legal and documentary purposes as well as to provide national statistical data. In general, the term health statistics should include all statistical information required for the health agency and so would comprise not only vital statistics but also a good deal of other numerical information. But it is more usually limited to health data other than the term vital statistics.

1.2 Public diagnosis

In order to arrive at a better appreciation of their value we may consider the parallelism between the responsibility a clinician has towards an individual and the responsibility of the health officer towards his community. When an individual needs a medical examination or a health check up, he goes to his physician who makes a number of counts or measurements of temperature, pulse, blood pressure, etc. estimates the proportions of various blood cells, and looks for the presence or absence of specific infections. The clinician is, to a large extent, engaged in observing, counting, measuring and expressing his observations on some scales of values. We entrust this counting and measuring to him because we regard him as being responsible for maintaining us in health. In the same way the health officer has a responsibility towards his patient whom he considers not merely as an individual but as a member of a community. The health officer has to work, not in a single dimension of one patient but in many dimensions requiring new techniques and new approaches to the diagnosis of the community ills. Diagnostic tests are needed and are in fact available; only they are of a completely different kind, involving a novel statistical way of thinking.

In public health counting and measuring assume even greater importance because we are dealing with a large number of individuals. The statistician assists the health officer as diagnostician as follows:
(1) His patient is the community;
(2) His diagnostic materials are the raw statistical data;
(3) His tools are the various statistical indices;
(4) His techniques are those of modern statistical methodology.

Thus, the health examination or continuous check-up of a community depends chiefly upon the availability of the diagnostic material, that is, upon recording continuously and completely all such events occurring in each household. Herein lies the value of the records of deaths, births, and foetal death, marriages, divorces, etc.

1.3 List of special uses of statistics

Here is a short list in which health statistics are used:

(1) What is the leading cause of death in this area? Is it tuberculosis, cancer, malaria, or accidents, or some other causes as yet unsuspected?

(2) At what age is the mortality rate highest, and from what disease?

(3) What sections of the area are the most unhealthy, and what is the outstanding cause of death there?

(4) In comparison with areas of similar size in other countries is this area healthy or not?

(5) To what extent are the hospital facilities, staffing, drugs and equipment able to cope with disease problem?

(6) Are there seasons at which various diseases have a tendency to break out? If so can these be distinguished?

1.4 Other uses of statistics

(1) to describe the level of community health;

(2) to diagnose community ills;

(3) to discover a solution to health problems and find clues for administrative action;

(4) to determine priorities for health programmes;

(5) to direct or maintain control during the execution of health programmes;
(6) to promote health legislation;
(7) to create administrative standards of health activities;
(8) to determine the met and unmet health needs;
(9) to determine the success or failure of specific health programmes or undertake overall evaluation of public health work;
(10) to demand public support for health work.

1.5 Records for a local health unit

Dealing specifically with a local health unit - the nucleus of the rural health service is under the direct supervision of the district medical officer. The WHO Expert Committee on Public Health Administration briefly outlined the maintenance of the following simple records for the administration of a local rural health unit.

(1) Population records

These include the number of inhabitants, grouped by locality, and individual records indicating age, sex, ethnic origin and marriage. Other data which provide information about the community should also be kept, e.g. housing, water-supply and methods of refuse-disposal and sewage disposal, educational facilities, general economic and agricultural conditions. Some of these data might be obtained from National Census Bureau but should be checked and completed by the local survey.

(2) Birth records

These include individual records of live births and foetal death.

(3) Mortality records

Individual records of deaths indicating the dates and causes should be kept for the compilations of the rates on general mortality due to communicable diseases, mortality from certain chronic diseases such as cancer, diabetes, heart diseases, and the ten main causes of death. Death certificates should be recorded by the doctor. These data should be analyzed monthly and annually. In areas where there is a local

WHO Tech. rep. Ser. (1954), 72
Office of the Civil Registry recording births, deaths, marriages and movements of the population, the work of the registry should be co-ordinated with the local health unit.

(4) Morbidity records
These include records for communicable diseases and important chronic conditions such as cancer, diabetes, heart disease, in addition to the information derived from the working records of the health unit.

(5) Notification
The occurrence of the six quarantinable diseases (smallpox, cholera, plague, yellow fever, typhus and relapsing fever) should be reported immediately by telegraph or telephone to higher authorities. Weekly reporting of communicable diseases and a narrative and statistical monthly report of activities carried out by the unit is absolutely essential.

2. SOME INDICATORS FOR APPRAISING THE HEALTH OF THE POPULATION

2.1 Crude death rate

\[
\frac{\text{Deaths, all causes, in calendar year}}{\text{Mid-year population}} \times 1000
\]

Example: Suppose that during the calendar year 1957 (1 January - 31 December) a total of 600 people in Town A died. The population of Town A was estimated at 50 000 as of 1 July 1957 (mid-year).

Crude death rate in Town A for 1957 = \( \frac{600}{50000} \times 1000 \)

= 12 per 1000 population per year

Age-specific death rate =

\[
\frac{\text{Deaths among persons in specified age group in calendar year}}{\text{Mid-year population in specified age group}} \times \text{Factor (e.g. 1000)}
\]

The age-specific death rates vary with age. For all causes, the age-specific death rate is high during infancy (under 1) and pre-school age (1-4), lowest during the school age (5-24) and gradually rises as middle
age approaches, then steeply rises beyond 65.

The age-specific death rates give us a truer picture of the force of mortality in a given population.

A comparison of crude death rates is erroneous if the populations compared are appreciably dissimilar in age composition.

2.2 Infant mortality rate

\[
\text{Infant mortality rate} = \frac{\text{Number of deaths under 1 year of age in a calendar year}}{\text{Number of live births during the same year}} \times 1000
\]

The infant mortality rate if reliably determined is considered more sensitive than the crude death rate as an index of the health conditions obtaining in a population. The crude death rate includes deaths from old age and from degenerative diseases and other causes not readily preventable by public health measures. The infant mortality rate, on the other hand, is closely linked with preventable factors; infant deaths are tied up intimately with acute communicable diseases, environmental sanitation and personal hygiene practices and in general, with the adequacy of well established public health services.

The principal errors that enter in the determination of the infant mortality rate are:

1. under-reporting of infant deaths,
2. under-registration of live births.

While under-registration of live births is generally observed in urban areas, the reported number of live births may be inflated as a result of registration of births of non-resident mothers admitted in the urban hospitals.

If under-reporting of infant deaths as well as of live births obtains in various regions of the country, and if the extent of under-reporting varies appreciably from region to region, it is difficult to compare the risk of dying among infants in one region with that in other regions. The reported infant mortality rates may reflect differences in the extent of under-reporting rather than differences in the health hazards that infant undergo.

2.3 Maternal mortality rate

\[
\text{Maternal mortality rate} = \frac{\text{Deaths in a calendar year among women during pregnancy, labour and the puerperium}}{\text{Number of live births during the same year}} \times 1000
\]
2.4 Morbidity rates

Morbidity rates are generally set up for particular causes of illness or disability, or for groups of allied illnesses. Morbidity rates are of two types: namely INCIDENCE RATE AND PREVALENCE RATIO.

INCIDENCE RATE = Number of newly discovered cases of a particular disease occurring during a calendar year x 100 000

mid-year population

Synonyms - Case rate
Sickness rate
Attack rate
Morbidity rate

Example: Typhoid fever incidence rate, City X 1957

\[
\frac{\text{Number of typhoid fever cases reported in City X in 1957}}{\text{City X population, 1 July 1957}} \times 100 000
\]

The incidence rate in practice falls short of the definition. Many discovered cases are not reported. Also, the same case may be reported more than once, i.e. not only when it was first discovered.

An incidence rate answers the question - "How frequently do cases of a particular disease occur during a year or a given time period?"

During an epidemic, an incidence rate for the epidemic disease may be obtained based not on the total population but on household members surveyed. For example, suppose that soon after an epidemic of influenza 200 households are visited, or a total of 1100 household members surveyed. If it is found that 792 of the 1100 persons came down with influenza during the epidemic, the incidence rate or ATTACK RATE of the disease is estimated at 792/1100 x 100 or 72 per cent.

PREVALENCE RATIO = Number of cases, both old and new, of a particular disease existing at a particular time x Factor (e.g. 1000)

Population at that time

Example: After the physical examination of students enrolling in a certain school it was found that 240 out of 12 000 students examined had "athlete's foot". The proportion, 240/12 000 x 100 or 2 per cent is a prevalence ratio which estimates the extent or prevalence of "athlete's foot" among the student population.

Other examples of prevalence ratios are: percent positive for malarial parasites among inhabitants surveyed; percent positive for ascarsis eggs among school children examined; percent showing evidences of pulmonary tuberculosis among persons examined in a mass chest X-ray survey.

A prevalence ratio answers the question - "What proportion of the population or of a group of persons are actually ill with a particular disease or are infected with a particular agent?"
Incidence rates as well as prevalence ratios may be constructed for specific segments of the population; for example, for specified age groups, for males or females, or for certain occupational groups.

2.5 Fertility rates

The most commonly used fertility rate is the CRUDE BIRTH RATE which is defined as:

\[
\text{Total live births in a calendar year} \div \text{Mid-year population} \times 1000
\]

2.6 The collection of statistical data

Some important principles underlying the collection of data are as follows:

(1) Data are collected with a purpose; namely, to secure answers to specific problems. It is wasteful to collect data which serve no purpose or which are irrelevant to the problem for which an answer is sought.

(2) The soundness of conclusions drawn from collected data depends primarily on the accuracy and completeness of the information obtained. In planning collection as well as in analysing data, it is essential to consider the various sources of inaccuracy and deficiency.

(3) If information about a population is to be secured by studying a sample, the sample should be as fair and representative of the population as possible. It is advisable to be always on the lookout for biased information.

When looking at data collected, it is helpful to ask several questions:

(1) Who collected the data? Were they adequately trained and competent to make the counts or measurements, or to make the necessary classification? Were there any personal prejudices that entered in the collection, or was the element of personal equation reduced to a minimum?

(2) Has there been any withholding of unfavourable or erratic observations?

(3) What was the purpose of the collection of data? Are the data relevant to the problem under consideration?

(4) Are the things to be counted so well defined that there is little difficulty in recognizing what is to be counted
and what is not to be counted? In other words, are the criteria for classification sufficiently clear cut and consistently followed?

(5) If comparisons are to be made between one group and another, or among various groups, were the groups to be compared selected without bias for any particular group - i.e. as impartially as possible. In other words, are the groups essentially comparable with respect to important factors like age, sex, income status, length of observation period, etc.

(6) Were the data collected to gain information about the total population of the country or of a subdivision of the country, or about a particular segment of the population? Was there complete coverage of the population under study or of a sample of that population? How was the sample obtained and was it a fair sample?

3. ASSESSING HEALTH NEEDS

In simple words, the steps in planning health programmes consist essentially of determining:

(1) What are the health problems or health needs

(2) What is being done about them

(3) What needs to be done about them

(4) What can be done about them.

It can thus be seen that the assessment of health needs is fundamental to programme planning since it serves as the basis of any health programme that is to be instituted. There are certain means by which the health worker can measure or determine health needs and they are by:

(a) Analysis of vital and health statistics

Certain indicators for assessing the health of the population are usually available from routine reports compiled in health agencies. Among them are:

(1) mortality rates - crude death rate, age specific death rates, proportionate mortality rates, infant mortality rates, maternal mortality rates, expectation of life;

(2) morbidity rates;
(3) indicators of environmental conditions such as: proportion of population with protected water supply, proportion of population with facilities for waste disposal;

(4) indicators concerned with health services and activities such as: availability and use of hospitals, physicians and other health personnel, utilization of local health services, etc.

(b) Information gathered from special studies or surveys

When data are not available as would occur in a newly established community or in cases where there is a problem about which only meagre information exists, a special study or a survey may be made. The extent of coverage of such a study or survey will depend on our objective or purpose.

Establishing priorities

The following points should be considered in determining which problems should be given priority:

(1) Services that will provide the most immediate benefit in relation to the health needs of the area especially if they are undertaken in relation to social, industrial or agricultural schemes.

(2) Certain preventable diseases that are prevalent, such as malaria, yaws, tuberculosis, nutritional diseases, etc. should be given priority. It is more economical to eradicate or at least achieve large-scale control over such diseases and thus reduce the total disease problem to more manageable proportions.

In some instances preventable diseases must be separated and accorded priorities according to the following:

(a) first attention should be given to groups of diseases that can be prevented by a single measure, e.g. the introduction of potable water supplies or sanitary disposal of excreta to control gastro-intestinal diseases or DDT spraying for insect-borne diseases;

(b) the cost of measures and whether they need to be repeated, e.g. the introduction of safe piped water supply lines involves a greater initial expense but is more economical in the long run since it need not be repeated;
(c) diseases affecting productivity;
(d) diseases affecting large numbers;
(e) diseases causing high fatality.

(3) The demand of the people for certain services should not be ignored. The administrator should endeavour to satisfy felt needs but not at the sacrifice of activities considered important for technical reasons.

(4) There are certain responsibilities that are always carried out by health administrations.

(5) The availability of preventive measure and trained personnel.

4. EPIDEMIOLOGICAL CASE RECORDS

4.1 Definition

EPIDEMIOLOGY is medical ecology; it deals with the study of the natural history of disease. Experience has shown that disease is best studied in its environment hence the most important information relating to disease is best obtained from the field. Of course it must be remembered that the useful information relating to disease does not all come from the field. Other sources of information particularly data on populations, geology, climate, etc. may be obtained from official or non-official agencies.

In the collection of field data we make use of forms or schedules. The most common form used in epidemiological work is the epidemiological case record or investigation card. The construction of these forms or schedules will depend on the purpose or objective of our study.

4.2 Design of forms

Since the analysis of epidemiological problems depends a great deal on the data collected in the forms, it can be seen that forms are very valuable and hence must be carefully designed. Every item to be included must be carefully scrutinized and the following questions asked:

(1) Is it important that this information be secured?

(2) Can the information be secured with reasonable facility and accuracy?

(3) Will the information be used if recorded?

(4) Will the use contribute to the care of the case, the protection of the community, the administration of the service, to the evaluation of results?
Two of the most common faults of epidemiological case cards are (a) the inclusion of entries which are not useful either because the information asked for is not obtainable with any accuracy or because it is uninterpretable in the absence of "denominator" data, and (b) the attempt to make a single record form serve too many purposes. In constructing such forms several questions need to be kept in mind:

(1) What use is to be made of the record? Is it for routine use in providing statistical data of general interest about a disease; or to find out the source and mode of transmission of infection in a particular outbreak; or to answer specific questions in a preplanned research study? Is it employed for multiple purposes, including the collection of data for administrative use? (This is frequently unwise.)

(2) What personnel are to use the record? Are the entries to be filled in by the health officer, a public health nurse, a trained or untrained lay interviewer, by many practising physicians, or by the subjects themselves?

The point of view which leads the designer of a form to add an entry "because it is just one more entry and may possibly be useful some day" is fatal to the development of good records because it leads to the conclusion of numerous unnecessary entries. Faced with a long, complex record form the average person either does not bother to make it out at all, or at best gives a perfunctory set of answers. His response to the next survey is likely to be even less enthusiastic.

On the other hand, the omission of crucial items is just as fatal to the success of a study. The form hence should not be too brief nor too long.

Also remember the suitability of the record to carry around in the field, and the size of the available filing cabinets. In recording ages, if there is any likelihood of a record being used in subsequent years, year of birth rather than age at the time of initial study should be given.

Arrangement of entries in the same order as that in which questions are naturally asked is helpful. The date on which information was secured and the name of investigator and informant may be important.

If records are to be analyzed, it is important that the entries be made so as to discourage equivocal or uninterpretable answers. A useful device for this is to preprint a choice of answers of which the appropriate one is to be checked. This technique can perhaps be overdone, as is suggested in the old query, "Have you stopped beating your wife?" (yes or no), or the quantitative version, "How many days have elapsed since you last beat your wife?"
The number of persons who will misinterpret entries in a record, especially in a questionnaire to be filled in by the subject, is remarkable. The author of a questionnaire should ask himself, not "is this question clear?" (which he will usually answer "yes," since he knows what he wanted to ask even before he wrote it down), but "is there any possibility that anyone could deliberately misinterpret the meaning of this question?" Then if there is time, he should give the questionnaire a field trial and revise it to correct the faults which will inevitably be found. The preparation of a code which the meaning of the questions are explained, the classification of answers given, etc. would help in preventing hit and miss recording and facilitate analysis later on.

In general epidemiological case records are usually divided into four parts:

1. **Identifying data** relation to the patient as age, sex, address, diagnosis, onset, etc.;

2. **Data about contacts:**
   a. set up of the family roster or household contacts - any case in the family, age, immunity, status, etc.;
   b. contacts outside the household - includes visitors, date of contact and other circumstances. Space should be left for remarks.

3. **Vectors of infection and possible sources of infection** - includes the water, milk, food, general sanitary surroundings of the home with regard to excreta and garbage disposal, protection against insects and pests, etc.;

4. **Remarks or other special features indicated by preliminary survey.**

When indicated, supplementary forms may be made since usually after a preliminary investigation, we may find that certain important items are omitted.

Collection of field data is difficult and is an art by itself. Two kinds of evidence are usually gathered:

1. **Objective evidence** - those that we actually see. The question however is that what we see is a fact but when we put it down on paper it is already in interpretation, e.g. the X-ray plates, presence of flies, etc. Generally we place more reliance on our observations than that of others.

2. **Subjective evidence** - this is less reliable and would depend a great deal on the kind of person we are dealing
with. Oftentimes we want to know about something that has already passed and have to depend on the memory of our subject. Sometimes information has to be taken from a person other than the patient himself - as when the patient is a child or is seriously ill or is dead.

In getting information from the patient, it is necessary to gain the confidence of the patient. The patient should be guided in telling his story if he finds difficulty in answering. The face and style of the interview may be changed as we get more acquainted with the patient. There should be no arguments with the patient.

Whatever kind of evidence that is collected, it is necessary for the investigator to determine the reliability of the observation. Evidence may thus be classified as good, slightly doubtful, not reliable or completely skeptical. Irrespective of the source or kind of evidence however we must put down what we really observed and not our opinions.

An important thing to remember is that the filling up of forms does not constitute the epidemiological investigation. What is important is the analysis of the forms as they are received.

5. OUTLINE OF HEALTH SURVEY OF A COMMUNITY

5.1 

5.1.1 General description of the community

(a) Brief history

(b) Geography - map

(c) Climate

(d) Economic resources

(e) Transportation and communication

(f) Educational facilities

(g) Social and cultural characteristics

5.1.2 The local government

(a) Organization

(b) Budget

5.1.3 The local health department

(a) Table of organization
(b) Personnel - including qualifications, powers and duties
(c) Facilities and services rendered
(d) Budget - source of funds, per capita expense for health
(e) Health programme

5.1.4 Other agencies engaged in health work

(a) Governmental - school, social welfare, armed forces, etc.
(b) Voluntary - Women's clubs, Missions, other organizations

5.1.5 Medical facilities

(a) Number of hospitals, clinics, laboratories
(b) Number of private professional personnel

5.2 Vital statistics and demography

5.2.1 Population

(a) Estimated or actual population for the current year
(b) Population trends
(c) Factors influencing population trends
(d) Density of population
(e) Age and sex distribution
(f) Distribution by occupation, religion, economic status - per capita income
(g) Average size of family

5.2.2 Marriages

(a) Procedure and efficiency of registration
(b) Marriage rates and trend

5.2.3 Births

(a) Registration of births - procedure, defects, efficiency
(b) Birth rates and trend
5.2.4 Deaths

(a) Death registration - procedure, defects, efficiency

(b) Proportion of deaths with and without medical attendance

(c) Death rate for current year and past 10 years

(d) Monthly death rates for current year compared with average of past 3-5 years

(e) Age and sex specific death rates - all causes for current year

(f) Leading causes of death for current year compared to past 5 years

(g) Age and sex distribution of deaths due to specific causes

5.3 Prevention and control of communicable diseases

5.3.1 Important notifiable diseases in the area

5.3.2 Record keeping of the above diseases

(a) Notification

(b) Case-finding

(c) Follow-up and epidemiologic investigation

(d) Spot maps

(e) Epidemic indices

(f) Yearly, monthly, age and sex distribution of cases of dysenteries, typhoid fever, pertussis, etc.

5.3.3 Preventive and control measures applied

5.4 Special disease problems

(a) Tuberculosis

(b) Malaria

(c) Nutritional diseases

(d) Intestinal parasitism
(e) Filaria

(f) Others

5.5 Maternal and child health

5.5.1 Total births and stillbirths

(a) Attendance at delivery

(b) Maternal mortality

(i) causes of mortality

(ii) factors influencing mortality

(c) Maternal health programme

(i) pre-nuptial, prenatal, intramatal and post-natal care

5.5.2 Infant and pre-school health

(a) Infant mortality rates - current and for the past five years

(b) Neonatal mortality - current and for the past five years

(c) Causes of infant and neonatal mortality

(d) Preventive services

(i) care of prematures

(ii) child health conferences

(iii) nursery classes

5.5.3 School health

(a) Agencies concerned in school health

(b) School health programmes

(c) School enrollment

5.6 Dental health

(1) Prevalence of dental defects

(2) Dental health programme

5.7 Environmental sanitation (see later)
5.9 Health education

(1) Health education programme in the area

(2) Agencies concerned

6. THE PREVENTION AND CONTROL OF COMMUNICABLE DISEASES

There are three main factors involved in a disease process, namely the Agent, the Host and the Environment. Disease results from an imbalance between the disease agents and the host. The nature and extent of the imbalance depend upon the nature and characteristics of the hosts and agents. The characteristics of the agent and the host and their interaction are directly related to and depend largely on the nature of the environment.

6.1 The agent

A disease agent has been defined as an element or a substance, which may be living or non-living (or a force), the presence (or absence) of which may initiate or perpetuate a disease process.

Agents may be classified as follows:

(a) biologic agents or living agents, e.g. viruses, bacteria, helminths, etc.;

(b) nutrient agents, e.g. vitamins, fats, proteins, carbohydrates and other food substances. Usually it is the relative absence of these agents that may bring about the development of disease;

(c) chemical agents, e.g. acids, bases, iodine, fluorides, etc.;

(d) physical agents, e.g. electricity, heat, cold, a piece of wood, etc.

The biologic agents of disease, particularly viruses and bacteria, are responsible for the communicable or infectious diseases that plague man. These agents do not arise spontaneously but are usually derived from reservoirs of infection. Reservoirs of infection include man, animals, plants, soil or inanimate organic matter in which an infectious agent
lives or multiplies and depends primarily for survival. Man himself is the most frequent reservoir of infectious agents that affect man.

