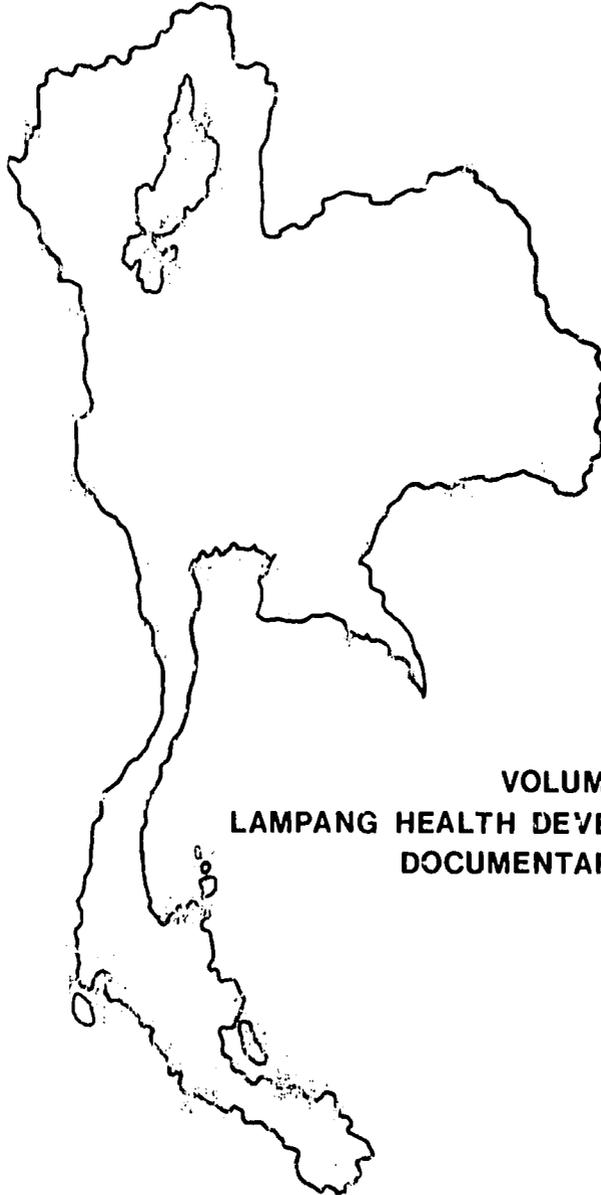




**COMMUNITY HEALTH PARAPHYSICIAN
(WECHAKORN)
TRAINING IN PUBLIC HEALTH**



**VOLUME VI
LAMPANG HEALTH DEVELOPMENT PROJECT
DOCUMENTARY SERIES**



MINISTRY OF PUBLIC HEALTH THAILAND 1981



LAMPANG HEALTH DEVELOPMENT PROJECT
DOCUMENTARY SERIES

VOLUME VI

COMMUNITY HEALTH PARAPHYSICIAN (WECHAKORN)
TRAINING IN PUBLIC HEALTH
MODULES 14-24

Edited by

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Ministry of Public Health

Thailand

1981

The Lampang Health Development Project Documentary Series

Is Dedicated To

DR. SOMBOON VACHROTAI

(1924 - 1980)

Project Director

1974 - 1980



CONTENT OF THE LAMPANG HEALTH DEVELOPMENT PROJECT
DOCUMENTARY SERIES

The documentary series comprises six volumes. Volume I summarizes the development, evaluation, conclusions and recommendations of the Project. Volume II describes the development of the Project, focussing on it's key features, and Volume III presents the Project's evaluation, results, conclusions and recommendations. The remaining three volumes present translations of materials used in developing community health volunteers and paraphysicians, key manpower of the Lampang rural health care system.