Infectious agents usually leave the human reservoir through the various excretions, secretions and exudes of the human body such as faeces, urine, nasopharyngeal discharges, sputum, pus, etc. In some instances assistance of an external factor, as for example the bite of a mosquito is necessary before the agent can leave the body of the human reservoir. The various ways by which the agent leaves the human reservoir of infection are known as the portals of exit of the agents. It is important to know the portals of exit for purposes of collecting specimens and also for disinfection purposes.

6.2 The host

This includes man or other living animals in which the agents usually live and multiply.

Living agents of disease usually prefer to parasitize certain tissues of the host and have to reach these tissues before infection can occur. For example, the tubercle bacillus has to reach the lung tissue to be able to produce pulmonary tuberculosis. The Shigella organisms have to get into the intestines to bring about bacillary dysentery. The pathways followed by various biologic agents in order to reach the tissues they parasitize are known as the portals of entry. These portals of entry include the various openings of the body as the mouth, the nose, etc. In certain instances, the aid of an external factor, such as the bite of an insect, is necessary before the agent can enter the body of the host.

The mere fact that the agent reaches the body of the host does not necessarily mean that infection will result since there are a number of body mechanisms which impede the progress of invasion by infectious agents. The sum total of body mechanisms which interposes barriers to the progress of invasion of infection agents is known as resistance.

Resistance may either be specific or non-specific in nature. Specific resistance or immunity is associated with possession of antibodies having a specific action on the micro-organism concerned with a particular infectious disease. Immunity may either be active or passive. Active immunity is attained either naturally by infection, or artificially by inoculation of fractions or products of the infectious agent or of the agent itself in killed, modified or variant form.

Passive immunity is attained either naturally by maternal transfer or artificially by inoculation of specific protective antibodies (convalescent or immune serum, or gamma globulin) and is of brief duration.

Non-specific resistance or inherent unsusceptibility is an ability to resist disease independently of antibodies or specifically developed tissue response; it depends upon the anatomic and physiologic characteristics of the host. It may be genetic or acquired and permanent or temporary in nature.
6.3 The environment

The environment is made up of all the external conditions and influences that affect the development of an organism. Essentially it can be subdivided into three components, namely: (a) the physical environment; (b) the biologic environment and (c) the socio-economic environment.

The physical environment includes all the inanimate factors that surround us, such as climate, weather, rainfall, temperature, pressure, humidity, wind velocity, geological features, topography, etc. These factors in one way or another may influence the occurrence of disease. To illustrate, the amount of rainfall would certainly influence the prevalence of a mosquito-borne disease inasmuch as mosquitoes breed in water. The type of soil will be a factor in the transmission of hookworm infection since this parasite spends part of its life cycle in the soil.

The biologic environment is made up of all the living things such as plants and animals that surround us. The biologic environment is considered to be important because certain of its features may serve as reservoirs or vectors of infection. For example, domestic animals such as dogs, cattle, pigs, rats, etc. serve as reservoirs for certain animal diseases such as rabies, anthrax, taeniasis, plague, etc. which may be transmitted to man. The insect component of our environment such as mosquitoes, flies, fleas, lice, ticks, etc. are responsible for the transmission of malaria, filariasis, dysentery and other intestinal infections, typhus fever and other major illnesses of mankind.

The social environment pertains to man's relationship with his fellow human being. Since it is closely tied up with economic factors the two are generally combined into the socio-economic environment. Certain features of the socio-economic environment that may influence the behaviour of disease are the nature of occupation, the amount of income, the level of education, habits and customs, religion, etc.

6.4 Modes of transmission

These consist of the various ways by which an infectious agent is transported from the reservoir to the susceptible human host. They are:

6.4.1 Contact

(i) Direct contact. There is actual touching of the reservoir of infection as in kissing, sexual intercourse, handshaking or other forms of contiguous personal contact.

(ii) Indirect contact. The touching of contaminated objects such as dressings, beddings, soiled clothing, toys, etc. with subsequent hand to mouth transfer of infective material or transfer to skin or mucous membrane.
(iii) Droplet spread. The projection on the conjunctivae, nose, mouth or face of droplets coming from an infected person during sneezing, coughing, singing or talking.

6.4.2 Vehicle

This includes water, food, milk, biologic products as serum and plasma or any substance serving as an intermediate means by which an infectious agent is transported from a reservoir and introduced into a susceptible through ingestion, inoculation or by deposit on the skin or mucous membrane.

6.4.3 Vector

This includes transmission by arthropods or other invertebrates which transmit infection by inoculation by biting or by deposit of infective materials on the skin or on food or other objects.

6.4.4 Air-borne

This includes inhalation of droplet nuclei which results from evaporation of droplets or which are created accidentally in the course of many laboratory procedures, and the inhalation or setting on body surfaces of dust which may arise from contaminated floors, clothes, beddings, etc.

6.5 Host-agent interaction

This interaction depends upon the relative strength of the agent factor (its virulence and pathogenicity) and the host factor (the various defensive mechanisms of the host). The possible interactions that may result are:

(a) The agent may fail to lodge or is destroyed by the non-specific outer defences of the host.

(b) The agent may succeed not only in gaining entry but also develops and multiplies in the body of the host. This is known as infection. Infection may be

(i) **inapparent** - when there are no discernible signs or symptoms,

(ii) **subclinical** - when the reaction is so mild that it escapes detection, or

(iii) **manifest** - when typical signs and symptoms are present.

The most severe interaction is when the individual becomes totally overcame by the infectious agents and dies.
6.6 Community reactions to infectious agents

The physical, biological and the socio-economic features of the environment (see No. 6.3) may affect either the agent or the host or both. Furthermore, these features may even affect one another. It can, therefore, be seen that the occurrence of a disease in a community is dependent upon a number of relationships and is, therefore, a complex affair.

Depending upon the above relationships, the community reactions that may occur are:

(a) the disease may be sporadic form - when only a few unrelated cases occur in the community every now and then;

(b) the disease may be endemic - when cases of a particular disease are constantly present in the community. Endemicity may be of a low or a high level;

(c) the disease may break out in epidemic form - when cases of a particular disease occur in a community clearly in excess of normal expectancy and derived from a common or from a propagated source. An epidemic of continental or world-wide proportion is known as a pandemic.

6.7 Principles of prevention and control of communicable diseases

In considering the prevention and control of any communicable diseases, it is essential that the natural history of the disease be understood and the sources of infection be known.

Long before man and the agent interact to produce disease, certain predisposing factors such as heredity, socio-economic factors, etc. may already be in operation. This preliminary interaction of the potential agent, the host and environmental factors is called the period of pre-pathogenesis. The course of a disease in man, from the first entry of the agent to the changes that the agent may bring about, is known as the period of pathogenesis in man. The combination of the processes of the period of pre-pathogenesis and the period of pathogenesis is known as the natural history of the disease.

Based on the natural history of any given disease, the following are the five levels of application of preventive measures:

(a) Prepathogenesis period

(i) Health promotion. The measures used in promoting health are not directed to any specific disease but serve to further general health and well being. These measures include health education, good nutrition, attention to personality development,
periodic examinations, provision of adequate housing, etc.

(ii) Specific protection. This includes measures applicable to a particular disease or group of diseases in order to intercept the causes of disease before they involve man. Examples of these measures are: specific immunizations, attention to personal hygiene, use of environmental sanitation, etc.

(b) Period of pathogenesis

(i) Early diagnosis and treatment. This will prevent the spread to others if the disease is communicable; cure or arrest the disease process to prevent complications and prevent prolonged disability.

Case finding or recognition of the foci of infection has become an important phase of any control programme.

(ii) Disability limitation. This includes measures such as adequate treatment and provisions of facilities to limit disability and to prevent death, to prevent or delay the consequences of clinically advanced disease. This indicates that there was failure of prevention at some earlier phase of disease process.

(iii) Rehabilitation. This involves the prevention of complete disability after anatomical and physiological changes are more or less stabilized. Its objective is to return the individual to a useful place in society and make use of his remaining capacities. This includes measures such as provision of hospital and community facilities for re-training and education for maximum use of remaining capacities, education of the public and industry to utilize the rehabilitated, provision of work therapy in hospitals, etc.

Determining of foci of infection. The existence of cases on foci of infection in a community are usually brought to our knowledge through reports submitted to health agencies. Such reporting is generally provided for by law. In some instances, the search for cases are done through surveys (example, yaws survey, tuberculosis survey, etc.).
6.8 Preventive and control measures

6.8.1 Measures against the agent

This group of measures is applied to the reservoirs of infection.

(i) Isolation. The separation for the period of communicability of infected persons from other persons under such conditions as will prevent the direct or indirect transfer of the infectious agent from infected persons to other persons. The period of communicability refers to the time interval during which the infectious agent may be transferred directly or indirectly from an infected person to another person. This period varies for different diseases.

Infected persons include patients or sick persons, persons with inapparent infection or carriers. A carrier is a person who harbours a specific infectious agent in the absence of discernible clinical disease.

(ii) Quarantine. The limitation of freedom of movement of such well persons as have been exposed to a communicable disease (also called contacts), for a period of time equal to the longest usual incubation period of the disease in such manner as to prevent effective contact with those not so exposed. Incubation period refers to the time interval between the infection of a susceptible person or animal and the appearance of signs and symptoms of the disease in question.

6.8.2 Measures directed towards the host

These measures attempt to make the susceptible host non-susceptible and they may be grouped into specific and general measures. Specific measures are directed towards a particular disease; general measures are directed towards all communicable disease in general.

(i) Specific measures include: immunization, either active or passive; chemoprophylaxis and chemotherapy.

(ii) General measures: these include health education measures particularly on matters related to personal hygiene; improvement of the general socio-economic conditions resulting in adequate nutrition, adequate housing, adequate medical care, etc.

6.8.3 Measures directed towards the agent while it is in transit from the source of infection to susceptibles

These measures include the various aspects of environmental sanitation such as the protection and purification of water supply, food hygiene, sewerage disposal, control of insect and animal vectors and others as discussed in the chapter on environmental sanitation.
6.8.4 **Choice of procedure**

Theoretically the most effective preventive and control measure should be applied for any given situation. In many instances, however, the most effective measure may not be the most practical one due to lack of finances, lack of technical personnel or the indifference of the people.

In principle, the measures to be adopted are those that will give the most results with the least expense.
# MATERNAL AND CHILD HEALTH

(Synopsis of Lectures by Dr. A. E. Wilmot)

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PRENATAL CARE</td>
<td>53</td>
</tr>
<tr>
<td>1.1 Preparation for motherhood: pregnancy, labour and child-care</td>
<td>54</td>
</tr>
<tr>
<td>2. INFANT HEALTH</td>
<td>56</td>
</tr>
<tr>
<td>3. CONDUCT OF AN INFANT WELFARE CENTRE</td>
<td>60</td>
</tr>
<tr>
<td>3.1 Object</td>
<td>60</td>
</tr>
<tr>
<td>3.2 Approach to the parents</td>
<td>60</td>
</tr>
<tr>
<td>3.3 Examination of the infant</td>
<td>61</td>
</tr>
<tr>
<td>3.4 Home visiting</td>
<td>62</td>
</tr>
<tr>
<td>3.5 Toddler attendance</td>
<td>62</td>
</tr>
<tr>
<td>3.6 Immunization</td>
<td>62</td>
</tr>
<tr>
<td>3.7 The centre as an educative medium</td>
<td>63</td>
</tr>
<tr>
<td>4. THE DEVELOPMENT OF THE PRE-SCHOOL CHILD</td>
<td>63</td>
</tr>
<tr>
<td>5. SCHOOL HEALTH</td>
<td>65</td>
</tr>
<tr>
<td>5.1 Object</td>
<td>65</td>
</tr>
<tr>
<td>5.2 Principles underlying the organization of school medical service</td>
<td>66</td>
</tr>
<tr>
<td>5.3 The medical examination</td>
<td>67</td>
</tr>
<tr>
<td>6. ADMINISTRATION OF MATERNAL AND CHILD HEALTH SERVICES</td>
<td>68</td>
</tr>
<tr>
<td>6.1 General aims of maternal and child health</td>
<td>68</td>
</tr>
<tr>
<td>6.2 Content of a comprehensive MCH programme</td>
<td>68</td>
</tr>
<tr>
<td>6.3 Organization and structure of MCH services</td>
<td>69</td>
</tr>
<tr>
<td>7. VITAL STATISTICS AND INFANT HEALTH</td>
<td>70</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>73/74</td>
</tr>
</tbody>
</table>
1. PRENATAL CARE

1.1 Preparation for motherhood: pregnancy, labour and child care

(1) The preparation required will vary with the cultural pattern and the type of community in which one is working. In some groups the most urgent need is for some general health education and in others for more specialised knowledge of the process of childbirth.

(2) Teaching should be begun before pregnancy has commenced, and should include:

- nutrition,
- mothercraft,
- marriage guidance.

(3) Prenatal clinics should offer simple teaching to the mother including:

- the course of pregnancy,
- requirements for labour,
- nutrition of pregnancy,
- importance of breast feeding,
- personal hygiene,
- exercise,
- warning signs,
- clothing.

(4) Opportunity for asking questions about fears and anxieties should be given to the mother. Often the nurse in attendance is an easier person for the mother to talk to.

(5) During early pregnancy the decision will need to be made as to where the confinement will take place - at home, in the local maternity centre, or at hospital.

(6) Attendance at the prenatal clinic. This should be commenced right from the beginning of pregnancy. It is important that the medical practitioner see all patients in the early stages so that their general health can be checked and any conditions such as chronic infection, nutritional deficiencies and bowel infestations treated as soon as possible so that the development of the foetus will not be impaired and the mother's health strained through meeting the requirements of the growing foetus.

(7) Procedure to be adopted at prenatal clinics

First visit. (History taking.) Full history will be taken, past and present. Past history will reveal general health
nutrition practices and include obstetrical history, family history and social history. Present history will include signs and symptoms noted by the mother - bowels, frequency of micturition, digestive disturbances, headache or oedema, vaginal discharge, foetal movements, etc.

Examination must include the following points:

A. **General hygiene of the body**

1. clothing,
2. hair,
3. skin - presence of infection or infestation,
4. mouth and teeth - oral hygiene important, decayed teeth should be treated. Teaching on dental care is important.

B. **General physical health**

1. nutritional state - height and weight, distribution of fat, haemoglobin level, signs of dietary deficiencies;
2. posture, pelvis, spine, muscle tone, mobility of joints;
3. cardiovascular system. Heart: N.B. evidence of rheumatic carditis or cardiac insufficiency;
4. chest and lungs - evidence of pulmonary disease;
5. thyroid gland - any enlargement or signs or symptoms of over or under action;
6. breasts - degree of development - give advice on support if unduly pendulant - state of nipple, if inverted, treat;
7. abdomen - presence of scars or hernia, muscle tone, enlargement of viscera, height of fundus and if pregnancy is sufficiently advanced, presence of foetal heart sounds;
8. pelvis - pelvimetry may be practised if desired. Smallness of pelvis or orthopaedic conditions effecting it should be noted.
9. tests which should be carried out:
   - weight and height;
   - blood pressure - reading of 130/80 upper limit of normality;
   - haemoglobin level - if less than 11 gms. repeat in 1 month;
   - blood grouping (and Rh factor where relevant);
   - Wasserman or Kahn or Kline;
   - X-ray of chest.
Subsequent visits - These should take place every four weeks for the first 24 weeks then every two weeks until the 36th week, then every week until the 40th week. Any abnormal finding may necessitate more frequent visits in the first 24 weeks, such as excessive gain in weight, failure to gain expected amount, rise of blood pressure to 140/90, oedema, presence of albumin in urine, glycosuria.

At these visits the doctor is observing the effect the pregnancy is having on the mother and how the foetus is developing.

1. **The effect on the mother**

   The presence of the growing foetus may impose:

   (a) a strain on her circulation and kidneys - revealed by rise in B.P. and oedema and varicosity of veins;

   (b) a drain on her nutritional reserves - symptoms of anaemia and vitamin deficiencies;

   (c) an increased burden is placed on liver function and signs of stress may be found especially if there has been previous impairment of the liver as in amoebic dysentery, malaria, hepatitis;

   (d) digestive and bowel disturbance may result - nausea and vomiting and constipation due to mechanical and hormonal causes;

   (e) a flare up of previous diabetes, thyroid imbalance or tuberculosis.

2. **The effect on the foetus**

   (a) It is in the first trimester that harmful influences are most likely to result in malformation in the foetus, especially malnutrition, anaemia, virus infection and X-rays. The result may be foetal death and expulsion as a miscarriage, abortion or still birth depending on how long the damaged foetus survives. If less damage is done the foetus may survive but with a defect, e.g. a hearing defect in the child following rubella in the mother.

   (b) In the second trimester - infection in the mother is not so likely to cause malformation but the baby may get an infection also encephalitis, syphilis, liver damage, and the effect may be debilitating.

   (c) In the third trimester - good nutrition is important.
(3) Further examination for the position and lie of the foetus will be made in the late months of pregnancy.

2. INFANT HEALTH

Consideration of the health of the infant must include all factors from the commencement of development of the foetus from the time of conception throughout the period of intra-uterine life, as well as during the natal and post-natal periods. In the previous lecture on prenatal care a description was given of the three phases of intra-uterine life, the processes which were taking place and the effects of certain environmental conditions on the development of the infant.

To study the progress of development after birth, it is useful to have some standards for comparison. These standards will not be hard and fast for all countries and should eventually be compiled from observations made in the particular country in which one is working. However, a study of findings in many countries does show that there is not a very wide variation when optimal living conditions can be obtained.

A birth weight of 7-1/2 lbs. for full-term infants is the average. Average length at birth is 20 inches, measured from crown to heels.

Other measurements should be recorded during subsequent development. The ones usually selected are as follows:

(1) Head circumference

The average head circumference at birth is 13-14 inches. For infants longer than the average length of 20", the head is often larger than 14" and if less than 20" may be smaller than 13".

The baby's head grows as much during the first year as it does during the rest of life. The average increases are:

First 3 months - 2 inches - making circumference of 16" at 3 months
Second 3 months - 1 inch - " " 17" at 6 "
Third 3 months - 3/4" - " " 17-3/4" at 9 "
Fourth 3 months - 1/2 " - " " 18-1/4" at 12 "

In all a growth of 4-1/2" takes place in the first year of life. In the second year growth is only 1", giving a circumference of 19-1/4" at 2 years. In the three-year period from 2 to 5 years another 1" of growth occurs making a circumference of 20-1/4" at 5 years.
(2) The fontanelles

The posterior fontanelle closes usually by the end of the second month.

The anterior fontanelle is about 3/4" in diameter at a year and usually closes at 18 months but four months earlier or later may be found with no associated abnormality.

Excessively early closure (at six months or so) may be found in cases of microcephaly. Late closure is seen in rickets, hydrocephalus and cretinism, also in some types of mental defect, e.g. mongolism.

(3) The chest

The circumference of the chest is measured at the level of the nipples during quiet inspiration.

At birth it is generally 1/2 inch less than the circumference of the head. It is equal to the skull circumference at three months and continues so to eighteen months. Thereafter it enlarges more rapidly than the head. In young infants the chest is circular in shape. As the child becomes older it develops the adult contour.

(4) The abdomen

This circumference is measured with the child lying flat on the back and during quiet inspiration. It is usually the same as that of the head and chest up to two years of age. After this time it is less than the chest.

(5) Muscular development

This is an important observation because it shows not only the development of the child's muscular system, but also the development of important tracts in the central nervous system.

(6) Milestones of development

The age at which babies "do things," usually referred to as "the milestones," depends on several factors, mental, motor, social and development of special senses.

1 - 2 months  - Smiles
                  Eyes follow moving objects

3 - 4 "  - Holds up head
                 Reaches for objects
<table>
<thead>
<tr>
<th>Age Range</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 4 - 5 months | - Grasps objects  
Carries small objects to mouth |
| 5 - 6 "     | - Recognises people  
Rolls over |
| 6 - 8 "     | - Sits alone  
Use thumb against first finger in grasping objects |
| 9 - 10 "    | - Crawls  
Stands with support |
| 11 - 12 "   | - Pulls himself up  
Says single "words" |
| 12 - 13 "   | - Walks with support |
| 14 - 15 "   | - Walks alone |
| 16 - 18 "   | - Runs |
| 2 years     | - Says simple sentences. |

The sequence given above is characteristic but the times are subject to wide variations still within normal range. Generally, the smaller more active children stand and walk earlier than the big overweight infants.

It is not uncommon to find infants whose development is irregular as compared with the above time-table. This need not cause anxiety. If, however, the infant is four months or more behind the average in acquiring all the usual activities, we must look for a cause.

(7) The special senses

Sight - is present at birth but is imperfectly developed. Bright light is unpleasant to the newborn baby. It usually takes the baby three months to learn to co-ordinate the movement of the two eyes, so that transient squinting in infants up to three months of age need not cause anxiety. If it persists after six months the infant should be referred for treatment.

At about two months the baby is said to look at objects "regardfully" - far vision is better developed than near vision.

At ve-six months he appears to recognize persons and objects.
To test the vision a bright light or shining object is held not too closely before the infant's eyes and moved. If the infant sees, his eyes will follow the moving object. It is important that this should be done without any sound as this may attract the attention of a blind child. Some parents think the child is blind if he fails to blink when a hand is waved before his eyes. This absence of blinking is quite normal.

Hearing - A few days after birth hearing is very acute. Loud or sudden noises will frighten the child, causing him to start or cry.

By the end of the third month he will turn his head in the direction of a sound, and is thought to recognize voices by four months.

It is very difficult to be certain in the first year whether a baby hears. Infants will often respond to vibration or to movement and gestures accompanying the sound and so give an erroneous impression of hearing. Also they may hear sounds of a certain pitch and intensity but be deaf to the ranges of tones of the human voice.

A simple method of testing is to stand behind the infant and rattle coins. If he turns in the direction of the noise he obviously hears. The oculo-auditory reflex should be tested. The examiner stands out of sight behind the infant and claps his hands. If the infant blinks it indicates that he hears. These are simple tests and by no means final.

Speech

To speak he must be able to hear. He must be spoken to so that he has speech to imitate and he must have intelligence so that he can learn.

At two months the baby takes notice of a speaking voice and at four months will laugh. At six months he will vocalize both vowels and consonants, e.g., "gooo."

At nine months he will make such sounds as "Dadda" but without meaning. They are just sounds, and deflating though it may be, have no reference to his male parent. Soon after this he begins to imitate sounds. The average attainment at a year is for the baby to say two or three words with meaning, e.g., "Dadda," "Mumma," "Bubba." At 15 months his vocabulary has increased to four words and at 18 months to six. About this time children often have their own jargon in which they conduct protracted conversation. About this age he can point to the parts of the body when named.
At two years we expect the child to speak in short phrases and sentences of two or three words and to use pronouns. By three years he has acquired a large vocabulary and talks freely.

If a child of two years makes no attempt to speak, we should seek for the cause: e.g. congenital deafness, or congenital mental defect, or he may have been over-protected and all his wants forestalled so that there has been no need for speech.

Dentition

The order in which the teeth erupt is very much more constant than is the age at which they erupt.

By the time the child is one year old he usually has six teeth, by eighteen months he usually has twelve teeth and at two years sixteen teeth. The full set of 20 milk is usually present at two-and-a-half years.

In certain conditions, such as mongolism, cretinism, mental defect and usually in rickets, there is delay in the eruption of the teeth.

3. CONDUCT OF AN INFANT WELFARE CENTRE

3.1 Object

The object of infant welfare is to build a healthy, happy well-adjusted child.

Regular examination of the infant by nurse and doctor and recording of their findings at specified intervals will enable the progress to be checked and any deviations from normal recognised and appropriate treatment introduced as early as possible.

The medical practitioner should see every newborn baby at least by the end of the first month. He should conduct a systematic examination noting and recording additional points to those noted by the nurse.

A special card or a special place on the card kept by the nurse should be reserved for his findings.

3.2 Approach to the parents

A nurse in charge of an infant welfare centre must have a humanitarian outlook and be possessed of tolerance, sympathy and understanding. Her attitude should never be critical, condemnatory or condescending. The mother should be made to feel welcome.
3.3 Examination of the infant

During the interview, the attitude of the mother to the baby, her method of handling him and the infant's response to her should be noted. The nurse should also get an impression of the child's alertness and ability to take notice of his surroundings, and whether he is happy and cheerful or unhappy and distressed.

The infant is undressed, and weighed and measured - the tone of his flesh is felt, note whether it is firm as in a well-nourished baby or soft and flabby as in the ill-nourished.

The condition of the skin is noted, if soft and smooth or affected with rashes. Measurements of the head, chest and abdomen are taken every three months.

The head is inspected, its shape and the presence of any abnormality such as bossing or asymmetry is noted.

Notice the size of the fontanelle, also the tension, whether there is any variation from the normal elastic tension of health. A flat depressed fontanelle is found in dehydration, and a bulging fontanelle with increased tension when intra-cranial pressure is raised.

The ears are examined looking for cracks behind them, discharge from them or any other abnormality. Note whether the baby appears to hear.

The eyes are examined for discharge, cataract, squint or any other abnormality. Notice if the baby appears to see.

The nose is inspected to determine whether or not the airway is obstructed and if any discharge is present.

The mouth is next examined for presence of any abnormality such as harelip or cleft palate. The condition of the tongue is observed, and a note made of any teeth which have erupted, or if thrush is present. The throat is also examined.

The neck is examined for any enlargement of glands or wry neck.

The shape of the chest is observed. Any abnormality such as ricketty rosary should be noticed.

The condition of the umbilicus is observed. In young infants, note whether it has healed and is clean and dry. In older infants, examine for evidence of umbilical hernia.

The genitals are examined. In girls, any discharge noted. In boys, the condition of the prepuce is noted, and whether the testicles are descended.
Any abnormality of the spine such as spina bifida should be looked for.

The buttocks are inspected for evidence of scalding or rash.

The thighs should be tested for abduction. If this is limited, the child should be referred for medical opinion as there is a possibility that the baby may have a congenital dislocation of the hip. Examine the legs for any abnormality such as unequal length, or in older children, for deformities such as bowlegs or knock-knees.

The feet are examined for talipes or other abnormalities. When the child is walking look for inversion or eversion of the foot and valgus and varus ankles.

The arms and hands are observed for any abnormality.

The stage of the child's development is noted, whether he can hold up his head, sit, stand, walk or talk.

3.4 Home visiting

This is essential and is greatly appreciated by the mother. It establishes a good relationship between the nurse and the mother, and enables the nurse to know the environment of the child.

3.5 Toddler attendance

When the baby enters his second year, less attention is focused on him, particularly if the mother is expecting another child and often his condition suffers. The nurse should explain to the mother that after the first year the child still requires supervision and that she is welcome to discuss any special problems that may occur in these years. She should invite the mother to continue to bring her child to the centre, at intervals of from 1-3 months until he is five.

3.6 Immunization

(a) Diphtheria, pertussis and tetanus immunization is usually carried out on babies from three months onwards. Triple vaccine may be used. The nurse should use her influence to ensure that all babies attending are immunized. A record of the immunization is entered on the record card.

(b) Poliomyelitis immunization should be encouraged and may be combined with the first three injections as quadruple vaccine, or may be given separately.

(c) Smallpox vaccination should be given in the first year of life. Views differ as to the safest time to give it. Two months is the time stated in Victoria. In England
authorities are tending towards leaving it till the end of the first year.

(d) BCG vaccination should be advised for the child in contact with tuberculosis, if it is not given as a routine.

3.7 The centre as an educative medium

The infant welfare nurse is a health teacher who acts as a link between the medical world and the family. In her consultation with the mothers she can help them to understand current trends in health teaching. Whenever possible she should reassure the mother and make her feel confident to care for her child.

4. THE DEVELOPMENT OF THE PRE-SCHOOL CHILD

One of the important functions of pre-school centres is health supervision and annual medical examination should be given by the doctor of every child attending. The mother should be present with the child to discuss with the doctor any problems concerning the child.

In preparation for the medical consultation the kindergarten teacher will fill in details on the pre-school medical card in regard to name, age, address of child. A parent sheet will be given to the mother on which details relating to the child's progress during infancy, family history, etc. are entered.

The points to be noted in examination of the pre-school aged child are, beginning from the top:

The eyes. Are the eye muscles functioning in harmony or is there any strabismus? Is there any infection of the lids, blepharitis, or conjunctivitis? Is there any evidence of a visual defect, e.g. myopia? Are there any other abnormalities, such as pacities, scanning of sclera or vascular protrusion?

The ears. The external ear: Is there any eczema or discharge from within? Is there any suggestion that there may be a hearing defect? Simple tests for recognizing the presence of hearing defects should be done and referral to the specialist for testing if indicated.

The mouth. Are the teeth in good alignment or is there any malformation of bite or palate? Are any of the teeth showing signs of dental caries? Is staining present or any dislocation? Are the gums healthy? Advice should be given to the mother on to prevention of caries and the need for treatment of early caries.

The throat. Are the tonsils healthy? Has there been frequent otitis media? Are the glands of the neck enlarged?
The nose. Does the child breathe freely through the nose or is there evidence of nasal obstructions? Is there a discharge?

The chest. Is there evidence of asthma bronchitis or chest deformities such as asymmetry? This may be the result of a lung defect or of abnormality of the heart.

The abdomen. Is it unduly protuberant? Is there an umbilical hernia?

The urinogenital system. Is micturition normal, is there any frequency or scalding or puritis? Are the external genitals normal? Is there any swelling in the scrotum or labium?

The orthopaedic features. Is the child's posture good?

The legs. Is there evidence of knee or ankle weakness such as knock-knees and everted ankles? Are the feet well formed and strong or are they flat or with metatarsus varus?

The skin. Is it a normal healthy skin or is there evidence of allergy or any of the common infections such as impetigo, ringworm or scabies present?

Nutrition. Is the child over or under the average weight for height and age? For the height the shoes should be removed and the child should be standing erect, feet together, with his heels against the wall or the base of the measuring rod and his head erect. A large set-square or a book should be held with one edge placed vertical against the wall so that the adjacent side, at right angles, makes a horizontal upper limit for the child's head.

In tracing the growth of the child reference should be made to his progress in infancy. The continuous curve from infancy through the pre-school years reveals his health pattern.

The nervous system. Evidence of nerve palsies, muscle wasting or weakness, the presence of tics, blinking, etc. and the history of convulsions or fits should be noted.

The mentality. Any query as to retarded development should be noted and followed up.

The emotional state. Signs of undue tension such as nail-biting or thumb-sucking or enuresis should be noted.

The speech development is noted. The child should be encouraged to talk so that any infantile defects such as dislalia can be detected.

Records. The findings in the medical examinations should be entered on a record sheet for each centre. These in turn can be summarised
and entered into an annual report book. In this way the incidence of defects and conditions can be determined for the total number of children examined. A picture of health problems in this age group is so gained and steps can be taken to overcome them.

5. SCHOOL HEALTH

5.1 Object

School health consists of more than just the school medical service. It covers the total health programme of the school, the provision of healthy conditions in which the child may learn to the best of his ability, the teaching of health so that the child has a full understanding of how it is achieved and the practice of good health habits. It embodies health education of both teaching staff and pupils and requires the participation of parents, school nurses and doctors, dentists and all other people who are concerned with the health and welfare of school aged children.

Since parents are responsible for the health of their children, it is desirable to have the attendance of a parent at the school for interview at the time the medical examination is made. This interview is particularly valuable as a source of additional information about the child's physical health and behaviour, and can also be used for the education of the parent in health matters.

Since the teacher is in daily contact with the children and has had some instruction in the recognition of departures from normal, he or she should also be available for consultation.

A record should be made of defects and departures from normal health, structure and function. When recognised an accurate assessment should be made of the nature and extent, the possible effects on physical and emotional growth, whether treatment is indicated, attitudes of the parents to the defect and the facilities for treatment available to that particular child.

A follow-up of each child referred, to see that medical attention has been obtained should be made at the next visit to the school.

Special surveys, e.g. goitre, posture, morbidity, and nutrition, may be made from time to time, as circumstances demand and opportunities permit.

Medical examination of teachers is an important function of the school medical service and its aims include:

(1) assessment of the medical suitability of the person for performing normal teaching duties;
(ii) assessment of eligibility for superannuation benefits;

(iii) assessment of the potential effects of any medical defects found on children in the classroom, implications in relation to other members of staff and to the school organization;

(iv) assessment of eligibility for sick leave, special or superannuation;

(v) assessment of fitness to resume duty after illness or to continue on duty when it appears to officers of the Education Department that the teacher is unwell but has not applied for sick leave.

5.2 Principles underlying the organization of school medical service

(1) The medical examination made after the year of entrance (i.e., aged six years) is important, for at this examination all congenital defects and those which developed in early childhood may be detected. The emotional problems associated with settling in at school may also be observed at this time.

(2) A further examination at about nine or ten years of age affords opportunities to detect defects or abnormalities acquired in the early years at school, and those not evident at the entrance examination. It is during this time that acquired deafness, visual defects, latent rheumatic heart disease and postural defects most frequently occur.

(3) An examination at the end of school life (i.e., fourteen to fifteen years of age) combined with a vocational guidance test, can be of great value in assisting the child in his entrance into industrial or commercial life.

(4) In addition to these examinations regular inspection should be made by the school nurse. Her duties will include examinations of the children for personal hygiene, recognition of skin conditions, such as impetigo, scabies, ringworm, and pediculosis. Where necessary exclusion from school and treatment will be instigated and visits made to the home to insure that complete treatment of the infection within the family is carried out. Printed instructions on the treatment of these conditions are issued and copies are submitted. In addition the nurse carries out regular tests for vision and hearing and enters her findings on the nurse's card which is available for the doctor to see when he visits the school. She prepares the children for the medical examination when the doctor conducts his examination.
(5) In addition, provision is made for the referral to the school medical service by parent, teacher or school nurse of the following groups of children:

(a) those who are considered to show early signs of ill-health, either physical or mental;

(b) those with learning difficulties;

(c) those who are frequently absent from school;

(d) those who show signs of abnormal behaviour;

(e) those who have recently returned to school following a prolonged absence;

(f) those referred for review by the medical officer at a previous medical examination.

Although the majority of children examined show no obvious physical defects, even a short conversation with the parents may reveal a hidden disorder such as nephritis, epilepsy, hernia or diabetes. Nutritional errors, previous illnesses, family traits, domestic relationships and the general behaviour of the child at home or other points regarding the child which can only be given by the parent.

5.3 The medical examination

Medical cards are used to record these findings. There is one for the parents to fill in, one for the nurses and one for the doctors. In addition to doing the vision tests, hearing tests, weighing and measuring, the nurse does urine testing.

When the examinations are completed a summary of the findings is made so that the total number of each type of defect occurring is determined. Valuable information on the incidence of different health problems in childhood can in this way be collected and understanding of the major health problems requiring attention in the community can be gained.

Follow-up of all cases in need of treatment is most important and this is one of the duties of the school nurse. It is also important to ensure that provisions are made for the best type of education of children with handicaps and it is the doctor's duty to refer such children for placement in proper schools or proper classes within the same school.

In regard to handicaps such as those of sight and hearing it is necessary for proper assessment to be made of the extent of these handicaps before the best type of special teaching methods can be determined.
Dental services constitute a very important part of the school health services. It is however difficult to provide enough dentists to carry out all the preventive dental care required and it involves a very large expenditure. To help meet this need in New Zealand dental nurses have been trained to carry out preventive dental care and do primary fillings. The commonest defect in all children is that of dental caries and it leads to much ill health and expense in later life. Improvement in dietary habits and oral hygiene are important preventive measures. Fluoride administration or external application is now under consideration.

6. ADMINISTRATION OF MATERNAL AND CHILD HEALTH SERVICES

6.1 General aims of maternal and child health

Maternal and child health (MCH) is concerned with all matters pertaining to the health of children of all ages from conception through childhood and adolescence, and of expectant and nursing mothers.

The WHO Expert Committee defines the ideals to which maternal and child health services should aim - namely to ensure that

1. Every expectant and nursing mother maintains good health, learns the art of child care, has a normal delivery, and bears healthy children.

2. Every child, wherever possible, lives and grows up in a family unit, with love and security in healthy surroundings, receives adequate nourishment, health supervision, and efficient medical attention, and is taught the elements of healthy living.

It is recognised that the health of mothers and children is closely related to the general health of the community and to the social, economic, and cultural background of the country as a whole. All measures which improve the general public health will benefit mothers and children.

6.2 Content of a comprehensive MCH programme

(1) Maternity care providing for adequate prenatal, natal, and post-natal care, including health supervision of nursing mothers; continuing health supervision and total medical care of all children from birth through childhood and adolescence.

(2) Studies of problems affecting the health and well-being of mothers and children (to serve as a basis or guide to programme development).
(3) Analysis of vital data and statistics concerning mothers and children (to serve as a basis or guide to programme development).

(4) Health education of parents in child care, of school children, and of the general public in MCH matters.

(5) Education of auxiliary staff through the training facilities at clinics.

Priorities - Preference should be given to activities which will benefit the greatest number of mothers and children, for example, in a country where malnutrition is prevalent improvement of nutrition would have higher priority than a programme for providing health for a small group of handicapped children. Initial planning should be for basic services on a limited scale which can be carried out properly and expanded later when sufficient trained personnel and finance are available.

6.3 Organization and structure of MCH services

The distribution of authority and responsibility for MCH among national or local public health administrative units varies from country to country. In some, all of the functions listed below are assumed by the MCH unit at the national level for the country as a whole. In others, major responsibility for some function is assumed by MCH units at the local level.

At the national level it would be the responsibility of the MCH unit to:

(1) study the special problems affecting the health of mothers and children;

(2) stimulate the formulation of broad policy;

(3) promote co-ordination with other units in the department of health and with other government and voluntary agencies concerned with mothers and children;

(4) secure adequate financial support for MCH services at intermediate and local levels;

(5) promote the necessary legislation;

(6) define standards of maternal and child care and for personnel rendering such care;

(7) promote guidance and leadership;

(8) stimulate planning and evaluation of programmes and research with personnel at intermediate or local levels;
(9) provide consultation and advice on technical problems;

(10) promote training of MCH personnel and to establish standards for MCH staff;

(11) stimulate research.

In some countries, there is a tendency to exert excessive central control over local health services. Under these conditions, local initiative is suppressed and the services are likely to be less responsive to local needs. As soon as possible, when circumstances permit, such rigid control should be reduced and local enterprise encouraged.

Relationships with other agencies and departments concerned with services for mothers and children. It is important for these to be in close co-operation with social agencies serving families, as well as with other government departments such as the education department and welfare department.

It is important also that there should be a close relationship between MCH personnel and the staff of hospitals providing beds for mothers and children.

Integration of MCH services. The increasing recognition of the inter-dependence of health and social factors, of the value of the family approach, and of the importance of the closest possible integration of preventive and curative health services, is beginning to influence public health philosophy and the organization and staffing of MCH programmes.

7. VITAL STATISTICS AND INFANT HEALTH

One of the first requirements in evaluating health standards and particularly those of infant health is to have a record of all births, both live and still. Notification of birth within a short time after delivery is a requirement and necessary legislation and adequate provisions for its implementation and policing are essential. A record of all infant deaths is also required and is sometimes harder to enforce than that of adult deaths. We can then determine the infant mortality rate, i.e., the number of deaths of infants in the first year of life per 1000 births.

Study of the fall in the infant mortality rate that has taken place in various countries where health measures have been improved provides useful information. The infant mortality rate for Victoria since 1900 shows the dramatic decrease which has taken place during that period - namely from 100 to 18.46. To what has thus been due? Analysis of causes of deaths is necessary to answer this question. Statistics reveal that in the first twenty years the major cause of death in infancy was infant diarrhoea. At this time typhoid fever was a major cause of death for the whole population. Public health measures were then directed towards
sanitation, water supplies and towards the end of the first twenty years infant welfare centres were beginning to grow up. By 1930 teaching was being given throughout the state on hygiene in the home and in particular in the care of babies, the need for protection from flies, and preparation of milk and care of utensils used in the artificial feeding of infants who could not be breast fed. A big drop in infant deaths resulted from this combination of applied environmental sanitation and teaching of hygiene, mothercraft and infant feeding.

By 1935 the infant mortality rate had fallen to 41.5 and now that the great toll of life due to gastro-intestinal infections was reduced, what were the major causes of death? Prematurity, respiratory diseases and infections such as diphtheria and whooping cough in that order. An important measure in combating these infections was the introduction of immunization with diphtheria toxoid. This greatly reduced the death rate from diphtheria and now whooping cough caused more deaths in the first year of life. Then pertussis vaccine was introduced and deaths from this disease have now dropped to a very low figure. Deaths from pneumonia and bronchitis have been greatly reduced since the introduction of chemotherapy and antibiotics.

Now in 1960 the infant mortality rate is 18.46, the principal causes of death are now congenital malformation, birth injuries, post-natal asphyxia and atelectasis and immaturity unqualified. This gives some indication as to where attention needs to be directed to reduce these deaths.

Further information can be obtained by analysing the infant deaths into groups: those occurring in the first month of life, known as neonatal deaths, and those in the first week of life.

Improvement of the technique used by those who attend mothers during childbirth and take care of newly born infants may lead to a reduction of deaths from birth injury, post-natal asphyxia and atelectasis.

The term perinatal care is used to refer to the care given immediately prior to birth and after birth. Perinatal mortality rates are now being recorded in countries where efforts are being made to reduce the incidence of death in early infancy.

Once the infant mortality rate is reduced, attention is devoted more towards children in the preschool age group. The causes of death are now being recorded by age. A study of deaths in Victoria in 1960 revealed that of the 237 which occurred the major cause was accidents which accounted to 84.

Analysis of the findings at medical examination of some thousands of preschool children attending centres in Victoria reveals some of the problems which require attention. Dental caries is the commonest of these.
Once the major public health problems such as malaria, leprosy, and tuberculosis are overcome, a country can devote more time and planning to maternal and child health promotive welfare programmes. All infants should receive medical examination at one month and twelve months of age and careful records kept from which statistics can be compiled to give indication of the problems needing attention. The need for regular medical examination of children at the age of three or four years is emphasized. This can be arranged at infant welfare clinics and careful records should be kept. From these the information relating to the health problems of this age group in your countries can be obtained and you can plan your health programmes to meet your own special needs.
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# NUTRITION

*(Synopsis of lectures by Dr. A.E. Wilmot)*

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NORMAL NUTRITION</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>WHAT ARE THE SIGNS OF GOOD HEALTH?</td>
<td>77</td>
</tr>
<tr>
<td>3</td>
<td>WHAT IS NORMAL GROWTH, AND WHAT FACTORS INFLUENCE IT?</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>3.1 Genetic</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>3.2 Endocrine</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>3.3 Nutritional malnutrition</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>3.4 Protein malnutrition</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>3.5 Vitamin A deficiency</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>3.6 Vitamin B₁ deficiency</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>3.7 Atrophy</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>3.8 Arboflavinosis</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>3.9 Niacin (nicotinic acid) deficiency</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>3.10 Folic acid</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>3.11 Vitamin C</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>3.12 Vitamin D deficiency</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>FOOD PATTERNS AND NUTRITION EDUCATION</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>4.1 Cultural factors</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>4.2 Meal pattern</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>4.3 Customary division of food within the family</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>4.4 Altering food habits</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>4.5 Nutrition education</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>4.5.1 Personnel</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>4.5.2 Where to teach and when?</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>4.5.3 What to teach and how?</td>
<td>83</td>
</tr>
<tr>
<td>5</td>
<td>INFANT NUTRITION</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>5.1 Assessment of nutritional state</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>5.2 Satisfactory growth</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>5.3 What is the calorie requirement of an infant and what factors influence it?</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>5.4 How are the caloric requirements best provided?</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>5.5 Supplementary solids</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>REFERENCES</td>
<td>89/90</td>
</tr>
</tbody>
</table>
1. NORMAL NUTRITION

The following definition has been given. "A state of normal nutrition exists when the growth and development in childhood are within the range of normal, for one of that particular parentage, and the signs of good health are present."

2. WHAT ARE THE SIGNS OF GOOD HEALTH?

Good posture, good muscle tone, normal tissue turgor, sound sleep, vigour, mental alertness, happiness, ability to perform task involving skills which are within the capacity of the age group and culture under consideration.

3. WHAT IS NORMAL GROWTH; AND WHAT FACTORS INFLUENCE IT?

3.1 Genetic.

The variation found between different racial groups is associated with the genes carried in the chromosomes of the cell nuclei. Tendency to shortness or tallness found within certain families is associated with the genes carried by the parents. So each child has a growth potential determined by his inherited genes, but whether or not this potential will be reached will depend on the adequacy of his diet and freedom from disease and adverse environmental conditions.

3.2 Endocrine.

The part played by the different ductless glands cannot be dealt with in any detail in this lecture. Recall the importance of the pituitary gland and the occurrence of pituitary dwarfs and giants when different parts of the gland are disturbed.