VOLUME I: SUMMARY FINAL REPORT, CONCLUSIONS AND RECOMMENDATIONS OF THE LAMPANG HEALTH DEVELOPMENT PROJECT (Monograph 12)

VOLUME II: DEVELOPMENT OF AN INTEGRATED RURAL HEALTH SERVICES AND PRIMARY HEALTH CARE SYSTEM IN LAMPANG THAILAND

- Monograph 1 - The Lampang Health Development Project: New Approaches to Rural Health Care
- Monograph 2 - Developing Community Health Volunteers and Primary Health Care
- Monograph 3 - Developing Community Health Paraphysicians (Wechakorn)
- Monograph 4 - Expanding the Community Health Role of the Provincial Hospital
- Monograph 5 - Strengthening Management, Supervision, and Support for Rural Health Care
- Monograph 6 - A System of Evaluation and Management Information for Rural Health Care

VOLUME III: EVALUATION OF THE LAMPANG INTEGRATED RURAL HEALTH SERVICES AND PRIMARY HEALTH CARE SYSTEM

- Monograph 7 - Evaluating and Monitoring Integrated Rural Health Services: Lessons from the Lampang Experience
- Monograph 8 - Consumer Accessibility to and Acceptance of Rural Health Services in Lampang
- Monograph 9 - Health System and Personnel Performance and Costs
- Monograph 10 - Impact on the Population's Health

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Monograph 11 - Feasibility and Affordability of Implementing
the Lampang System's Key Features
Nationwide: Implications for the Future

VOLUME IV: COMMUNITY HEALTH VOLUNTEERS' MANUALS

- Section 1 - Health Post Volunteer Manual
- Section 2 - Health Post Volunteer Nutrition Manual
- Section 3 - Health Communicator Manual
- Section 4 - Health Communicator Nutrition Manual
- Section 5 - Traditional Birth Attendant Manual

VOLUME V: COMMUNITY HEALTH PARAPHYSICIAN (WECHAKORN)
TRAINING IN CLINICAL CARE

- Module 1 - Introduction to Comprehensive Health Care
- Module 2 - Medical Terminology
- Module 3 - Anatomy and Physiology
- Module 4 - Medical History-Taking
- Module 5 - Physical Examination
- Module 7 - Formulary: Essential Drugs for Wechakorn
- Module 8 - Skin Problems
- Module 9 - Eye, Ear, Nose and Throat Problems
- Module 10 - Medical Problems
- Module 11 - Pediatric Problems
- Module 12 - Gynecological Problems
- Module 13 - Emergency Problems

VOLUME VI: COMMUNITY HEALTH PARAPHYSICIAN (WECHAKORN)
TRAINING IN PUBLIC HEALTH

- Module 14 - Public Health Administration and Primary Health Care
- Module 15 - Community Health Services: Organization, Management and Supervision
- Module 16 - Maternal and Child Health Care
- Module 17 - Family Planning
- Module 18 - Nutrition
- Module 19 - Dental Health
- Module 20 - Environmental Sanitation
- Module 21 - Statistics
- Module 22 - Epidemiology
- Module 23 - Communicable Diseases Control
- Module 24 - Health Education

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FOREWORD

From 1974 to 1981 the Ministry of Public Health implemented the Lampang Health Development Project, a seven year effort to pioneer and research many approaches for integrating and expanding medical and health service coverage and for creating village-based primary health care services. During this period, I followed closely the reorganization of the provincial health administration, the integration of medical and health services, and the creation of the Department of Community Health in the Lampang Provincial Hospital with its outreach programs in rural health and medical care delivery. The major thrust of the health manpower development effort involved the training of three types of government health workers to serve as wechakorn paraprofessionals in all subdistrict health centers and district hospitals, the training of thousands of villagers to serve as health volunteers and health communicators, and the training of hundreds of traditional birth attendants. The effort included the organization and orientation of village health committees, and stimulating contributions by the private sector and by the communities themselves. Beyond the increased demand for health services which resulted, I also noted with great interest evidence of village-based health activities supported by villagers in many localities: improvements in community water sources, installation and maintenance of handpumps for the newly improved and covered wells, nutritional surveillance, family planning supply distribution, and so on. The focus of the Lampang Project was primarily on the district, subdistrict and village levels.