3.3 Nutritional malnutrition may be primary due to faulty diet or secondary due to inability to digest the food. Primary malnutrition may be due to inadequate calories and if severe or prolonged, starvation and death may result. Sufficient calories may be provided but primary malnutrition may still be present due to a qualitative defect in the diet. The protein may be poor and if this occurs in early childhood growth will be impaired. Lack of any vitamin will also affect growth.

There is an individual growth pattern or "norm" for each particular child since no two children have exactly the same genetic pattern or the same environment. However, we can construct growth curves showing the average rate of growth for a large number of children in the community. Such graphs are made from height and weight measurements of groups of children, infant, pre-school and school ages. Individual growth curves can be made for any particular child and these reveal his health history. Diminished rates of growth may be associated with episodes of physical illness, emotional disturbances or mental ill health.
In assessing a child's state of nutrition it is his growth curve rather than any isolated reading that is of more significance. If the gradient is flatter than average then a cause should be sought. If the amount of food and the calories provided are adequate then other causes are looked for. The caloric requirements for a child of the age presenting can be obtained from the chart given in the back of the good composition tables you have been given.

The next point to consider is the amount of protein in the diet. This can be estimated approximately by ascertaining the amounts of the main protein-containing foods being consumed. If more accurate information is required an estimate can be made by calculating the protein content of each item of food taken in the day's diet, and totalling up the amounts and comparing the result with the standard.

3.4 Protein malnutrition

When this occurs in young children, especially about the time of weaning, the condition described as Kwashiorkor may occur. This condition is characterised by apathy, lassitude, misery. Circulation is poor and hands and feet may be blue and cold, hair changed in colour and texture, often red tinged, and areas of dyspigmentation may be present on the skin. Oedema is present associated with hypoalbuminaemia. If untreated the mortality rate is high. Response to feeding with powdered skimmed milk is good. This condition will be discussed in more detail in a later lecture on infant feeding. Protein malnutrition is often accompanied by a deficiency of vitamins of the B group, particularly riboflavin and niacin. Some observers have reported accompanying thiamine deficiency and others a lack of vitamin A. In order to clarify our thinking on this subject later let us summarise the signs and symptoms resulting from vitamin deficiencies.

3.5 Vitamin A deficiency in mild degree causes a night blindness, slowness of accommodation, dimness of vision, conjunctivitis and in severe degree, xerophthalmia, keratomalacia, keratinization of epithelial cells, kidney calculi, renal tubular changes, liver cirrhosis, an acne-like skin eruption, keratosis, loss of weight, weakness and susceptibility to infections. It is cured by administering 10 000 units as cod liver oil for ten days.

It is prevented by taking foods rich in vitamin A or its precursor, carotene. It is a fat soluble vitamin present in milk fat, fish oils and in varying amounts in liver of different animals and in different vegetable oils. It is present in egg yolk. Carotene is found in carrots and other yellow or red pigmented vegetables and in addition green vegetables. It is not easily destroyed by heating or oxidation in cooking.

3.6 Vitamin B1 deficiency - lack of thiamine leads to the condition of beri-beri, a form of multiple neuritis. In the wet type oedema is present; symptoms include tachycardia, anorexia, nausea, skin rashes, pain.
3.7 Atrophy

Loss of reflexes, optic, crural and peripheral neuritis and paralysis, irritability, nervousness occur. Acidosis and cardiac enlargement may occur. There is retarded growth and general malnutrition with enlargement of liver and spleen. Laryngeal lesions may develop, producing immobility of the vocal cords. Decreased parastalsis, poor assimilation and susceptibility to intestinal infections result. Beri-beri is cured by giving an adequate diet together with 2 to 8 mgs. thiamine daily by mouth.

It is prevented by taking a diet containing foods rich enough in thiamine to provide 1.5 mgs. a day. Food rich in thiamine are yeast extract such as vegemite and marmite, wholegrain cereals, nuts, peas and beans, egg yolk and liver. Some will be lost in cooking as it is water soluble and destroyed by prolonged heating in the presence of air.

3.8 Ariboflavinosis - lack of riboflavin results in skin lesions; cheilosis - the lips becoming dry red and shiny, the tongue becomes smooth shiny and magenta coloured, angular stomatitis occurs and a similar splitting occurs at the outer angles of the eyes. The skin about the genital regions is also affected. In the eyes, photophobia, dimness of vision and vascularization of the cornea develop, and keratitis. It is cured by giving large doses of riboflavin daily - 3 to 10 mgs. (or 30 gms. Brewers yeast or liver extract). Recurrences are common unless the diet is improved. Eye changes may be irreversible.

It is prevented by taking a diet providing 2 mgs. of riboflavin a day, provided in such foods as liver, kidney, yeast extract, milk and egg and to a lesser degree, meat. Many fruits and vegetables contain some riboflavin. It is not destroyed by heating.

3.9 Niacin (nicotinic acid) deficiency leads to pellagra - this begins with loss of appetite, weight loss, mental lassitude, glossitis, dermatitis - (areas develop a sunburn like erythema which in a month or so becomes scaly and desquamate), pigmentation of the skin exposed to sunlight, hands, feet, neck and face. Diarrhoea alternating with constipation, nausea, vomiting, ataxia and dementia may follow. Paralysis, atrophy and reflex changes occur in advanced cases. It is cured by administration of nicotinic acid in normal saline, 1.5 mg. per kg. of body weight, orally, intra-muscularly or intra-venously, daily for 4 to 8 days.

It is prevented by giving sufficient of the foods rich in niacin to provide 15 mg. daily. Such foods are liver, peanuts, meats, fish, yeast, whole grain cereals and milk. It is not destroyed by ordinary cooking or processing temperatures.

3.10 Folic acid.

Lack leads to easy fatigability and anaemia, and usually results from malabsorption and intestinal disturbances. It is obtained in the diet from dark green leafy vegetables.
3.11 **Vitamin C**, or ascorbic acid deficiency, leads to scurvy characterized by tendency to bleed chiefly subperiosteal haemorrhages leading to tenderness of the limbs and pain and crying on handling. Gums bleed, small petechial haemorrhages or larger bruises occur about the body. Bleeding may occur behind the eyeball, displacing the eye forward. There may be bleeding from the nose, blood in the urine or stools. Microscopic haematuria is one of the earliest indications. Subperiosteal bleeding may produce painful swelling of bones and separation of the epiphyseal ends of the long bones may appear. Prominence of costochondral junctions may be obvious, producing a raised sharp edge, the rib being more prominent than the cartilage. These prominences can be distinguished from the rounded swollen junction characteristic of rickets. There is retardation of growth, anaemia and increased susceptibility to infection, and delayed healing. Finally there may be cardiac enlargement, hypertrophy and myocarditis and sometimes sudden death. Treatment consists of giving large doses of ascorbic acid 100-200 mgs. daily by mouth. It is prevented by giving foods rich in vitamin C, fresh fruits especially citrus, paw-paw, tomatoes and fresh green leafy vegetables which are eaten raw, in amounts which will provide 50 mgs. a day. Vitamin C is easily destroyed by oxidation and prolonged cooking in the presence of air will reduce it to a small percentage. It is also water soluble and likely to be lost in the cooking water.

3.12 **Vitamin D deficiency** leads to rickets characterized by poor ossification of bones resulting in softening due to lack of calcium. Signs and symptoms are craniotabes, skull bossing, head sweats, head nodding and rolling, enlarged wrists and ankles, pot belly, delayed dentition, delayed fontanelle closure, failure to sit and walk at the normal age. In older children lordosis develops and bowing of legs and often pigeon chest. In marked deficiency pelvic deformity may result which later interferes with normal childbirth. The general musculature of the body is of poor tone and joints and ligaments are lax. Tetany may occur with convulsions or spasmodic cough. Carpopedal spasm may be present. The diagnosis is confirmed by characteristic X-ray findings. Treatment by administration of 1600 to 5000 units of vitamin D daily should control the condition within three to four weeks. When tetany is present calcium is also given in the first week. The child should in addition be exposed to sunlight or ultra violet light. Toxic symptoms have been found in cases where massive doses, e.g. 125 000 units daily have been continued for several months. Rickets is prevented by providing sufficient foods rich in vitamin D in the diet, e.g. egg yolk, butter and cream of milk, and fish liver oils, enough to provide 400 units is suggested. Additional vitamin D is synthesised by the action of the sun's rays falling on the skin provided the supply of ergosterol or other precursors of the vitamin are present in adequate amounts. Therefore, an adequate amount of time should be spent out of doors to provide opportunity for ultra violet light to act on the skin.

It is obvious that if nutritional deficiencies are to be prevented, the diet used by the people must provide the essential food requirements. To ensure this teaching is necessary, first of personnel engaged in preventive health work. Then, through them the members of every family should be reached.
4. FOOD PATTERNS AND NUTRITION EDUCATION

4.1 Cultural factors

(1) Social prestige. In some communities highly refined foods are considered desirable by people who consider themselves to be refined or in the upper strata of society for instance the eating of white bread or highly polished rice in preference to wholemeal or unpolished forms which are of much high nutritive value, particularly in regard to iron and thiamine content.

Sometimes a valuable food is scorned for human consumption because it is used for feeding animals, e.g. paw-paw in some of the islands, pumpkin in parts of England, skimmed milk in parts of Australia.

(2) Superstitions and prejudices, which sometimes preclude an article of diet being taken at a particular time. Particularly in pregnancy is this likely to be the case and it is during this time that it is particularly important that the women should receive a good diet. Attitudes to a particular food, such as milk, vary within different cultures.

(3) Sense of security. Lack of accustomed foods may cause great anxiety and tension and unwillingness to accept substitutes, e.g., during the potato famine in Ireland, when shipments of maize were sent from America the people were apprehensive about eating it, many of them completely rejecting it, though they were hungry. When unable to obtain fresh supplies of milk early in the last war, many young American soldiers were very disturbed.

4.2 Meal pattern

The day's meals may be based on one or two staple articles of diet such as rice or taro or built around one main meal of which meat is the central course.

4.3 Customary division of food within the family

Do all members share the meals together or does the mother eat separately after having waited on the family; do the children receive as much consideration as the adults or are they left to eat the remnants of the adult's meals? How many meals are eaten during the day; is there any reason for the practice in use?
4.4 Altering food habits

Unless there is a good reason for trying to alter a pattern existing in a community, this should not be attempted. There are a variety of different ways in which the daily dietary requirements can be provided and there is no reason why the same method should be used in all countries. In fact there are good reasons why they should not. "Food habits are not static. Though many obstacles stand in the way of modifying them, they are constantly changing in a changing world. In general food intake improves with improved economic status." However in countries where refined foods have high prestige this may not be the case. Where other things, such as possession of furniture or TV sets are regarded as evidence of higher living standards, purchase of good foods may be sacrificed for these. A campaign which tries to alter existing customs rapidly often meets with an unfavourable response. Resistance to change may sometimes be justified, for efforts to alter established food habits can sometimes do more harm than good, unless their implications are fully understood. For example it is dangerous to teach people to eat raw salads and to drink fresh milk without first finding out whether the available supply is free from contamination. "The closer a programme to effect changes in the lives of people is lined to established customs and habits the more successful it is likely to be. Wherever possible, it is better to encourage the increased use of a food of good nutritive value already known to the people than to try to introduce new foods. If entirely new foods are to be popularized, the methods suggested for their preparation should as far as possible resemble those already in use, or the new foods should be added to dishes already in common use."

It can be seen that a knowledge of existing diets and food patterns and of economic and social background is necessary in order to plan a satisfactory programme of education in nutrition.

4.5 Nutrition education

4.5.1 Personnel

Although doctors and nurses are not the only people whose field of work carries the responsibility of teaching sound food habits, they are in a particularly good position to do this work. They have a high prestige in the community and their daily duties take them into the homes of the people, enabling them to become familiar with their household practices. School teachers should plan an important part in teaching school children to understand the functions of food and particularly which foods are needed for growth and what vitamins are required for health and how they are best provided in the daily diet. To teach nutrition properly the teachers need to have a good background knowledge themselves. Assistance should be given by the medical practitioners in instructing them
about the diseases that result from deficiencies and the best ways of ensuring that their diets contain an adequate amount of each vitamin and essential mineral as well as protein.

4.5.2 Where to teach and when?

Mention has been made of the schools and school aged children are capable of learning a great deal. It is essential that they are taught things which have an important bearing on their own life. Another particularly receptive period in the life of a woman is during pregnancy. While she is waiting for the birth of her baby she thinks about the future and if she is given good teaching about how to choose her own diet so that she will be able to breast feed her child adequately she is likely to do so. It is obvious that the infant and preschool child clinics are important teaching centres and from time to time the medical practitioners should arrange with the district nurses to give talks on nutrition, stressing particularly the foods required at the time of weaning and in the three to four year age groups. These are the times that protein deficiencies and insufficient vitamins become apparent in children who may have been adequately nourished while they were being completely breast fed.

4.5.3 What to teach and how?

What will be taught will depend on the level of knowledge of the people being taught. It may be necessary to teach dogmatically, stating “have so much of this and that fruit or vegetable every day.” Generally it is preferable to give reasons why particular foods should be taken so that the person has a motive for their action. If possible, it is better for the knowledge of the three main classes of food - proteins, carbohydrates and fats and of the minerals and vitamins to be given, but not all in one lesson. The Fiji Daily Dietary Poster is based on this concept. If people understand why protein is important and learn which of their foods are the best available source of it they can select their diets wisely. If they understand the reasons for having the different vitamins and minerals they will try to obtain them. If the basic knowledge is patiently and wisely given the people will not be worried by fanatical cranks and distorting advertising.
5. INFANT NUTRITION

5.1 Assessment of nutritional state

The nutritional state of an infant is assessed by the medical practitioner by:

(1) Observation. If the infant's nutrition is good a happy contented baby will be found, sleeping peacefully after feeding, alert and eager for food after a lapse of time. When not ready for sleep he will be interested in what goes on around him and when he becomes accustomed to people he will enjoy fondling and play. However his desire for mothering and love from his own mother is paramount in the early months of life.

(2) Examination will reveal a clear healthy skin, lustrous hair, bright clear eyes, good tissue turgor, clean moist tongue and lips. Faeces will be soft in texture, but formed, yellowish to light brown in colour and passed without pain.

(3) Study of growth curve will reveal a steady gain in weight with a gradient comparable to the standard and an increase in length up to expected amount.

(4) History taken from the mother will reveal any difficulties which may have presented in regard to feeding, sleeping or general progress and development.

5.2 Satisfactory growth

Birth weight - is usually about 7-1/2 lbs. A gain of 5-7 ozs. a week then occurs till at 5 to 6 months he has doubled his birth weight. A smaller gain 3-5 ozs. a week takes place from 6 to 9 months and 2-3 ozs. from 9 to 12 months. At one year his weight is 3 times his birth weight. From 1 to 2 years he gains about 1/2 lb. a month, 6 lbs. in the year so that at 2 years he weighs 2 stone (28 lbs.).

Length at birth - measured from crown to heels with the child lying flat on his back with both legs extended and the heels held together and the pelvis straight - the average for Australian babies is reported to be 20 inches. An increase of 6 inches occurs in the first 6 months, an average of 1 inch a month, and an increase of 3 inches in the second 6 months, 2 inches between 6 and 9 months and 1 inch from 9 to 12 months.

From 1 to 2 years the rate falls still further, the increase being 4 inches. This would make the child 33 inches by the end of the second year. Length is more directly related to size of parents than is weight. Underfeeding (inadequate calories) affects weight increase more than length.
5.3 What is the calorie requirement of an infant and what factors influence it?

Influencing factors: age, weight, endocrine secretions, physical and nervous activity, climate, protein content of diet. Calorie requirements are usually expressed as the number per lb. of body weight day.

In the first 3 months 50 calories per lb. of body weight are considered adequate.

At 6 months of age 40 calories per lb. of body weight are considered adequate.

At 9 months of age 42 calories per lb. of body weight are considered adequate.

At 12 months 42 calories per lb. of body weight are considered adequate.

At 2 years 40 calories per lb. of body weight are considered adequate.

Premature infants have a higher calorie requirement than full term babies since the last months of intra-uterine growth are even at a more rapid rate than after full-term birth.

An infant who is under his expected weight for his age due to having received insufficient food will have a higher caloric requirement per lb. of body weight to enable him to catch up. It is not wise to immediately give him enough calories for his expected weight in case his digestive system cannot handle the sudden increase. It is wiser to gradually increase the amount or concentration of the feeding.

5.4 How are the caloric requirements best provided?

By breast feeding. To what age? Breast milk alone can adequately provide the full caloric and protein requirements up to six months. After that additional carbohydrate should be gradually introduced and extra protein foods, if suitable ones are available, so that if the breast milk supply diminishes at nine months, as it often does, the child is ready to depend on an outside supply and will not suffer a protein deficiency on weaning. By this age additional foods are required to supply the full mineral and vitamin requirements. Breast milk provides 20 calories per ounce and the volume provided by the healthy mother in response to the sucking of the healthy infant is sufficient to supply the required number of calories.
Breast milk - Total solids 12% water 88% "WHO Manual of Nutrition"

protein 1.5% lactalbumin 0.9% (Jelliffe gives 0.44) 1.0%
casein 0.6% (Jelliffe gives 0.45) protein

carbohydrate 7% (lactose) (Jelliffe gives 6.5%)
fat 3.5% (Jelliffe gives 5.0%)

If the mother is receiving an adequate diet and no difficulties arise to prevent the infant sucking normally, with breast feeding alone nutrition should be satisfactory till six months.

5.5 Supplementary solids

What additional foods are now given will determine the future state of nutrition. The first additions in most countries are carbohydrate foods, cereals such as rice, barley, wheat, oatmeal. In many tropical and sub-tropical countries these are first partly masticated in the mother's mouth to make them easier for the infant to digest. This is a common practice in countries where rice is a staple article of diet. Unhygienic as it may sound, it certainly meets the needs of many infants. If the bolus of salivated chewed cereal is simply placed in the baby's mouth well back on the tongue not much harm seems to result but in some countries it is the practice to "force feed," the bolus of food being rammed down the child's throat and the chin held up to make it swallow. Inhalation of food particles sometimes occurs and much coughing and spluttering is produced. In the South Pacific countries Jelliffe quotes from different reports in regard to weaning times and foods used. In most cases weaning occurs between one and two years and chewed taro is the commonest food first introduced. In Fiji tapioca may replace taro and in urban areas sugar and white bread are introduced early. In Tonga premasticated root vegetables are used together with green coconut water and in more sophisticated families this is being replaced by white bread and biscuits soaked in tea or cocoa prepared with sweetened condensed milk. In the Solomon Islands after the teeth erupt a soup prepared from "kumara" or yam may be used and at a year the infant receives part of whatever the family is eating. In New Guinea at about one month infants are given premasticated taro, sweet potato, yam or bananas.

In most cases workers have reported a lag in weight gain or sometimes even a loss in the average child from ages ranging from 9-16 months. Supplementary foods were sometimes given as early as 2 weeks but not in appreciable amounts till 10-15 months. "Fruits, green vegetables and protein foods such as eggs, fish and poultry may not be introduced till the child is 1-1/2 - 2 years. Milk is rarely used. Frequently no attempt is made to prepare soups, purees or fruit juices, the only preparation being premastication of the carbohydrate usually employed."
It is not surprising to find that marasmus and protein malnutrition are some of the commonest nutritional problems presenting. This is in contrast to temperate zones where milk is available for supplementing and weaning and the chief nutritional disorders which have to be guarded against are rickets, scurvy and iron deficiency anaemias. Iron deficiency anaemias are also widespread in tropic and sub-tropic areas due to primary and secondary malnutrition.

The prevention of these conditions is dependent in many cases on finding a satisfactory substitute or supplement for breast feeding, and the commonest satisfactory one is by the use of cow's milk. This becomes most universally used first in the form of sweetened condensed milk, because of its good keeping powers. Unfortunately, the proportion of carbohydrate to protein is too high for continuous feeding. The introduction of powdered dried whole milk or skimmed milk is a great advance. The liquid evaporated milk is of course simpler for mother to dispense. If resistance to change is found the value of the sweetened condensed milk feeding can be enhanced by the addition of powdered skimmed milk to it. Addition of 2-4 teaspoons of powdered skimmed milk to 8 ozs. of 1 in 8 sweetened condensed milk will provide a feeding of strong enough protein content through the fat and fat soluble vitamin content will need supplementing.

Composition of cow's milk is not identical with human milk though its caloric value per ounce is also 20, and it contains 12% solids and 88% water. The main difference is in the protein content which is higher, since the young calf grows much more rapidly in the early months of life than does the baby. Total protein is 3.5% casein 3% lactalbumin 0.5%. One ounce cow's milk contains 1 gm. protein.

One-and-a-half to two gms. protein per lb. of body weight are required by the infant. The total amount of milk required per day can be easily calculated from this data. To make it more easily digested it is diluted with water, milk 2: water 1 is a safe dilution. Heating of the milk, in addition to killing off pathogenic organisms, makes the protein more easily digested. Extra sugar may be added to bring the calorie value of the diet up to the infant's needs.

Addition of cod liver oil to the babies' diet to provide extra vitamins A and D is usual or a multivitamin preparation containing the water soluble vitamin B and C may be used.

Secondary malnutrition - food requirements not absorbed even though provided in amounts up to standards, due to inefficient digestion which may have a variety of causes. They may be:

(1) Organic - such as obstruction of bowel due to a congenital anomalies, pancreatic fibrosis - leading to fibrocystic disease, obstructing jaundice, or cleft palate.
(2) **Mothercraft care may be poor** - preparation of foods may be insufficient to make them digestible too much fat, too much sugar - too coarse fibres. Evidence will be seen in the faeces.

(3) **Dyspepsia** - indigestion may be due to physiological inadequacies of the digestion system as well as incorrect food preparation and presentation. Fatty intolerance, lack of enzyme which handles gluten - resulting in coeliac disease.

(4) **Nervous disturbances** may be the cause of failure to thrive, vomiting, diarrhoea and anorexia. Improvement may result from mild sedation.

(5) **Allergic causes** may be the reason that the food presented is not utilized and is passed undigested in the faeces or held up in a constipated bowel.

(6) **Infections** which may be of the gastro intestinal tract due to either bacteria or parasites are a common cause of malnutrition which may be quantitative or qualitative. Nutritional anaemia is frequently associated with bowel infestation.