In 1977 and 1978 the Ministry of Public Health drew upon the personnel and experience of the Lampang Project to help plan and conduct two national primary health care seminars. In March, 1979, the Cabinet of the Royal Thai Government approved primary health care as a National Health Development Policy. The Ministry drew heavily from the Lampang Project again in 1979 as it planned with the WHO and UNICEF a biregional primary health care workshop, participated by nine countries of the South East Asia and Western Pacific regions. The first workshop was conducted in 1980, and we are currently planning with WHO and UNICEF for the next biregional workshop. The aim of these national and inter-regional activities is to rapidly feedback to planners and health leaders the field experience that is accumulating in Lampang and in similar efforts. One result, at the Thai national level, is the adoption of primary health care program implementation as a high priority in the National Social and Economic Development Plan.

The lessons and experience coming from Lampang over the past seven years have been quite useful to the Ministry of Public Health in planning and implementing similar approaches for nationwide coverage. In a similar manner, the Lampang experience may be useful to others and this is one of the major aims of the documentary series that is presented here with.

I wish to take this opportunity to express my gratitude and thanks to all institutions and agencies in Thailand and abroad that have contributed to the Lampang

effort. While all the organizations in Thailand that have made contributions are too numerous to list here, two deserve special recognition for their longstanding support: the Chiangmai University which provided two senior professionals to the Project who served as Chiefs of the Project's Division of Personnel Development and Division of Research and Evaluation, and the National Institute of Development Administration which played a key role in the research and evaluation effort. Special acknowledgement and appreciation is expressed for the contributions of the University of Hawaii who provided technical and managerial assistance throughout the seven year period, the American Public Health Association for its five year role in project management and liaison, and the U.S. Agency for International Development which was the major source of outside funding. We also appreciate and acknowledge the special purpose contributions of the U.S. Information Service Agency, the Asia Foundation, the World Health Organization, and the U.N. Children's Fund.

As Thailand enters the 1980's, the greatest aim of the Ministry of Public Health is to extend basic health services and to achieve health for all Thai citizens, if possible, by the turn of the century. The success of this effort will depend on three major factors: the seriousness and commitment of the Royal Thai Government in implementing its new Health Development Policy, the seriousness of health workers at all levels in serving those in need, and the ability and willingness of health workers to teach and guide villagers in matters of health and development, helping them to help themselves. Through continued effort and collaboration, like that of the Lamphang Health Development Project, we have good reason to be optimistic.

May, 1981



Dr. Sem Pringpuangeo
Minister of Public Health
Royal Thai Government

PREFACE

The Lampang Health Development Project, originally called the "DEIDS/Thailand Project" to signify the development and evaluation of an integrated health care delivery system, was conceptualized, planned, implemented and evaluated by the Ministry of Public Health, Royal Thai Government, through shared commitment and collegial collaboration with the University of Hawaii and the American Public Health Association.

Health professionals and leaders from these institutions recognized that conventional approaches to health care delivery were not reaching those most in need -- underserved rural villagers who comprised the majority of the population. Further, new approaches had to be conceptualized and tested in the context of Thailand's health care system if basic health services were to become available to and utilized by rural villagers.

Project planners hypothesized that basic health services could be delivered more cost-effectively if integrated; that the demand for medical care services could be met, to a great extent, by upgrading existing health personnel to be clinically-competent paraprofessionals; and, that the need for health promotion and disease prevention services could be more broadly and effectively extended through community participation. This participation could be achieved by training community health volunteers -- health post volunteers, traditional birth attendants and village health communicators as well as involving the private sector. Some elements of these approaches had been implemented in Thailand on a small (district-level) scale in earlier projects, but they had not been adequately evaluated. The Ministry of Public Health, already committed to the concept of integration of health promotion, disease prevention and medical care services, was ready to embark on a major effort to test this approach, and to find ways to broadly extend integrated basic health services to all rural villagers in Thailand.