(7) **Miscellaneous causes** which have not been included in the previous groups are bound to occur to you. An example is the child who fails to thrive due to mental defect which prevents him from sucking sufficiently at the breast or the "snuffy" infant of a syphilitic mother.
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CONTROL MEASURES IN A TUBERCULOSIS PROGRAMME
(Synopsis of lectures by Dr. E.S. Han)

CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BCG VACCINATION</td>
<td>93</td>
</tr>
<tr>
<td>2</td>
<td>CASE FINDING</td>
<td>93</td>
</tr>
<tr>
<td>2.1</td>
<td>Aim</td>
<td>93</td>
</tr>
<tr>
<td>2.2</td>
<td>Tuberculin testing</td>
<td>93</td>
</tr>
<tr>
<td>2.3</td>
<td>X-ray of the chest</td>
<td>93</td>
</tr>
<tr>
<td>2.4</td>
<td>Bacteriological examination</td>
<td>94</td>
</tr>
<tr>
<td>3</td>
<td>CHEMOPROPHYLAXIS</td>
<td>94</td>
</tr>
<tr>
<td>4</td>
<td>TREATMENT AND FOLLOW-UP PROGRAMME</td>
<td>95</td>
</tr>
<tr>
<td>4.1</td>
<td>Anti-tuberculosis drugs</td>
<td>95</td>
</tr>
<tr>
<td>4.2</td>
<td>Institutional and domiciliary treatment</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>HEALTH EDUCATION</td>
<td>96</td>
</tr>
<tr>
<td>6</td>
<td>PLANNING, ORGANIZATION AND EVALUATION</td>
<td>96</td>
</tr>
</tbody>
</table>
1. **BCG VACCINATION**

To date more than 300 million people have been tuberculin tested and more than 120 million have been BCG vaccinated in internationally assisted programmes covering 58 countries. Mass BCG vaccination can substantially increase the resistance of the non-infected portion of the community against tuberculosis providing that the potency of BCG used is satisfactory. Inconveniences and risks associated with the vaccination are insignificant. But according to the epidemiological situation in tuberculosis the place of BCG in tuberculosis control will vary, as in Western Samoa where the prevalence of tuberculosis in the entire territory is not high, therefore, coverage of the entire population especially the non-infected population with BCG vaccination, is not necessary, and only a group at risk or close contacts of tuberculosis patients, need to be vaccinated. In a country with a high prevalence of tuberculosis, however, a mass BCG programme is one of the most economic and effective preventive measures.

2. **CASE FINDING**

2.1 **Aim**

The aim of case finding is to detect and then treat the infectious persons, especially hidden sources of infections, and render them non-infectious.

The three diagnostic procedures, the tuberculin test, X-ray of the chest and bacteriological examination, are important. However, the use of the necessary procedures, have to be adjusted according to the prevalence of infection, facilities and personnel available. For instance, in an area where the high prevalence of the disease is known, mass miniature radiography would serve the purpose well without going through the tuberculin test procedure.

2.2 **Tuberculin testing**

Tuberculin testing is one of the most valuable diagnostic tools in tuberculosis for the prevalence study, for case finding as well as for a differential diagnosis. WHO recommends the use of the standard tuberculin, RT23 with Tween 80.

2.3 **X-ray of the chest**

Chest X-ray examination is an extremely valuable tool in tuberculosis control. The merit of X-ray examination is the detection of hidden tuberculosis cases amongst the apparently healthy members of a community.
Routine examination by radiography of children is not recommendable unless indicated for some specific reason such as strong tuberculin reactor, contact with open tuberculosis cases, etc.

In low prevalence areas the X-ray case finding programme is becoming more selective, i.e. it is confined to certain groups. These groups may be broadly divided into (i) high prevalence groups (contacts of known cases of tuberculosis patients referred by their medical attendants, hospital patients); (ii) high risk groups (persons exposed to more than average risk of infection e.g. staff of hospitals, sanatoria, clinics, laboratory workers and prisoners); and (iii) danger groups (i.e. persons who by virtue of their occupation may constitute a special danger to others should they have infectious tuberculosis, teachers, children, nurses, food handlers, hair dressers, staff of public transport, etc.).

2.4 Bacteriological examination

Direct microscopic examination is a simple method but has several disadvantages. It is simple but less sensitive than culture. One cannot determine viability of M. tuberculosis, nor distinguish between M. tuberculosis and non-specific acid fast bacilli including M. Leprae. It is, however, widely used for mass screening purposes especially when X-ray apparatus is not available.

3. CHEMOPROPHYLAXIS

Primary (infection) chemoprophylaxis is the use of antituberculous drugs in persons not infected, i.e. non-reactors to tuberculin.

Secondary (disease) chemoprophylaxis is the use of antituberculous drugs in persons who are infected, demonstrated by a significant reaction to the tuberculin test, but who have no signs or symptoms of tuberculosis disease.

As indicated elsewhere the risk of developing tuberculosis among natural tuberculin reactors is greater than in non-reactors. The present opinion is that primary chemoprophylaxis should not be employed as a replacement for BCG vaccination. Secondary chemoprophylaxis, however, has a definite place in many control programmes since it reduces the dissemination of infection and so partly or wholly prevents the progress of such disseminations into active disease processes by diminishing the likelihood of the re-activation of old infections.

The following groups are recommended for secondary chemoprophylaxis:

(a) infants and pre-school children who are "natural" reactors;
(b) children who are reactors at school entrance and who have not already received BCG;

(c) schoolchildren and adolescents who are reactors and who fall into the following categories:

(i) individuals who live in highly prevalent areas in the 6-12 or 12-20 year old age groups,
(ii) large reactors to standard dose of tuberculin especially those who are household associates of patients under domiciliary treatment,
(iii) known recent converters at any age.

(d) tuberculin reactors who are measurably "poor hosts," such as diabetics, silicostics and persons receiving steroid therapy.

The recommended dosage of INH is 5 mgs. per kg. body weight for 6 to 12 months.

4. TREATMENT AND FOLLOW-UP PROGRAMME

4.1 Anti-tuberculosis drugs

Treatment of potentially or apparently infectious cases will reduce the danger of spreading the disease. The key of success in the treatment of tuberculosis is that it must be prolonged, at least twelve months, uninterrupted and given in the correct manner and in adequate doses of either one or two of the three commonly used antimicrobial drugs, e.g. isoniazid (INH), para-aminosalicylic acid (PAS) and streptomycin.

4.2 Institutional and domiciliary treatment

Since the Madras study enlightened tuberculous workers of all those countries with a large tuberculosis problem and limited resources that domiciliary drug treatment of pulmonary tuberculosis yields similar therapeutic results compared with hospitalization. Nor was the epidemiological aspect made any worse.

A proper utilization of hospital beds to render the open tuberculosis cases non-infectious through intensive and appropriate chemotherapy or surgery, and segregation of highly infectious cases from the community, especially the highly susceptible young age group, is a sound approach in tuberculosis control.
5. HEALTH EDUCATION

The health education approach to tuberculosis cases, may be direct or indirect. For example, case-finding campaigns including tuberculin testing, BCG vaccination and X-ray examination, are excellent opportunities. It is again to be emphasized that the patient's understanding is the most important factor in achieving successful treatment. Thus, intensive and persistent health education of the public, especially of tuberculous patients, as well as a careful guidance of daily life and close supervision of pill-taking are essential factors in the daily practice of domiciliary care of pulmonary tuberculosis. The role of voluntary organizations is very valuable and they should be encouraged to participate in the country-wide campaigns to obtain more co-operation of the public.

6. PLANNING, ORGANIZATION AND EVALUATION

The overall aim is eradication of tuberculosis, but if the prevalence is high, then the load of infectious cases must be reduced first. Any country-wide project must be preceded by a pilot project and a prevalence survey so that the national campaign can be based on correct scientific data.

The tuberculosis control campaign should be integrated into the general public health programme. But if, as in most developing countries, rural health centres do not exist, tuberculosis centres may be established to start with. However, a co-operative attitude with other public health matters must always be maintained in the operation of such centres.

In a highly prevalent country, the extensive use of BCG on tuberculin negative children to induce immunity is well justified. In a country where the prevalence of tuberculosis is low, chemoprophylaxis can be used on the persons indicated above, especially young children.

A regular case finding programme in a selected group of persons followed by a well supervised treatment programme and follow-up scheme, occupies an important position in the control programme.
LEPROSY
(Synopsis of lectures by Dr. D.W. Beckett)

CONTENTS

<table>
<thead>
<tr>
<th></th>
<th>CLASSIFICATION</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>DIAGNOSIS</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>2.1 Macular lesions</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>2.2 Infiltrated lesions</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>2.3 Neural lesions</td>
<td>101</td>
</tr>
<tr>
<td>3</td>
<td>TREATMENT</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>3.1 General</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>3.2 Specific</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>3.3 Auxiliary</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>3.4 Treatment of lepra reaction</td>
<td>102</td>
</tr>
<tr>
<td>4</td>
<td>EPIDEMIOLOGY</td>
<td>103</td>
</tr>
<tr>
<td>5</td>
<td>CONTROL</td>
<td>103</td>
</tr>
</tbody>
</table>
1. CLASSIFICATION

Since leprosy assumes several guises, some classification is required so that we may understand how they tie up. The most simple one is as follows:

<table>
<thead>
<tr>
<th>Tuberculoid leprosy</th>
<th>Indeterminate leprosy</th>
<th>Lepromatous leprosy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macular</td>
<td>Dimorphous leprosy</td>
<td>Macular</td>
</tr>
<tr>
<td>Infiltrated</td>
<td>Polyneuritic</td>
<td>Infiltrated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nodular</td>
</tr>
</tbody>
</table>

The type of leprosy a patient may develop depends not on the organism but on the patient himself. If he has some ingrained resistance to the disease he will develop the milder tuberculoid form but if he has no resistance he gets the more severe lepromatous type. Dimorphous leprosy lies between these extremes and varies from almost tuberculoid to almost lepromatous.

2. DIAGNOSIS

There are two cardinal signs of leprosy which must be continually kept in mind. These are:

(1) sensory changes,

(2) presence of M. leprae on ordinary methods of examination.

(To examine for M. leprae make a cut in the skin about 5 mm. long and just deep enough to draw blood, twist the knife blade and scrape the side of this wound once fairly firmly. Spread the scrapings on a slide, allow to dry, stain by the Ziehl-Nilsen method as for sputum, and examine under the oil-immersion objective.)

The lesions of leprosy may be divided into:

(1) macular lesions,

(2) infiltrated lesions,

(3) neural lesions.

2.1 Macular lesions

All types of leprosy start with a macule. A macule is defined as an alteration in the colour of the skin of any size or shape which is not raised above the surrounding skin.
The macular of tuberculoid leprosy is typical. It is a sharply defined pale patch on the skin of any shape with a very definite hard outline. It may vary in size from that of a florin (in which case there will probably be more than one of them) to an area covering almost half the trunk. They may occur anywhere on the body but the commonest sites for these, and all other skin lesions of leprosy, are the extensor surfaces of the limbs, the buttocks, the scapular regions and the face. The macules will have definite diminution of sensation but will probably be negative for M. leprae. The macular stage of tuberculoid leprosy used to be known as maculo-anaesthetic leprosy.

The macule of lepromatous leprosy is quite different in appearance. There are nearly always many of them and they consist of ill-defined pink or bronze spots. They are small in size and look rather like Rubella. There are no sensory changes but the skin scrappings will be positive. If you see a "rash" that does not itch and does not clean up in a few days, it is often worthwhile doing a skin scraping.

The macule of dimorphous leprosy lies between these two. On the whole the smaller macules look like those of lepromatous and the larger like those of tuberculoid leprosy. All grades can be seen - even on the one patient.

2.2 Infiltrated lesions

If treatment is not instituted, the macules become infiltrated and swell above the surrounding skin. The infiltrated lesion of tuberculoid leprosy is called a lepride, that of lepromatous leprosy, a leproma.

Lepride: The macule becomes infiltrated to form a plaque and this starts to heal from the centre to form an irregular red or bronze raised serpiginous line with normal skin or scarring behind it. The small leprides look like ringworm. There will be few if any bacteria in a smear but there will be definite sensory changes in the patch. The large nerves are usually involved at this stage so check for anaesthesia of the extremities or nerve thickening.

Leproma: This is merely a raised, more angry form of the macule. It is a fleshy soft hyperaemic swelling - it looks like an early abscess or boil. There are few if any sensory changes but it is swarming with bacilli.

If untreated this lesion becomes thicker until it goes on to form a nodule and the classical nodular type of leprosy results.

Dimorphous infiltrated lesions: These vary but tend to be more like lepromata than leprides. The last body defences are being overwhelmed.
2.3 Neural lesions

(1) Anaesthesia
(2) Nerve enlargement
(3) Muscular paralyses
(4) Trophic changes

Anaesthesia is one of the cardinal signs. It occurs early in tuberculoid leprosy and not very late in lepromatous. It is found in the hands and feet and in the centre of tuberculoid patches. Sensation is lost in the order of heat, touch, pain, pressure.

Enlargement of a nerve associated with pain is always due to leprosy. The sign is common and marked in tuberculoid leprosy and not infrequent in lepromatous. The nerves can be exquisitely tender and abscess formation can occur. Most commonly affected nerves are ulnars, common peroneals and great auriculars.

Muscular paralysis is indicated by drop wrist and drop foot. Facial nerve palsy leading to lagophthalmos, keratitis and blindness is also seen. Full recovery is rare but residual paralysis does not necessarily mean the disease is still active.

Trophic changes cause the deformity which makes leprosy the dread disease that it is. The hands become clawed, the fingers and toes shorten, plantar ulcers are found. These are almost impossible to cure. The end result of this process of wasting and deformity is one of the most pitiful sights in medicine.

3. TREATMENT

Treatment can be divided into general, specific and auxiliary treatment. Treatment of the lepra reaction must also be considered.

3.1 General

Treat the patient's underlying condition: anaemia, malaria, malnutrition, worms, etc. If he is admitted to hospital, help him to settle his family worries. Give him useful employment and try to persuade him that he is still a valuable member of society. Above all, give him kindness in large doses. Remember he will be feeling an outcast.

3.2 Specific

Treat his leprosy with drugs which have a specific action on M. leprae. These are as follows:
(1) Diamino-phenyl sulfone (D.D.S. Dapsone). Dispensed as tablets containing 100 mg. or as solution for infection, 100 mg/0.5 ml.

_Dosage:_ Up to 800 mg. weekly. Start with 100 mg. and work up slowly. May be given daily or twice weekly and orally or parenterally. D.D.S. is still the most effective drug in the treatment of leprosy. Side effects are few - nausea and malaise, occasional anaemia. Drug resistance does not seem to occur.

(2) Di-phenyl-thiourea (D.P.T., Ciba 1906). Dispensed as tablets containing 0.5 g.

_Dosage:_ 2.0 g. daily.

Not as effective as D.D.S. and drug resistance develops in under two years. It is less toxic than D.D.S. and can be given to those patients who cannot tolerate the latter.

(3) Di-ethyl-dithiolisophthalate (E.T.I.P., Etisu). This preparation is put up in 5 cc. tubes each containing 5 g. of the drug in a non-greasy ointment. The contents of one tube are rubbed into the body twice weekly. The preparation has an unpleasant odour and is unpopular with patients. It is reputed to be very effective for about three months but resistance develops early. It is still in the experimental stage.

### 3.3 **Auxiliary:**

- prevention and cure of deformity by exercises and physiotherapy;
- surgical transplantation of tendons to cure deformity;
- plastic surgery for cosmetic reasons;
- treatment of plantar ulcers;
- treatment of nerve pain by injection of byalase and cortisone in procaine.

### 3.4 **Treatment of lepra reaction:**

- I.N.A.H.
- Benadryl
- Chloroquin
Sodium antimoryl tartrate

Cortico-steroids.

Progress under treatment is slow but it is always towards recovery. The duration of treatment depends on the severity of the case and it should be continued in full dosage for one year after apparent recovery, and thereafter on reduced dosage for at least three years and preferably for life.

4. EPIDEMIOLOGY

Although we cannot be certain, it is thought that leprosy is spread by contact; it is truly contagious. This being so, four factors must be considered.

(1) Intimacy of the contact: Sleeping in the same bed, swapping clothes and towels, mothers cuddling their children or carrying them on their backs.

(2) Duration of the contact: Living in the same room, house, village. 83% of cases are household contacts of known cases.

(3) Infectiousness of the infector: Lepromatous cases in the infiltrated stage are obviously more dangerous than muscular tuberculoid cases. A case may vary in infectiousness from time to time. Influence of lepra reaction. Modifying effect of treatment.

(4) Susceptibility of infectee: Some people can live for years with a case without developing leprosy, others develop it readily. Recent work in New Guinea indicates that susceptible populations exist. Chemoprophylaxis of contacts modifies their susceptibility.

5. CONTROL

Control is a long-term process.

Mass campaigns are of little value.

A survey to find extent of the disease in the population may be of help.

Segregation of infectious cases is still the main weapon. However this may be unnecessary if there
is very little leprosy or impossible if there is
a great deal. Partial segregation at night may be
possible.

- Keep a watch on all contacts and continue checking them —
it is among them that most new cases will be found.

- Chemoprophylaxis of contacts advisable — particularly
  where domiciliary treatment is being practised.

- Health education, especially to try to change the
  attitude of the public towards this disease.
ENVIRONMENTAL SANITATION

(Synopsis of lectures by Mr. B.L. Adan and Mr. R.L. Hall)

CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FUNDAMENTAL CONCEPTS</td>
<td>107</td>
</tr>
<tr>
<td>2</td>
<td>FUNCTIONS OF THE HEALTH INSPECTOR</td>
<td>107</td>
</tr>
<tr>
<td>2.1</td>
<td>Administration</td>
<td>107</td>
</tr>
<tr>
<td>2.2</td>
<td>Health education</td>
<td>107</td>
</tr>
<tr>
<td>2.3</td>
<td>Sanitation</td>
<td>108</td>
</tr>
<tr>
<td>2.4</td>
<td>Maternal and child health</td>
<td>109</td>
</tr>
<tr>
<td>2.5</td>
<td>Control of communicable diseases</td>
<td>110</td>
</tr>
<tr>
<td>2.6</td>
<td>Public health laboratory</td>
<td>110</td>
</tr>
<tr>
<td>2.7</td>
<td>The health inspector</td>
<td>110</td>
</tr>
<tr>
<td>2.8</td>
<td>The health inspector as a member of the team</td>
<td>110</td>
</tr>
<tr>
<td>3</td>
<td>HYGIENE OF HOUSING</td>
<td>111</td>
</tr>
<tr>
<td>3.1</td>
<td>House construction</td>
<td>111</td>
</tr>
<tr>
<td>3.2</td>
<td>House sanitation</td>
<td>111</td>
</tr>
<tr>
<td>3.3</td>
<td>Housing problems</td>
<td>111</td>
</tr>
<tr>
<td>4</td>
<td>HYGIENE OF FOOD</td>
<td>112</td>
</tr>
<tr>
<td>4.1</td>
<td>Problem involved</td>
<td>112</td>
</tr>
<tr>
<td>4.2</td>
<td>Preparation</td>
<td>112</td>
</tr>
<tr>
<td>4.3</td>
<td>Storage</td>
<td>112</td>
</tr>
<tr>
<td>4.4</td>
<td>Restaurants, hotels, etc.</td>
<td>112</td>
</tr>
<tr>
<td>4.5</td>
<td>Public feasts</td>
<td>113</td>
</tr>
<tr>
<td>5</td>
<td>CONTROL OF VECTORS</td>
<td>113</td>
</tr>
<tr>
<td>5.1</td>
<td>Mosquitoes</td>
<td>113</td>
</tr>
<tr>
<td>5.2</td>
<td>Flies</td>
<td>114</td>
</tr>
<tr>
<td>5.3</td>
<td>Rats</td>
<td>114</td>
</tr>
<tr>
<td>6</td>
<td>REFUSE DISPOSAL</td>
<td>114</td>
</tr>
<tr>
<td>6.1</td>
<td>Three states</td>
<td>114</td>
</tr>
<tr>
<td>7</td>
<td>HUMAN EXCRETA DISPOSAL</td>
<td>114</td>
</tr>
<tr>
<td>7.1</td>
<td>Requirements</td>
<td>114</td>
</tr>
<tr>
<td>7.2</td>
<td>Latrines</td>
<td>115</td>
</tr>
</tbody>
</table>
### CONTENTS (continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>WATER SUPPLIES</td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>Basic requirements</td>
<td>115</td>
</tr>
<tr>
<td>8.2</td>
<td>Types</td>
<td>115</td>
</tr>
<tr>
<td>8.3</td>
<td>Water sampling</td>
<td>116</td>
</tr>
<tr>
<td>8.4</td>
<td>Island wells</td>
<td>116</td>
</tr>
<tr>
<td>9</td>
<td>ENVIRONMENTAL SURVEY</td>
<td>116</td>
</tr>
<tr>
<td>9.1</td>
<td>Purpose</td>
<td>116</td>
</tr>
<tr>
<td>9.2</td>
<td>Information to be obtained in surveys</td>
<td>116</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Population</td>
<td>116</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Environmental features</td>
<td>117</td>
</tr>
<tr>
<td>9.2.3</td>
<td>The Health Department</td>
<td>118</td>
</tr>
<tr>
<td>9.2.4</td>
<td>Resumé</td>
<td>118</td>
</tr>
<tr>
<td>9.2.5</td>
<td>Report</td>
<td>118</td>
</tr>
</tbody>
</table>
1. FUNDAMENTAL CONCEPTS

"Sanitation is the quality of living that is expressed in a clean house, clean neighbourhood and clean community." Sanitation may be defined as the control of those factors in man's physical environment for the prevention of the spread of communicable diseases which are thought to be communicated to man through his environment, particularly air, light, food (and the places where it is prepared or sold), solid and liquid wastes, drinking water, and plants and animals which influence health.

2. FUNCTIONS OF THE HEALTH INSPECTOR

2.1 Administration

(a) The health inspector acts as the agent of the district medical officer enabling him to carry out his responsibilities for public health.

(b) The health inspector prepares the necessary reports for the guidance of the district medical officer.

(c) He assists in the enforcement of health laws, rules and regulations and, when deputized, issues sanitary orders for the enforcement of same.

(d) He participates in the planning and evaluation of the total health programme and helps in the interpretation of his functions to the other members of the health team.

(e) He participates in staff meetings and conferences.

(f) He assists in the promotion of personal and public relations.

(g) He assists in the collection of births, mortality and morbidity statistics, where required.

2.2 Health education

(a) He assists in the dissemination of health information and makes known to the community the available facilities and services of the health department.

(b) He takes advantage of opportunities incidental in his work for health education as a learning experience for all, as in his immunization activities, environmental sanitation campaigns, etc.
(c) He motivates, reactivates and/or assists the organization of health councils, or existing community organizations, if there are any, along their health activities.

(d) He takes the leadership in the organization of the study groups pertaining to environmental sanitation and assists in the conduct of other study groups in so far as environmental sanitation is concerned.

(e) He suggests ideas that can be utilized in the preparation of tools and media of health education.

2.3 Sanitation

(a) Water

(1) He assists in the sanitary survey of water sources and in the selection of sites for water supplies.

(2) He collects water samples for laboratory examinations.

(3) He makes recommendations and assists in the improvement of water sources.

(4) He sees to it that the sources of water supply in his area are properly maintained and are safe regardless of ownership.

(b) Excreta

He promotes, advises and helps in the provision of proper excreta disposal.

(c) Food sanitation

(1) He makes periodic inspections of food processing, storage, serving establishments and markets, and collects food samples therefrom for analysis.

(2) He inspects food establishments for compliance with sanitary requirements prior to issuance of licenses (where licenses are required by law).

(3) In the absence of a qualified meat inspector he makes the necessary inspection, ante-mortem and post-mortem, of all meats offered for sale to the public and sees to it that they are safe for human consumption. The same inspection is made of fish, shellfish, and other marine products.
(d) Refuse disposal

He inspects regularly residences and establishments to check on proper storage and disposal of refuse.

(e) Home sanitation

(1) He advises on the proper disposal of wastes of all kinds.

(2) He inspects for overcrowding, ventilation, lighting, water supplies, dampness, cooking facilities.

(3) He promotes proper house building and sanitation including construction materials, design, facilities.

(f) Vermin and insect control

He inspects premises to ensure that breeding places and harbourages for insects, vermins and rodents are eliminated.

(g) Nuisance abatement

He investigates all complaints related to nuisances and submits the necessary reports to the district medical officer of health.

(h) Sanitation of public places

He conducts regular and periodic inspections of parks, recreation centres and other public places.

(i) He looks into the sanitation of public conveyances such as inter-island vessels, buses, aeroplanes, etc.

(j) He makes regular inspection of industrial establishments for general sanitation.

(k) In the course of his routine activities, he reports all environmental conditions observed that pose a threat to the health, life and safety of the individuals, or the existence of suspected communicable disease.

2.4 Maternal and child health (including school and dental health)

When requested or when he comes across cases in the course of his work:

(1) He gives information on the government's activities in connexion with prenatal, natal and post-natal care and
encourages mothers to seek prenatal supervision.

(2) He reminds mothers about the importance of making and keeping appointments for a clinical check-up.

(3) He helps in the case-finding and reporting of prenatal cases in conjunction with other services.

(4) He may assist with immunization campaigns.

(5) He takes part in the inspection and supervision of school sanitary arrangements, e.g., latrines and water supplies.

2.5 Control of communicable diseases

(1) He undertakes case-finding and reporting.

(2) He conducts epidemiological investigations under the supervision and authority of the medical officer.

(3) He institutes control measures under the guidance of the health officer.

2.6 Public health laboratory

He collects samples of water, urine, faeces, sputum, blood smear, etc. for specimens, when requested by the district medical officer.

2.7 The health inspector, in addition to his regular duties, from time to time, receives additional duties and assignments from the district medical officer.

2.8 The health inspector as a member of the team

In most health organizations it is accepted that the director of local health work is the medical health officer. The relationship between the medical officer and health inspector should be based on the principle of collaboration. In the same manner the health inspector and the nurse are collaborators in different aspects of the same work. They should realize that their activities are closely tied together. Each member of the team in the course of his work has various opportunities to assist other members to achieve the common goal. The physician as he attends to a patient should not only treat the illness but also probe into the circumstances contributing to the illness. A nurse who continues to visit a home that has poor sanitary facilities for excreta disposal or has an unsafe water supply, or where the family is suffering from hookworm, or other intestinal disease, and does not confer with the health inspector or report these
conditions to the medical health officer, is not performing an optimally efficient job. Conversely, a health inspector who in the performance of his duties sees sickness and debility or notices neglected children and does not confer with the nurse or report them to the health officer is remiss in the performance of a good job.

3. HYGIENE OF HOUSING

3.1 House construction

- Plans to be approved according to by-laws
- Siting
- Orientation
- Damp-proofing
- Materials
- Arrangement of rooms

3.2 House sanitation

- Water supplies: accessible, potable
- Excreta disposal
- Drainage
- Refuse disposal
- Lighting - windows at least 1/10th floor area
- Ventilation
- Number of occupants

3.3 Housing problems

- Week legislation
- Low legal standards
- Overcrowding
- Poverty
4. HYGIENE OF FOOD

Food must be wholesome from its growth, production, preparation, and storage until it is consumed.

4.1 Problems involved

Contamination - Bacterial - Salmonella
                 Staphylococcal
                 Botulism

Chemical - insecticides, etc.

Adulteration

Mislabelling

4.2 Preparation

Personnel - clean and healthy, washing facilities

Premises - clean, washable
            well lighted
            water supplies
            ventilation, air circulation
            drainage

Equipment - clean, sterile

4.3 Storage

Cool

Ventilated

Protected from flies, rats, cockroaches

Perishable foods to be refrigerated

Frozen foods must be kept frozen (not re-frozen)

4.4 Restaurants, hotels, etc.

Note particularly:
general cleanliness
fly proofing, rat proofing,
refrigeration,
washing-up facilities,
lavatories and washing facilities for staff,
garbage disposal.

4.5 Public feasts

Food poisoning due to:

ignorant preparation,
long time elapsing between preparation and eating,
lack of facilities (washing, utensils, etc.),
fly contamination.

5. CONTROL OF VECTORS

5.1 Mosquitoes

(1) Note species which transmit local malaria or filaria. (Other species transmit dengue, and other fevers.)

(2) Note breeding site of species, and adopt suitable measures (anti-larval):

e.g., elimination - fill marshes or holes
get rid of cans, pods, etc.

e.g., for deep pits, tanks, etc.

poisoning - Parisgreen, DDT in kerosene

fish - gambusia

(3) Screening of houses and/or beds

(4) Residual spraying (DDT) inside dwellings.
5.2 Flies

Breed in animal and human manure, garbage, or ground where liquid waste is split. (Egg-larval-adult, takes two weeks.)

Control methods

(1) Rubbish to be collected and disposed of in a sanitary manner.

(2) Screen houses and food.

(3) Fly traps and poison baits.

5.3 Rats

Control by

(1) rat-proof storage of food,

(2) hygienic refuse disposal,

(3) killing by poisoning (Warfarin, a blood-anticoagulant is the best) or by trapping, or by fumigation (with cyanide - only to be done by trained workers).

6. REFUSE DISPOSAL

6.1 Three stages:

(1) household - fly-proof bin

(2) collection - by local council or by private contractor

(3) disposal - dumping in water, sanitary land-fill, incineration, composting.

7. HUMAN EXCRETA DISPOSAL

7.1 Requirements

(1) No contamination of - drinking or swimming water, shellfish (typhoid) - soil (hookworm)
(2) Protection from flies, dogs, pigs, etc.,
(3) Not to be used as fertilizer,
(4) Not to cause a nuisance (smell).

7.2 Latrines must be simple, inexpensive, require minimum maintenance, must be convenient and private.

Types:

(1) Deep-pit, cheapest and simplest, but may breed flies and may pollute water. Smell.
(2) Bore hole. Fly and smell proof but may pollute water.
(3) Chemical closet - expensive.
(4) Septic privy, needs water but is convenient and hygienic.
(6) Earth pit
(7) Septic tank - expensive
(8) Public sewage system

8. WATER SUPPLIES

8.1 Basic requirements

Must be from a safe source
Must be from an ample source
Must be properly constructed
Must be properly operated
Must be properly maintained
Must be conveniently sited for users.
8.2 Types

(1) Rain water tanks - should be of a capacity greater than average rainfall.

(2) Wells. Should be more than 50 feet from a deep pit latrine, or 150 from bore-hole latrine. Must be more than 10 feet deep. Protected from surface pollution.

(3) Springs - as for wells.

8.3 Water sampling

Use a sterile bottle and aseptic precautions. Pack in ice. Three negative results are necessary (i.e., less than 2 coliforms per 100 ml.).

8.4 Island wells

There is usually a lense of fresh water 40 times as deep below sea level as the normal water table is above it. Excessive pumping must be avoided or salt water will flow into the lens. Shallow galleries are preferable to deep wells.

9. ENVIRONMENTAL SURVEY

9.1 Purpose

To indicate sanitation problems, to indicate practical procedures and plans.

Use systematised form for collecting data in an orderly manner.

9.2 Information to be obtained in surveys

9.2.1 Population

(1) Composition: age, sex, race, urban, rural and occupational distribution, areas of density (important in provision of water, sewerage, refuse disposal, etc.)

(2) Social and economic: living conditions, habits and customs, education, civic organizations and their activities, voluntary health agencies, principal occupation and industries, per capita income, taxable wealth, tax rate, total revenue, total per capita spent for public health as a whole.
(3) **Political, legal and governmental**: health laws, rules and regulations, effectiveness of enforcement, political subdivisions.

(4) **Mortality and morbidity**: most important diseases and relation to need for sanitation improvement, distribution of cases and deaths by age, sex, race, economic level, occupational groups.

**9.2.2 Environmental features**

(1) **Geographical and meteorological**: These have a decided influence on the activities and occupation of the people: size, distance to other important places, railroads, bus lines, mountains and hills, bodies of water, drainage, character of top soil and subsoil, water table, rainfall, temperature variation, humidity, winds, seasonal variations, flora and fauna.

(2) **Water supply**: sources (adequacy and character of water), treatment processes, storage of treated water, distribution, area supplied, probable expansion; for rural water supply - types, adequacy and protection, ownerships, per capita consumption, potability, supervision and control by health authorities.

(3) **Sewage disposal**: sewerage system, treatment works - adequacy (compute per capita load), operation, volume of industrial waste discharged into sewers, final disposal of sludges and effluents, pollution of watercourse or disposal area, expansion plans, number and conditions of privies, cesspools, septic tanks in unsewered areas, attention to possibilities of water supply contamination.

(4) **Refuse disposal**: collection practice, storage in households, transport, final disposal (method, adequacy, condition), complaints, per capita cost.

(5) **Housing**: types of buildings (public and private), state of repair, heating, lighting, ventilation, plumbing and connexion to water and sewerage systems, screening, rat proofing, fire proofing, crowding, health hazards and nuisances, general cleanliness, building codes, housing ordinances.

(6) **Food supplies**: sources, methods of production, storage, distribution, training of food handlers and their supervision, cleanliness and adequacy of equipment, standard codes and effectiveness of enforcement procedures and proportion of insanitary establishments,
supervision of milk production, "spot" inspections of dairy farms and pasteurization plants to determine conditions of equipment and efficiency of operations, investigation of production and distribution of ice cream, cheese, butter processing and other milk products, supervision of distribution of meat, meat products and sea foods as well as processing and preservation.

(7) Insect and rodent control: prevalence of disease transmitted through insects and rodents, factors favourable to presence of insects and other vectors, complaints, control methods employed and effectiveness.

(8) Recreational facilities: playgrounds, theatres, camps, swimming pools; general state of repair, cleanliness and provisions of water supply and sanitary facilities; conformity to standards, codes and ordinances.

(9) Air pollution: types of industry and gases, fumes, dusts and mists emitted and discharged into the air; effectiveness of control procedures.

9.2.3 The Health Department:

(1) personnel - number and training;
(2) allocation of funds especially for sanitation;
(3) laws on sanitation;
(4) national consulting services;
(5) staffing pattern;
(6) responsibility of local, provincial and national health departments;
(7) outline of local sanitation programmes - consider community needs and efficiency of operation.

9.2.4 Resumé - a brief statement of health hazards found in area.

9.2.5 Report

The report should:

(1) be concise but supplemented by comprehensive data-
tables, charts, maps, which serve to substantiate the report;
(2) contain recommendations for remedial action on all objectionable features found including costing and financing;

(3) be disseminated to authorities concerned and to civic organizations.
PRINCIPLES OF PLANNING IN HEALTH EDUCATION

(Synopsis of lectures given by Miss L.J. Martin)
A health education officer cannot work in a vacuum. He is not so much responsible for a separate "programme" as for a service to and through other sections or divisions of the Health Department. Factual information comes from a number of sources, and it is the responsibility of the health education officer to put it, or to persuade field staff to put it, into a form that will be acceptable to the community and will be understood by them. He needs to be able to co-ordinate what is being done, and to help in the provision of suitable teaching aids, or of such "mass media" as posters, leaflets, etc. if these are to be used, or of radio programmes or newspaper publicity. He needs to be able to give training to local staff members (which will supplement their normal professional training) to enable them to assist in the education of the community.

If a health programme of any kind is to be planned, it must be remembered that health education will be a necessary part of the programme, and consideration must be given to the role of health education from the very beginning of the planning. We must "define the problem" from the point of view of health education, as well as medically.

Health education is an essential part of any health programme. The most effective health education of adults can often be carried out by the health worker (doctor, nurse, health inspector, etc.) who is already in contact with the community. But because the basic professional training of these people often does not include health education, it may be necessary to give them in-service training in order to help them to do a better job. It is also very necessary to have someone to co-ordinate the work of health and education departments (for health education goes on in schools also), to give in-service training to others, and to prepare mass media, teaching aids, etc. of a suitable kind. For these reasons it is desirable to have a professionally trained health education officer on the central staff of the health department. Such an officer can provide a service to and through other members of the health team.

In order to plan effectively, whether for health education or anything else, one must collect certain basic information. This basic information is needed to indicate the size and the nature of the problem to be tackled; to give a measure against which progress can be checked; and to indicate, in the case of the health educator, what existing customs, attitudes, habits or beliefs might hinder the work - or might be used to help its progress. It is important to know not only the method of transmission of the disease to be attacked, and the means adopted to break this; but also which groups of the population are most affected, who is most likely to have influence with these groups; who may be leaders who may prove helpful; and who among the leaders may be able to exert pressure against the new measures. Thus the health educator needs the same kind of basic information as the doctor in charge of the work, together with sociological data, in order to be able to plan effectively with the rest of the team for the health education aspects of the work.
It is also important that we do not offend against the attitudes, beliefs or customs of a community with which we are dealing, when we produce teaching aids or mass media. For example, in some instances colour may indicate definite things. In European cultures, red frequently symbolizes danger and green, safety. However this may not be true in all cultures and in some, red, instead of being the symbol of danger may in fact be a symbol of importance. If we are aware of these beliefs we can not only avoid upsetting people but can also use this knowledge to assist in our work.

Once we have our basic data and are beginning to apply it we must remember the principles of education when we are dealing with people. Not only is it important to give information, but we must give this information in ways which will arouse the interest of those whom we are informing. Not only must we arouse their interest, but we must motivate them to take some action. It is frequently easier for people to decide to take some action as a group rather than as solitary individuals, since the effect of a community group is to reinforce the decision with social approval and to remove the feeling of isolation that an individual may sometimes feel if he is acting against the accepted procedures of his own community. For this reason it is important to use group discussion as well as individual person-to-person discussion, in enabling decisions to be made and for action to be taken.

It is always important, too, to ensure that action by the people is indeed possible following our health education procedures. For example it is of little use to motivate people to seek immunization for their children against common communicable diseases, if such immunization is beyond their financial capacity to pay for, or is physically impossible for them to obtain because there are not sufficient supplies of drugs or because there are not adequate medical services within their reach. If we urge them to take action which they cannot in fact take, they are more likely to turn against us and to refuse to listen to us on other occasions when we try to talk to them.

We must, then, act in co-ordination with other departments, we must act in accordance with existing customs and beliefs of the community; and we must use the community leaders, whoever they may be, to assist us as much as possible. We must not only give information in an interesting way, but we must attempt to motivate people to take some action, and to ensure that action indeed is possible for them to take.

Occasionally, however, much we feel that it is an important matter for a community to take action in one particular aspect of health - for example in tuberculosis control - it may be that the community itself feels strongly that action in some other field is first required. In other words the need which the community feels as its own is not as we see the matter.

In this case it is desirable that we should attempt to assist the community to satisfy its own felt needs, before we attempt to impose upon it the needs which we feel are important for it. Those who have experienced
our willingness to help them with their problems will usually be much more ready in turn to listen to us when we have something new to say to them, and are asking them to take some new action.

Because it involves basic changes in ways of life, in old habits and customs, and in various aspects of community living, health education is of necessity a slow process. We need patience, more patience yet again. This is as important as our technical knowledge. In fact we must be prepared to wait if necessary for years before we can achieve tangible results. If we are satisfied to work slowly through existing community organizations, leaders and resources, and if we are prepared to accept the right of the community to self-determination, and not to try to impose our will upon them without their consent, then we will indeed find that the wholehearted acceptance of our suggestions comes, even though slowly, and that work is far more successful than if we had insisted upon forcing measures upon people. This is the argument used for health education and against legislation. Legislation may frequently be required in order to protect the community against the actions of certain thoughtless or careless members, who, unless legislation existed, might endanger the whole community by their particular actions. For example, if a community is living in an urban setting it may be necessary to have regulations covering the disposal of garbage or the disposal of human faeces, in order to prevent epidemics of communicable disease from sweeping through the community. Legislation in this case is a useful "backstop," but endeavours should always be made to use persuasion and education before enforcement is finally resorted to. Where it is merely a matter of individual safety or well-being, then education and persuasion of course are far more important.

In-service training for health and education personnel is an important part of the work of a trained health education officer. In this way he extends his usefulness to the community and indeed works to make the other members of the health team equal partners with himself in the work of educating the community to accept greater self responsibility for its own health measures. In health education the first essential is that the technical information given is adequate. This must be checked by medical sources before it is given out to be used with the public. Secondly, the method of giving this information to the public should be one that is acceptable to the community and suitable in the circumstances concerned. There are many kinds of teaching aids and of teaching methods which can be used in different circumstances and it is the job of the health education officer to teach these to the other members of the health team. Such teaching aids as flannelgraphs, posters, flipcharts, are excellent for illustrating a talk to a small group or even to an individual or to a family. Some of them can be used with larger groups together with such aids as filmstrips, films, and the blackboard, which are useful with larger groups. Radio talks and newspaper articles can be used to give mass information but by themselves and without individual follow-up they can lose most of their effectiveness. Their greatest value is as part of a planned campaign,
where they are followed up individually in each community by the local health staff. The classroom lessons in the school can also be co-ordinated with an overall campaign. Once the information has been given, group discussion, person-to-person discussion and other similar face-to-face methods of education will usually ensure that some kind of decision and subsequent action is taken within the community.

Perhaps the single most important factor in our health education work is that of language communication between people. We must be sure that the information that we give reaches people in a form which is easy for them to understand. Too often we who have had technical and professional education tend to use technical and professional terms. This may or may not mean something to local people; and frequently it may mean something which is different from what we ourselves understand it to mean. For this reason we must be clear and simple in our use of either English or the local language. It does not increase our importance to use large numbers of technical terms, and in fact may only confuse the issue and defeat the ends towards which we are striving.

Once a community understands, and is prepared to help in its own health determination, there are many ways in which we will find assistance being given to the health department. Indeed, there are three main channels. One is personnel, or help from individuals, such as aides to help with clinics, and in general hospital work, etc. Another is financial aid in the provision of buildings, paying for drugs, etc. The third is educational, whereby individuals will pass on what they know to others, and through an enlightened community demand for facilities and services the citizens themselves may help to determine the health policy of the country at large. Since preventive work is hard to document, and we cannot necessarily prove that we have prevented a particular disease as easily as we can prove so many cases had been treated, it is often difficult to obtain sufficient financial help from governments for public health or other required services, unless or until the community itself is prepared to understand and to request what is necessary.

Nor must we forget to evaluate and check against what we are doing. Only too often in the past, people have embarked on health education measures without stopping to find out not merely the existing situation, but also whether in fact they have achieved what was intended. In these circumstances it is possible that erroneous ideas may be spread in the community, and that we will in fact be achieving something quite different from what we intended. The only way to guard against this is to make periodic evaluation checks against what has changed since we began our work. This basically is the duty of the health education officer to determine, but having decided what checks are necessary these are then carried out by the field staff under his general direction. Such an evaluation enables to change methods (or information) if this is required from time to time, to improve the situation, and to guard against misunderstandings.
Finally, there is research. This is an important tool in health education, as in everything else, but it is difficult to carry out until there is adequate trained staff to do so. It is not likely that very much research will be possible in the Pacific for a little while yet since health education services are only starting to develop. However, its importance should not be forgotten and when time and personnel are available, certainly research should be undertaken.
AGRICULTURE AND HEALTH

(Synopsis of a lecture by Mr. P. Newell)

CONTENTS

HOW THE HEALTH SERVICES MAY ASSIST AGRICULTURE .................. 131

By co-operation in extension work ................................. 131

Safety factors ............................................................ 132

Nutrition ............................................................................. 132

Maintaining a healthy work-force ....................................... 132

Hygiene ............................................................................. 132
The health services, particularly in Samoa, but also elsewhere, are the main contributing factor in the need for rapid development, for the simple reason that the contribution that the health services have made and are making in increasing the population by extending the life expectancy of the population and decreasing infant mortality, is in advance of agricultural development in many of these countries. For this reason it is only right that the health services should be asked to assist, and they can greatly assist, the agricultural services in the agricultural economy.

HOW THE HEALTH SERVICES MAY ASSIST AGRICULTURE

By co-operation in extension work

In an economy such as that in the Samoas and many other Pacific territories the main bar to agriculture development is in getting planters to accept new ideas. Of course contact with the planter is the first thing to let him know there are new ideas. There are five stages through which the planter must pass where a new idea in agriculture is concerned:

(1) awareness - to be aware that the new idea exists;
(2) interest - to become interested in the new idea;
(3) evaluation - to weigh up the possibilities of the new idea;
(4) trial - usually in a small way as a demonstration;
(5) adoption - to accept the new idea and put the new idea into practice.

It is in the first three of these stages that the health services may assist materially. Due to their training nearly all health services officers are equipped to understand many of the new ideas which the agriculturist wishes to "put over" to the planters. For example, fungi, viruses, vectors and bacteria are well known to the officers of the health services as are fungicides, insecticides and bactericides to control them, and many of the agriculturist's new ideas involve control of diseases caused by the forms of life mentioned. The health services officers, particularly those working in close association with village peoples, can make a big contribution to the agriculture extension workers' task if they will help people to become aware of the existence of these things, to stimulate their interest in them and above all to assist them in their evaluation because this satisfactory evaluation is the turning point in the successful adoption of new ideas.
Safety factors

The introduction and use of new chemicals for weed control pests and disease in many countries, has caused a relatively large number of deaths. In 1960, two thousand people lost their lives using new insecticides and with the right understanding of the proper use of these chemicals, all of these lives could be saved. Agriculture services try as best they can to impress on users of these chemicals the potential dangers in the wrong hands but how much better it would be if the efforts of health services officers could also be added to this campaign.

Nutrition

To achieve even a reasonable development of agriculture in rapidly improving countries there is one thing certain and that is that everyone will have to do more work. There can be no time for twenty-hour weeks or forty-hour weeks - work will be necessary from daylight to dark. How well can a man work? Only as well as he is fed! And a big meal is not necessarily a good one. It must be well balanced. Agriculture officers are continually trying to introduce new crops into developing countries in an effort to improve the diet, and the acceptance of these new crops and inclusion in the diet is something that the health services officers can help us to establish.

Maintaining a healthy work-force

Earlier, I observed that both health services and agricultural services have the same high ideal - that is the well-being of all sections of the community.

There is one difference however, and that is, in the raw material. It is the health services finished product - that of a fit and healthy worker - in which the agriculture service is interested and it would be unable to carry out its task properly without a healthy work-force.

Hygiene

I know that this is an important word to the health services and it may surprise many to know that it is also important to agriculture and I suggest that roughly we both give it the same definition, that is, the elimination of breeding places. Now, any place a fly can breed is also a place that a rhinoceros beetle can possibly breed. Eliminating fly-breeding-places is your job but everyone you eliminate will be a help to agriculture and if you could just go a little further and destroy any place a fly might breed then you will be helping us immensely in our rhinoceros beetle control.
APPENDIX B

Report on the Falealili Health Survey
GROUP A: REPORT ON GENERAL FACILITIES AND DEMOGRAPHY

Geography and climate

The District of Falealili lies on the south coast of Upolu, about twelve miles south-east of Apia as the crow flies, but forty-five miles by road. The four villages surveyed lie along the coast adjoining Falealili harbour.

The main village Poutasi, with a population of 469, is an island between the sea, the two rivers and the swamp. Salailua lies to the west of Poutasi with a population of 491. Vaovi, east of Poutasi, has the largest population of 496 and the smallest is Matautu with a population of 258 and lying east of Vaovi.

The majority of the people in these villages live close to the sea, and the rest, live inland on plantations. Hence the area concerned extends along coastal fringes, Poutasi and part of Vaovi have swamps intervening before extending inland. The rest of the district is rolling and rocky, interspersed with luxuriant tropical vegetation, coconut, cocoa and other cash crops like bananas or coffee, etc.

The district is volcanic in origin. The nature of the soil in the coastal fringes is sandy loam. As we go inland, the soil becomes rocky and clayey with outcrops of basaltic rocks.

The climate is tropical with little variation from season to season. Although there is no definite division between the wet and the dry months, or the hot and cold months, the following has been received from the old chiefs of the villages:

(a) wet months: March and April;

(b) dry months: January and February.

However, we can say that some months are hotter and others are cooler. The sea also modifies the heat of summer.

The average annual rainfall is 120 inches, and average temperature varies from 61°F to 94°F. The meteorological station appears to have fallen into disuse, however.

Occupation

The majority of the men are engaged on plantations or cash crops and subsistence crops. The women, on the other hand, assist with the crops as well as in domestic duties and other women's activities. The men also provide food from the sea when time permits.
Recreation

For the energetic, both young and old, cricket is the most popular of pastimes. They also have volley-ball, tennis, basket-ball, and for the youths, football. Provisions are made in each village for cricket and a central playing ground for other sporting activities.

Population

The following table indicates the number of people examined or seen during the survey.

<table>
<thead>
<tr>
<th>Age groups (yr.)</th>
<th>0-1</th>
<th>2-7</th>
<th>6-11</th>
<th>16-21</th>
<th>26-31</th>
<th>36-41</th>
<th>46-46</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salailua</td>
<td>6</td>
<td>33</td>
<td>23</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Matautu</td>
<td>18</td>
<td>40</td>
<td>27</td>
<td>21</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Poutasi</td>
<td>17</td>
<td>41</td>
<td>45</td>
<td>24</td>
<td>18</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Vaotai</td>
<td>17</td>
<td>55</td>
<td>44</td>
<td>27</td>
<td>19</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salailua</td>
<td>10</td>
<td>19</td>
<td>13</td>
<td>10</td>
<td>13</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Matautu</td>
<td>18</td>
<td>40</td>
<td>27</td>
<td>21</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Poutasi</td>
<td>17</td>
<td>41</td>
<td>45</td>
<td>24</td>
<td>18</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Vaotai</td>
<td>17</td>
<td>55</td>
<td>44</td>
<td>27</td>
<td>19</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>106</td>
<td>288</td>
<td>232</td>
<td>161</td>
<td>108</td>
<td>67</td>
<td>113</td>
</tr>
</tbody>
</table>

The total number of people seen and examined was 1474; males 797 and females 677; 393 schoolchildren; 288 pre-school and 106 infants. It will be seen that these figures differ slightly from the official ones, due probably to the migrant habits of the people, and the total is about 300 short.

Vital statistics

The following rates are for three villages only as the figures for Salailua were not available.

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>1244</td>
</tr>
<tr>
<td>No. of births during 1961</td>
<td>56</td>
</tr>
<tr>
<td>Birth rate</td>
<td>47 per 1000</td>
</tr>
<tr>
<td>No. of deaths during 1961</td>
<td>9</td>
</tr>
<tr>
<td>Death rate</td>
<td>7.5 per 1000</td>
</tr>
<tr>
<td>Deaths under 1 year</td>
<td>2</td>
</tr>
<tr>
<td>Infant mortality rate</td>
<td>40 per 1000 births</td>
</tr>
</tbody>
</table>

*Figures obtained from local informants.*
Education

Two grades of education are provided, a primary and a district school. From grade 4 in the primary school, children are taught bilingually - Samoan and English.

Among the adult population, only a few cannot read nor write in Samoan. English is never spoken and only a few can read and write English.

Religion and customs

The majority of the people follows the London Missionary Society church. There are also Roman Catholics and Mormons, however, the latter denominations do not have resident pastors, elders or priests in these villages.

Religion still plays an important role in the life of the people and in the affairs of the community as a whole. There is no approach to any solution to a problem without first considering and understanding the beliefs and customs of the people. Every approach must meet with general approval and according to local customs. No matter how unimportant it may seem, one must always bear in mind that in every thought following the event, success or failure may well be the result.

The people of Fa'asili have lived and are still, in many ways, living their traditional way of life. Those of us who are preparing reports to condemn or commend on some of their ways of living must also bear in mind other aspects as viewed by the people themselves. Herein lies the strength of education in health matters.

Nutrition

The diet pattern varies from day to day and month to month. Taro and fish plus cooked green bananas is the main diet. Other foods are palusami, breadfruit (in season) shellfish and other sea foods, as well as foodstuffs from the traders. Articles of imported foods are also bought from stores, particularly bread, rice, sugar and tinned meat. There would thus appear to be an adequate supply of food both in quality and quantity.

In the group studies for growth of infants and schoolchildren the conclusion reached is that the children's development and growth are within normal limits as compared to Australia's children. There was little or no evidence of malnutrition.

From the physical examination of adults the findings are variable but again no obvious cases of malnutrition were seen. Growth seems to have been impaired in some cases at some stage of development. Men appeared to be more affected than women.
GROUP B: REPORT ON THE MEDICAL STATE

There is one hospital in the district, situated at Poutasi, accessible to the main road. There are twelve male beds and twelve female beds in two wards arranged in an "L" shape with the Nursing Staff Room in between. The out-patient block is separate, attached to the apex of the ward block by a covered way. It comprises one consulting room; one theatre; and one store-room and sterilizer. There is a radiophone; no electricity; main water supply.

The staff consists of a Samoan medical practitioner, a staff-nurse, a nurse aid and a district nurse. There are no maids or labourers.

There is no special Maternity Block, cases being lodged in the main female ward and delivered in the theatre when necessary.

The hospital is under the direction of the local hospital board, a voluntary fund raising organization. The hospital was built from local funds and is maintained at the expense of the local community. It appears to be in a moderately good state of repair, though parts of the windows of wards are missing. The Nurses Observation room appears to be in an unused and uncared for state. It is being used as a storeroom.

About 2468 patients have been seen this year up to 30 October; of whom 250 were in-patients. No regular returns are made however. No cooking facilities are provided. All food and much of the nursing is provided by relatives.

Special clinics

1. **Mondays** - An ante-natal clinic is held at the hospital dispensary.

2. **Wednesdays** - All boys desiring circumcision have this operation performed on this day of the week.

3. **Sundays** - Treatment day for intestinal worm infestation.

Maternity services

Almost all maternity cases are delivered in the Women's Committee Fale by trained midwives and/or ex-nurses. This can be regarded as a form of domiciliary midwifery. Difficult cases are confined in hospital.

Finances

In-patients are charged (since August 1961) a flat rate of 10/- per patient - regardless of the length of stay in hospital. This money is retained by the local hospital board.
Transportation

No transport is supplied, but buses to and from Apia pass about three times a day. The charge to Apia is about 10/- per trip. The ambulance from Apia Hospital is available on request.

Supply of stores and drugs

These are supplied monthly by the Central Government Health Department on indent from the medical officer. The supplies are reported to be adequate.

Folk medicine

People still resort to "herb" medicine and at times this practice creates a problem - when patients neglect to seek proper medical attention - quite often dying in the village. It is particularly harmful for eye conditions.

Medical Survey Falealili

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th>WOMEN</th>
<th>CHILDREN</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total examined</td>
<td>227</td>
<td>257</td>
<td>395</td>
<td>879</td>
</tr>
<tr>
<td>Seen but not examined</td>
<td>108</td>
<td>96</td>
<td>353</td>
<td>559</td>
</tr>
<tr>
<td>Elephantiasis</td>
<td>16</td>
<td>3</td>
<td>-</td>
<td>19    (2%)</td>
</tr>
<tr>
<td>Lymphangitis (history of)</td>
<td>25</td>
<td>10</td>
<td>3</td>
<td>38    (4%)</td>
</tr>
<tr>
<td>Microfilarial: (No. examined)</td>
<td>185</td>
<td>170</td>
<td>187</td>
<td>542</td>
</tr>
<tr>
<td>(positive)</td>
<td>50</td>
<td>21</td>
<td>4</td>
<td>75    (14%)</td>
</tr>
<tr>
<td>Eyes (Pterygium)</td>
<td>29</td>
<td>(14%)</td>
<td>22</td>
<td>(12%)</td>
</tr>
<tr>
<td>(Cataract)</td>
<td>10</td>
<td>13</td>
<td>-</td>
<td>23</td>
</tr>
<tr>
<td>(Corneal ulcer)</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>(Phlebitis)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>(Partial blindness)</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>(Total blindness)</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>(Squint)</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total eye defects</td>
<td>44</td>
<td>(20%)</td>
<td>44</td>
<td>(20%)</td>
</tr>
<tr>
<td>Hg. (less than 60%)</td>
<td>5</td>
<td>15</td>
<td>16</td>
<td>36</td>
</tr>
<tr>
<td>Skin (1. Seabies)</td>
<td>4</td>
<td>20</td>
<td>45</td>
<td>69</td>
</tr>
<tr>
<td>(2. T. Versicolor)</td>
<td>29</td>
<td>-</td>
<td>16</td>
<td>45</td>
</tr>
<tr>
<td>(3. Sores)</td>
<td>4</td>
<td>3</td>
<td>41</td>
<td>48</td>
</tr>
<tr>
<td>(4. Ringworm)</td>
<td>-</td>
<td>1</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Stool: (No. examined)</td>
<td>6</td>
<td>21</td>
<td>131</td>
<td>158</td>
</tr>
<tr>
<td>(Positive for ascaris)</td>
<td>1</td>
<td>4</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>(Positive for H.worms)</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>4    (2.5%)</td>
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<tr>
<td>Urine Sugar +</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Illnesses 1961</td>
<td>29</td>
<td>19</td>
<td>64</td>
<td>112</td>
</tr>
<tr>
<td>Past illnesses</td>
<td>45</td>
<td>20</td>
<td>40</td>
<td>105</td>
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<tr>
<td>Teeth (Caries)</td>
<td>19</td>
<td>14</td>
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<td>47</td>
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<tr>
<td>(Pyorrhea)</td>
<td>15</td>
<td>11</td>
<td>-</td>
<td>26</td>
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<tr>
<td>(Periodontitis)</td>
<td>2</td>
<td>-</td>
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<td>2</td>
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</tbody>
</table>
Comments

(1) The filariasis situation appears to be about the expected level, possibly slightly less than for Samoa as a whole.

(2) A fifth of the adult population is suffering from eye defects.

(3) Scabies and septic sores are too frequently found among children.

(4) The hookworm rate is gratifyingly low, but there is a reservoir of infection among the schoolchildren.
Poutasi Primary School is attended by children from four villages. The school is under a Samoan Head Mistress with a staff of five male teachers, four female teachers and a trainee. The total number of children is 376.

The school buildings consist of one European house and six Samoan fales. The main building has five classrooms, one staff room, and a store-room. Four rooms have the same measurements, i.e., each of which has a floor area of 648 sq. ft., while the bigger room, holding two classes, has a floor area of 1080 sq. ft. It is very difficult to measure the floor areas of the six Samoan fales. The school buildings lie with their frontages facing the northeast direction, and in this respect, good infiltration of sunlight and air into the class rooms is always maintained. The main school building is painted with dark green paint, with walls on two sides (long sides) open 3' from floor level up to ceiling. The open part is covered with wire nettings. The average number of children per classroom is about 34 to a floor area of 648 sq. ft. per room.

**Water supply**

The nearest tap water to the school lies about 100 yds. away. The children use either this tap or the stream that runs 50 yds. from the school for drinking and washing purposes. There is no proper drainage round the tap.

**Latrine**

The school has one latrine which is a sea latrine situated on the northern side of the school and is about 300 yds. from the school building. The latrine is 12' x 6', and it has two (2) compartments of 6' x 6', and three seats in each compartment. One is for the teachers and another is for the boys and girls of the school.

**Health supervision**

There is no health programme set out for the school as the Head Mistress said, all the minor troubles such as minor injuries, etc. are dealt with by the teachers in the school, except for major injuries, etc. which they refer to the hospital which is near by. The district nurse visits the school twice this year.
Health teaching

Theoretical instruction is given according to the official syllabus, but there appears to be little link between precept and practice.

Rubbish disposal

Rubbish is disposed of by dumping in the sea. A broken down incinerator lies at one end of the playground.

Medical examinations

Two hundred children were examined in this survey. The following defects were found:

- Defects of vision: 0
- Discharging ears: 3
- Partial deafness: 2
- Tooth caries requiring attention: 40
- Number of fillings done: 3
- Number of extractions done: 20
- Malformation of bite: 7
- Enlarged glands (inguinal): 9
- Palpable livers: 4
- Orthopaedic chest: 1
- Spine scoliosis: 1
- Flat feet: 1
- Skin infections: 20
- Ringworm (tinea): 25
- Colour (pale anaemic): 20
- Nutrition (malnutrition): 1

General remarks on the findings

The health of the children at school appears to be very good. Practically no malnutrition was seen and no serious handicaps were found. Immunization with triple antigen vaccine (diphtheria, tetanus and whooping cough) was given to 103 children. (Whooping cough vaccine is not normally required at this age however.)

INFANTS AND PRESCHOOL CHILDREN

There were 176 preschool children, ranging from three months to five years, examined, and the following findings were detected:

- Scabies: 1
- Malnutrition: 1
- Whooping cough: 13
- Paraplegia (Polio): 1
- Mongol children: 2
There was an epidemic of whooping cough prevailing in these 4 villages at the time of the survey.

The average weaning time of infants as found on examination is 10-1/2 months, but the most frequent age of weaning is 12 months. The average weight is 8 lbs.

First dose of triple antigen was given to 162 children. Heights and weights of the children revealed that their size is generally smaller than Australian children but that there is a more rapid gain at about the time of puberty and that their size eventually equals if not passes that of Australian children.

RECOMMENDATIONS

1. School health

1.1 Latrines

They are insufficient and too far distant. Three seats for the staff and three for the pupils appear to be an unfair allocation. There should be four seats per 100 girls and three seats per 100 boys, plus a urinal for the boys. The latrine, preferably of the water-seal type should be installed within easy walking distance of the school.

1.2 Refuse disposal

The incinerator should be put in order and used daily under the supervision of a teacher.

1.3 General cleanliness and maintenance of classrooms could be improved.

1.4 Pupils' health supervision needs to be put on a systematic basis, with regular monthly visits from the district nurse. She should regularly examine for skin conditions, and make routine examinations for eyesight, deafness, posture, general health and nutrition. She should also inspect the sanitary arrangements, washing facilities, etc.

1.5 Health teaching should be related to health practice.

2. Infant health

2.1 An immunization programme, using triple antigen for infants up to three years should be started. For older children double antigen (diphtheria and tetanus) should be used.

2.2 The recording of maternal and infant care should be more systematically done.
GROUP D: ENVIRONMENTAL SANITATION
(Sala'ilua, Vaovai and Mata'utu only)

The figures cannot be taken as an accurate estimate of conditions existing such as floor areas per person, number of taps, and animal enclosures and other items. However the findings will show what the state of environmental sanitation is for the district generally and will serve as a useful index and basis for further action if considered necessary by medical officer in charge of this district.

Dwellings and appurtenances

With very few exceptions, the dwellings are of the Samoan fale type. The majority were found in fair or good repair. Floors were raised on wood or stone foundation. No dampness was noticed. To us they appear reasonable in their construction for the existing climatic conditions. Nevertheless, we feel and recommend that some form of sealing should be done for the floors to allow readily cleansing or be of a nature that can allow the surface to be changed. Walls consist of blinds of coconut which are raised during fine weather and lowered on the side to protect interiors from driving rain. This method although not allowing privacy, is quite satisfactory for Samoa as the people as a whole live a communal life.

The roofs are of traditional thatching and at the time of inspection were found in good order. There is no ceiling and it is not considered necessary.

Kitchens

One outstanding defect found in all three villages was that the umuku-kas varied greatly and only 25% of the total can be designated as good while 75% were found to be very poor especially having no raised floors. The roof thatching for these were also found in many instances to be defective and allowed rain to enter into the cooking house.

Water

The water supply is obtained from a tributary of Fausaga River and a separate report is attached. The water is carried by galvanised iron pipes to supply the three villages surveyed. However it was noted in Vaovai that 94 inhabitants were using a nearby unprotected spring for their water supply. The pipe's supply has 1/2" branch to all families,
consisting of a standpipe situated nearby to the fales. The survey disclosed that no provisions have been made for the adequate disposal of waste waters where the standpipes were situated. Water storage in the fales was unsatisfactory in as much that no protection was given to the water contained in various utensils. Every family has a shower and the number of taps varies from one tap to 17 people to one tap to 15 people. Maintenance and fittings of this water supply appear to be a problem; it was stated by the District Medical Officer (who is a member of the Water Committee) that plumbers have to come from Apia, some 45 miles away, to do normal repairs. Many dripping taps were noticed indicating a lack of conscience on the part of the owners.

**Latrines**

For the three villages it was found that 32% of the families had provided latrines. These vary from very unsatisfactory to satisfactory with very few of a good standard. This shows 68% of the families surveyed do not possess latrines. Indiscriminate defecation around the bush immediately adjacent to fales was noted. The commonest latrines favoured were the over-hung sea latrines. Of these nearly all were dry at low tide, thus allowing the faecal matter to be exposed to flies and animals. The few pit latrines seen were of poor construction, and cannot be regarded as sanitary.

Only two water-closets exist. A pail flush latrine was therefore constructed in the Poutasi village, to show the villagers how a suitable and relatively economic latrine could be built.

Intestinal parasite index of 27 stools examined in one village showed 6 positives mainly ascaris, this gives a 25% index rate. This is due to indiscriminate defaecations.

**Refuse collection and disposal**

It can be stated with confidence that this item was unsatisfactory in 99% of all the households surveyed. Rubbish was not stored in vermin proof bins neither was it disposed of in a satisfactory manner. The normal procedure is for those people near the sea to dump their rubbish near the beach whilst others, away from the sea, dump theirs indiscriminably around the bush or nearby streams.

**Vermin**

In every village there was found a definite fly problem. This was most marked when food was present. Several rats were seen during
daylight hours, which shows marked infestation. Other evidence of their presence were noted. Cockroaches were noted especially around the latrines.

**Animals**

Pigs were found in two villages to be a problem. The dog problem is stated to be acute in some cases and it was noted that the majority of dogs showed a starved appearance.

**Food premises and handling**

There were no restaurants or eating houses. The stores are branches of merchants in Apia and these sell mainly tin goods and wrapped foods. However sugar, rice, salt and bread were sold after being made up by the traders. Some stores were provided with bins for those items. Raw food for domestic purposes was stored in the umukuka whilst cooked food and other foodstuffs were kept either in a safe or box by the greater majority of all families.

**Mosquitoes**

Mosquitoes were found to be a great problem in all villages and action will be needed to eradicate all breeding places such as swamps, shells, cocoa pads and clearing of grass and bush, etc.

**Recommendations**

1. **Dwellings.** It is recommended that:

   (a) Floors should be so constructed in such a way that they would be easy to clean (such as concrete or plank floors). If of pebble, these must be changed more frequently.

   (b) Umukuka floors should be raised above the ground and constructed in such a way that they can be readily cleansed. All roofs should be repaired so as to be water tight and general structure maintenance should be carried out from time to time to correct any deterioration.

2. **Water supplies**

   (a) A selected individual from each village should be trained to take care of simple repairs and maintenance of fittings.

   (b) Proper waste water disposal should be constructed to serve each tap and shower. All leaking taps on the pipeline should be immediately repaired to prevent collections of waste water in which mosquitoes may breed and pigs create nuisances. Family showers should be enclosed by planting shrubs around them or better still by constructing proper bathroom depending on the financial means of the household.
3. **Vacavai Spring**

(a) If this spring is to be used it should be properly protected to avoid contamination. Dipping buckets should be prohibited.

(b) A fence and ditch are required to avoid animal and surface contamination.

4. **Latrines**

The WHO model water flush pit latrines should replace the overhung sea latrines. These are cheaper and will prevent nuisances on the beach. The mould is available in the Apia Health Department. The senior medical practitioners who attended the refresher course should be asked to advise on construction. Health education should be used to prevent this nuisance and action should be taken against any unco-operative persons if health education fails.

5. **Refuse**

Incineration should be used for refuse disposal. The indiscriminate throwing of rubbish on the beach and bush should be stopped. Bury or burn procedures should be set up for the villagers.

6. **Vermin**

Health education should be undertaken aimed at general cleanliness regarding flies, mosquitoes, etc. All waste foods, windfallen fruits are breeding places and should be eradicated by a general village clean-up day which should be established on a monthly basis.

7. **Animals**

Pigs should be properly penned in drained concrete sites in all villages to avoid nuisance or, where applicable, pig pens should be constructed away from all habitations. Dogs, if required by villagers, should be well fed. Surplus, or unhealthy dogs, should be killed and buried.

8. **Food premises**

Stores should be regularly inspected by the District Medical Officer and all employees should be physically examined. Lidded bins should be provided for all loose foods.

**Conclusion**

It is felt that all improvements could be readily achieved if proper approaches were made to the Ali'i and Faipule and other committees, for with their backing many of the above improvements requiring little cost could be done.
FALEALILI WATER SUPPLY

This reservoir of water supply to the district of Falealili is located at a distance of about four miles from Poutasi. Water is distributed to the district by galvanized pipes. The people of this district always have sufficient water throughout the year. The number of population served is 1053 in spite of leaking taps.

Location

The reservoir is situated in a valley among the bush forest. There is no human settlement near this location, no plantation, no animal farms. The water source is a river. The river falls four feet and flows for 150 yds. and falls again another three feet. At this end the district of Poutasi has built the Intake. It is a box made of reinforced concrete with netting wire strainers.

Size - 10' W. x 6' L. x 4' D. Thickness of concrete wall 8". The box is connected to this pool by one wall facing the stream, made up of one inch wire netting reinforced by a timber frame on top. It is covered by wire netting which is not fixed. The water collects in this pool and overflows on top through a notch and overflow pipe. From this, led by a 6" diameter pipe, water travels to the villages. This pipe leaks very badly near the Intake through faulty coupling which has been strained due to the subsidence of the pipe. In front of this pool mud and leaves have gathered to a thickness of two feet. The pool itself is covered with rotten leaves and sticks. Inside the pool the same situation is found. On the floor the mud is about an inch thick with insects floating on top. Algae grow in the walls. Fallen rotten trees surround the pool.

Recommendations

1. Cut big trees around to allow sunrays, and avoid leaves falling on to the pool. This will also stop trees from falling and smashing the Intake (several have already fallen across).

2. Clean all rubbish in the pool and the surroundings.

3. Empty the mud in and outside the pool.

4. Fill the muddy area, i.e., space between the reservoir and the spring, with big stones, covered with small stones, to act as a filter.

5. Renew the timber reinforcement.

6. Clean the wire netting and walls of pools of algae.

7. Fix the cover of wire netting.
8. Repair the outlet pipe and support the pipeline through the entire length where necessary, on stone or concrete pillars, not on wood.

9. Water sampling to be done at least twice a year.

10. The reservoir must be inspected at least once every month and any defects noted should be remedied.

11. The two access tracks should be properly maintained. (It is obvious nobody had been near the Intake for many months.)

12. It is recommended that the Water Committee should draw up a roster of members of the committees and other persons required to inspect and report any faults found.

13. A person in the village to be made responsible for repairing leaking taps promptly, and for keeping the Intake clean.

THE HEALTH NEEDS OF THE COMMUNITY AND POINTS ON WHICH HEALTH EDUCATION MIGHT CONCENTRATE

1. **Eradication of mosquito breeding areas**

   Although the late and unsightly manifestations of filariasis - elephantiasis, filarial scrota - do not appear to be common (19 cases among 879 people examined) it still remains a problem in view of frequent attacks of lymphangitis and cellulitis which result from infestation with microfilariae.

   In view of the fact that the aedes mosquitoes play a direct role in the spread of filariasis, it is apparent that their eradication is of paramount importance. All breeding places should be destroyed - proper disposal of cocoa pods, coconut shells, oiling or drainage of swamps and proper drainage where water stagnates.

   People should be encouraged to sleep inside mosquito nets. This is not a protective measure against filaria (which is caught in the day time, particularly in the bush) but mosquito bites are a common cause of septic sores, not to mention loss of sleep.

2. **Eye conditions**

   The most common eye conditions seen were pterygium and cataract. In view of the fact that these conditions require surgical attention - every endeavour should be made to have people with these eye conditions treated in the near future - as, if not treated, both will lead either to total blindness or very restricted and poor vision.
It is suggested that pterygium could be produced by the bright glare of the sun from the sea - as the village is on the edge of sea and people go out almost daily to fish. The wearing of a hat and/or sunglasses is desirable.

3. Intestinal worm infestations

The incidence of intestinal worm infestation was 15%, and the most common one was ascariis infestation.

As worm infestation can bring with it a host of complaints - anaemia, malnutrition, etc., it is important that this matter receives due and urgent consideration.

The latrines in the village are almost all "overhung" sea types and insufficient in number. The majority of the villagers go to the bush for their daily natural functions - especially in cocoa and banana plantations. This is apparently where the people get infested with worms.

The proper construction and use of latrines - adequate in number - one for each household is recommended - is a problem that must be tackled and approached sincerely. People must be taught the importance of proper faecal disposal and the use of latrines. All available means should be taken in educating people towards this goal.

It should be particularly noticed that there is hookworm among the children. This is undoubtedly linked with the fact that children (1) go about bare footed and (2) do not use the latrines - presumably because of (a) lack of parental discipline and (b) the holes in the seats are too large and dangerous.

4. Dental infections

These are very common, especially periodontal disease among older people. Schoolchildren especially should be taught dental hygiene particularly the use of a toothbrush after refined or artificial carbo-hydrate and every opportunity should be taken to attend to the carious teeth of the children (and the older people).

5. Rubbish disposal

The proper disposal of refuse, by burning, not by dumping in the bush, should be insisted on by the women's committee. The high incidence of flies probably accounts for much of the intestinal disease and septic conditions.

Personal hygiene and environmental sanitation (good housing, clean surroundings, etc.) must be given due emphasis. This perhaps should be the foundation of health education.
6. **General cleanliness** of the body, the clothing and the house must be stressed. Several cases of head lice were noticed. Girls must be taught to comb their hair regularly (cutting the hair short is no prevention and gives no training in care of the hair). Scabies and sepsis are common, from the same cause.

7. **Care of water supplies**, particularly not to waste water, and to keep washing places free from accumulated water.
APPENDIX C

Programme of Studies
General principles to be followed

Integrated rural health should be seen as a unified system of medical practice, not as a series of unconnected activities. In this course the inter-relation of the various aspects of rural health will be stressed. For this reason the syllabus will not be worked through in the order in which it is listed. Item No. 1 on the agenda will, as far as possible, be taken first but after that the various items to be integrated will be introduced together, then developed, and finally the whole will be practised in a field exercise.

Below will be found the list of "units" into which the course of studies has been divided, and the "Objective" to be aimed at, each followed by a list of lectures and demonstrations by which we hope to attain those objectives.

Participants should have in mind the objectives and "evaluate" whether they are in fact being attained. If not the matter can be brought out in discussion and adjustment will be made if possible. At the end of the Conference a full evaluation will be made by participants.

UNITS OF STUDY

Unit No. 1 - Community Health

Objective:

To give an awareness of the health needs of people in rural areas, an understanding of the ecology of disease, and the concept of an integrated or total approach to dealing with the situation. This unit will serve as a general introduction, and will include a brief review of basic public health principles. Health education and the people's own responsibility for their health will be emphasized. Survey methods will be introduced as a means of ascertaining health needs.

<table>
<thead>
<tr>
<th>Topic No.</th>
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<th>Subject</th>
<th>Method of Study</th>
<th>Instructor</th>
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<td>What is integrated rural health?</td>
<td>Panel discussion</td>
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<td>Dr. Norman-Taylor</td>
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<td>2M1</td>
<td>How public health is organised in my country and the principal problems.</td>
<td>Individual talks</td>
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<td>Review of general principles of health and disease.</td>
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<td>6M3</td>
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<td>Discussion</td>
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<td>3M4</td>
<td>Planning a survey.</td>
<td>Practical</td>
<td>Dr. Reyes</td>
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<td>2Tn5</td>
<td>Community development.</td>
<td>Films</td>
<td>Dr. Norman-Taylor</td>
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<td>Rural Hospital</td>
<td>Visits</td>
<td>All staff</td>
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<td>Field visit</td>
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**Unit No. 2 - Maternal and Child Health**

**Objective:**

To study the special needs of the mother and child in the public health programmes and how they can be met and to give an opportunity of practising the techniques required.
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<td>Dr. Wilmot</td>
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<td>3W2</td>
<td>Infant health and welfare.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>2.5</td>
<td>3WI</td>
<td>The conduct of an infant welfare clinic.</td>
<td>Demonstration</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td></td>
<td>3Th3II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.6</td>
<td>4W2</td>
<td>The health and development of the preschool aged child.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>2.7</td>
<td>4W4I</td>
<td>Medical examination of the preschool aged child.</td>
<td>Demonstration</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td></td>
<td>4T4II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.8</td>
<td>4W2</td>
<td>Health services for the school aged child.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>2.9</td>
<td>4W3I</td>
<td>School medical inspection.</td>
<td>Demonstration</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td></td>
<td>4Th3II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.10</td>
<td>6M1</td>
<td>Dental health in childhood.</td>
<td>Lecture</td>
<td>Mr. Collins</td>
</tr>
<tr>
<td>2.11</td>
<td>3M2</td>
<td>Organisation of maternal and child health services.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>2.12</td>
<td></td>
<td>Health education in maternal and child health centres and schools.</td>
<td>Demonstration</td>
<td>Miss Martin</td>
</tr>
</tbody>
</table>

**Unit No. 3 - Nutrition**

**Objective:**

To study community nutritional problems, how they are recognised and the steps which may be taken to overcome them.
### Unit No. 3 - Nutritional Aspects

<table>
<thead>
<tr>
<th>Topic No.</th>
<th>Period</th>
<th>Subject</th>
<th>Method of Study</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>2T2</td>
<td>Nutrition principles and deficiencies.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>3.2</td>
<td>2W2</td>
<td>Nutrition patterns and education.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>3.3</td>
<td>2W4I</td>
<td>Health education and nutrition.</td>
<td>Demonstration</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>3.4</td>
<td>3Th2</td>
<td>Infant nutrition.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>3.5</td>
<td>4F2</td>
<td>Nutrition surveys.</td>
<td>Lecture</td>
<td>Dr. Wilmot</td>
</tr>
<tr>
<td>3.6</td>
<td>1F4</td>
<td>Economics and agriculture in relation to health.</td>
<td>Lecture</td>
<td>Mr. Newell</td>
</tr>
</tbody>
</table>

### Unit No. 4 - Communicable Disease Control

**Objective:**

To study the principal communicable diseases in this area and to gain the necessary knowledge and skills for their diagnosis, management, treatment, prevention and control.

<table>
<thead>
<tr>
<th>Topic No.</th>
<th>Period</th>
<th>Subject</th>
<th>Method of Study</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>2Th2</td>
<td>The spread of germs.</td>
<td>Lecture</td>
<td>Dr. Norman-Taylor</td>
</tr>
<tr>
<td>4.2</td>
<td>2Th1</td>
<td>Principles in prevention and control - I.</td>
<td>Lecture</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>4.3</td>
<td>3T1</td>
<td>Principles in prevention and control - II.</td>
<td>Lecture</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>4.4</td>
<td>3W1</td>
<td>Principles in prevention and control - III.</td>
<td>Lecture</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>4.5</td>
<td>3Th1</td>
<td>Principles in prevention and control - IV.</td>
<td>Lecture</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>4.6</td>
<td>3F1</td>
<td>Principles in prevention and control - V.</td>
<td>Lecture</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>4.7</td>
<td>3M4</td>
<td>Principles in prevention and control.</td>
<td>Discussion</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>Topic No.</td>
<td>Period</td>
<td>Subject</td>
<td>Method of Study</td>
<td>Instructor</td>
</tr>
<tr>
<td>----------</td>
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</tr>
<tr>
<td>4.8</td>
<td>3M1</td>
<td>Epidemiological procedures</td>
<td>Exercise</td>
<td>Dr. Reyes</td>
</tr>
<tr>
<td>4.9</td>
<td></td>
<td>Survey practical.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.10</td>
<td></td>
<td>Survey practical.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.11</td>
<td>4M1</td>
<td>Leprosy - I (clinical).</td>
<td>Lecture</td>
<td>Dr. Beckett</td>
</tr>
<tr>
<td>4.12</td>
<td>4T1</td>
<td>Leprosy - II (preventive).</td>
<td>Lecture</td>
<td>Dr. Beckett</td>
</tr>
<tr>
<td>4.13</td>
<td>4W4I</td>
<td>Leprosy (diagnosis).</td>
<td>Ward round</td>
<td>Dr. Beckett</td>
</tr>
<tr>
<td>4.14</td>
<td>6M2</td>
<td>Filarialias control.</td>
<td>Lecture</td>
<td>Dr. Norman-Taylor</td>
</tr>
<tr>
<td>4.15</td>
<td>4W4II</td>
<td>Filarialias case finding.</td>
<td>Field trip</td>
<td>SMP Tautasi</td>
</tr>
<tr>
<td>4.16</td>
<td>2W4II</td>
<td>Filarialias diagnosis.</td>
<td>Laboratory</td>
<td>Mr. Rasmussen</td>
</tr>
<tr>
<td>4.17</td>
<td>6M4II</td>
<td>Filarialias mosquito identification.</td>
<td>Laboratory</td>
<td>Mr. Rasmussen</td>
</tr>
<tr>
<td>4.18</td>
<td>4W1</td>
<td>Tuberculosis - I.</td>
<td>Lecture</td>
<td>Dr. Han</td>
</tr>
<tr>
<td>4.19</td>
<td>4W2</td>
<td>Tuberculosis - II.</td>
<td>Lecture</td>
<td>Dr. Han</td>
</tr>
<tr>
<td>4.20</td>
<td>6M4I</td>
<td>Tuberculosis campaign.</td>
<td>Visit</td>
<td>Dr. Han</td>
</tr>
<tr>
<td>4.21</td>
<td>6W1</td>
<td>Yaws control.</td>
<td>Filmstrip</td>
<td>Dr. Norman-Taylor</td>
</tr>
<tr>
<td>4.22</td>
<td>6T1</td>
<td>Yaws campaigns as part of an integrated programme.</td>
<td>Discussion</td>
<td>Dr. Norman-Taylor</td>
</tr>
<tr>
<td>4.23</td>
<td>6M1</td>
<td>Eye diseases in public health.</td>
<td>Lecture</td>
<td>SMP Sosene</td>
</tr>
</tbody>
</table>

Unit No. 5 - Environmental Sanitation

Objective:
To enable medical officers to give intelligent advice on environmental sanitation and to supervise this aspect of their health programme.
<table>
<thead>
<tr>
<th>Topic No.</th>
<th>Period</th>
<th>Subject</th>
<th>Method of Study</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>2W3</td>
<td>Functions of the health inspector.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.2</td>
<td>2Th3</td>
<td>Water supplies.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.3</td>
<td>2Th4</td>
<td>Water, sources.</td>
<td>Visit</td>
<td>Mr. Hall</td>
</tr>
<tr>
<td>5.4</td>
<td>4W4:II</td>
<td>Water, laboratory procedures.</td>
<td>Demonstration</td>
<td>Mr. Rasmussen</td>
</tr>
<tr>
<td>5.5</td>
<td>4W2</td>
<td>Disposal of excreta.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.6</td>
<td>4F4</td>
<td>Constructing a latrine.</td>
<td>Demonstration</td>
<td>Mr. Hall</td>
</tr>
<tr>
<td>5.7</td>
<td>2F3</td>
<td>Food sanitation.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.8</td>
<td>2F3</td>
<td>Food sanitation.</td>
<td>Demonstration</td>
<td>Mr. Hall</td>
</tr>
<tr>
<td>5.9</td>
<td>4M3</td>
<td>Refuse disposal.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.10</td>
<td>3F2</td>
<td>Housing.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.11</td>
<td>3W4:II</td>
<td>House inspection.</td>
<td>Visit</td>
<td>Mr. Hall</td>
</tr>
<tr>
<td>5.12</td>
<td>4W2</td>
<td>Environmental survey.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.13</td>
<td>4W2</td>
<td>Environmental survey.</td>
<td>Visit</td>
<td>Mr. Hall</td>
</tr>
<tr>
<td>5.14</td>
<td>3M3</td>
<td>Vector control.</td>
<td>Lecture</td>
<td>Mr. Adan</td>
</tr>
<tr>
<td>5.15</td>
<td>3T3</td>
<td>Community attitudes and beliefs.</td>
<td>Lecture</td>
<td>Miss Martin</td>
</tr>
</tbody>
</table>

**Unit No. 6 - Health Education**

**Objective:**

To gain an understanding of the methods of health education and how they are used as an essential part of a public health programme.

<table>
<thead>
<tr>
<th>Topic No.</th>
<th>Period</th>
<th>Subject</th>
<th>Method of Study</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>2F1</td>
<td>Principles and planning.</td>
<td>Discussion</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>6.2</td>
<td>3F3</td>
<td>Training field staff.</td>
<td>Lecture</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>6.3</td>
<td>4T3</td>
<td>Applied health education.</td>
<td>Discussion</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>Topic No.</td>
<td>Period</td>
<td>Subject</td>
<td>Method of study</td>
<td>Instructor</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>---------------------------------------------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>6.4</td>
<td>3W3II</td>
<td>Mass media and their uses.</td>
<td>Workshop</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>6.5</td>
<td>3W4I</td>
<td>Audio-visual aids and their uses.</td>
<td>Workshop</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>6.6</td>
<td>3T4II</td>
<td>Health education practical.</td>
<td>Workshop</td>
<td>Miss Martin</td>
</tr>
<tr>
<td>6.7</td>
<td>5</td>
<td>Health education in the field.</td>
<td>Field visit</td>
<td>SMP Fa'asaso</td>
</tr>
<tr>
<td>6.8</td>
<td>4W3</td>
<td>Health education experiences in New Zealand.</td>
<td>Lecture</td>
<td>Dr. Derek-Taylor</td>
</tr>
</tbody>
</table>

Unit No. 7 - Administration

Objective:

To study the official procedures in medical and health administration and to define the duties and responsibilities of the medical officer as a government official.

<table>
<thead>
<tr>
<th>Topic No.</th>
<th>Period</th>
<th>Subject</th>
<th>Method of study</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>6M2</td>
<td>Introduction.</td>
<td>Lecture</td>
<td>Dr. Norman-Taylor</td>
</tr>
<tr>
<td>7.2</td>
<td></td>
<td>Procedure in Western Samoa.</td>
<td>Project</td>
<td>Groups</td>
</tr>
<tr>
<td>7.3</td>
<td>4T3</td>
<td>Administrative procedures - I.</td>
<td>Lecture</td>
<td>Dr. Derek-Taylor</td>
</tr>
<tr>
<td>7.4</td>
<td>4F3</td>
<td>Administrative procedures - I.</td>
<td>Lecture</td>
<td>Dr. Derek-Taylor</td>
</tr>
</tbody>
</table>
APPENDIX D

"Half-Way" Evaluation Sheet
"HALF-WAY" EVALUATION SHEET

1. What do you understand by "integrated rural health services?" (Please enter your answer on the back of this sheet. About half a page will be sufficient).

2. Do you consider that the lectures so far have met your expectations in increasing your knowledge of:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Principles of integrated community health and health surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Maternal and child health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Principles of nutrition, nutritional deficiencies and dietary patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Communicable diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Rural sanitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Applied health education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Administrative procedures, records and basic statistics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Do you feel that you would be helped by a greater proportion of:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Lectures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Field trips</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Have you any general comment to make about the course?

5. Have you any comment to make regarding your general living condition?
APPENDIX E

Final Evaluation Sheet
REFRESHER COURSE  
FINAL EVALUATION SHEET

Please answer the following questions.  
Underline the answer where appropriate.  
(If more space needed, write on back)

<table>
<thead>
<tr>
<th>Question</th>
<th>Majority answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are you pleased that you were invited to attend the Conference? Yes/No (If not, why?)</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Have you attended such a course before? Yes/No (If yes, where?)</td>
<td>No</td>
</tr>
<tr>
<td>3. Do you think your attendance here will help you with the kind of work you do? Yes/No (If no, why not?)</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Did the course come up to your expectations? Yes/No (If no, why not?)</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Were you sufficiently prepared for the course and informed about its purpose?</td>
<td></td>
</tr>
<tr>
<td>By your administration? Yes/No</td>
<td>Yes</td>
</tr>
<tr>
<td>By the organisers? Yes/No</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Was the course too long/too short?</td>
<td>Too short</td>
</tr>
<tr>
<td>7. Was the timetable too crowded? Yes/No</td>
<td>Yes</td>
</tr>
<tr>
<td>8. Did you have too much/too little free time?</td>
<td>Too little</td>
</tr>
<tr>
<td>9. Did you need more time for private study? Yes/No</td>
<td>Yes</td>
</tr>
<tr>
<td>10. What aspects of the course did you find most interesting, useful or informative?</td>
<td>(See below)</td>
</tr>
<tr>
<td>11. Was the documentation too little/sufficient/excessive?</td>
<td>Sufficient</td>
</tr>
<tr>
<td>12. Was the instruction given too theoretical? Yes/No (If yes, which?)</td>
<td>No</td>
</tr>
<tr>
<td>13. Do you think that the syllabus has been adequately covered? Yes/No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

10. The replies were too varied to record here but field work on environmental sanitation was particularly mentioned.
<table>
<thead>
<tr>
<th>Question</th>
<th>Majority answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please answer the following questions.</td>
<td></td>
</tr>
<tr>
<td>Underline the answer where appropriate.</td>
<td></td>
</tr>
<tr>
<td>14. Which part of the syllabus is of most interest to you in your work?</td>
<td></td>
</tr>
<tr>
<td>15. Have you any comments about the method of study or instruction?</td>
<td></td>
</tr>
<tr>
<td>16. Do you wish that there had been a formal examination at the end?</td>
<td>No</td>
</tr>
<tr>
<td>17. Any other remarks to make?</td>
<td></td>
</tr>
<tr>
<td>18. Will you send to the Course Director a report in six months' time telling what you are doing in the way of integrated rural health?</td>
<td>Yes</td>
</tr>
<tr>
<td>19. If you wish to do so you may sign your name here.</td>
<td></td>
</tr>
<tr>
<td>20. Date.</td>
<td></td>
</tr>
</tbody>
</table>

14. Environmental sanitation again frequently mentioned, with MCH and School Health. The laboratory work is mentioned as being of great interest.

15. More practical demonstrations needed.

17. See comments above, Nos. 14 and 15.