Lampang Province in northern Thailand (see Figures 1 and 2) was selected as the project area because it had a population of over half a million people, fair communications, moderate economic status, minimal security and insurgency problems, and the endorsement of provincial authorities. While the overall and longterm goal of the Project was to improve the health status of the rural population of Lampang, the specific objectives of the Project were:

- (1) to expand health care coverage to at least two-thirds of the rural population, particularly women in their child-bearing years and preschool age children, with an emphasis on family planning, nutrition and other maternal and child health services;
- (2) to establish an integrated provincial health care services delivery system with the capacity to extend integrated medical, health promotion and

disease prevention services to every subdistrict health center, and to establish simple medical care, health promotion and disease prevention services in every village through community participation and private sector involvement) and,

- (3) to establish an integrated provincial health care services delivery system that is more cost-effective, meaning lower cost per service unit, the key features of which could be replicated nationwide within the limitations of resources available to the Royal Thai Government.

Given these objectives, Project planners and implementors developed a number of innovations and modifications of the existing health system which constituted the key features of the Project, as viewed in Figure 3 and as summarized below.

- (1) Reorganization and Strengthening of the Provincial Health Service Infrastructure by:
 - Integrating the curative, disease prevention, and health promotion services by coordinating and administering them under a single provincial health administration;
 - Establishing a Department of Community Health within the Provincial Hospital, and
 - Improving management and supervisory practices, in part by developing a practical management information system;
- (2) Development of Community Health Paraphysicians (wechakorn) from existing health service personnel to be deployed to every district hospital and subdistrict health center;
- (3) Development of Community Health Volunteers in every village, including training of a village health volunteer (health post volunteer) in every village, training of traditional birth attendants in every village where qualified candidates could be identified, and training of village health communicators for every 10-15 households in every village; and,
- (4) Stimulating other Community and Private Sector Involvement by establishing health committees in every village and at every administrative level, and by eliciting the interest and support of other private sector groups.

The Ministry of Public Health and other agencies of the Royal Thai Government began planning nationwide programs that would carry these approaches and key features, as modified, to the whole of the country during implementation of the 1977-1981 and 1982-1986 National Economic and Social Development Plans.

Several notable characteristics of Project development, planning and implementation had a bearing on the progress of the Project and on the acceptance of its approaches and key features:

- * *The Lampang Health Development Project was viewed from the beginning as a Thai project: Project planners, Project implementors, and Project leaders decision-makers were predominantly Thai.*
- * *The Project was established and directed by the Thai Ministry of Public Health, the official RTG authority that would be responsible for nationwide implementation if the approaches and key features were found to be worthy of "replication".*
- * *Project and Ministry leaders developed and maintained a broad base of involvement of Ministry of Public Health personnel and other Royal Thai Government officials in all phases of Project development, planning, implementation, and evaluation.*
- * *The Project maintained a continuing dialogue on Project approaches and progress with both Thai and international health agencies by providing Project information through periodic progress reports, organizing annual reviews and by conducting special workshops and seminars for review and refinement of Project approaches and key features.*
- * *Project administrative, managerial, and technical assistance from the University of Hawaii and the American Public Health Association was characterized by a spirit of mutualism, a shared commitment, and a collegial collaboration. Technical assistance was not limited to one institution, but involved a number of international organizations, U.S. and Thai institutions and agencies. Project leaders recognized that the Project was dealing with a universal problem of how to achieve "health for all", and that this problem was best approached through broad collaboration and solid commitment, based on a spirit of mutualism and learning together.*

This Lampang Health Development Project Documentary Series serves to comprehensively document the planning, implementation and evaluation processes, and to present the major findings and evaluation results of this seven-year effort. Volume 1 summarizes the Project's approaches and key features, evaluation and research findings, conclusions and recommendations. Volume II comprises six monographs which describe in detail the development and functioning of the Project's major approaches and components. Volume III comprises six monographs on evaluation findings, and discusses the Project results, conclusions and recommendations, based on the broad array of survey data, service statistics and other operational data that have been collected and analyzed. Volume IV presents the English language translations of Thai language materials used in developing and supporting community health volunteers -- health post volunteers, health communicators, and traditional birth attendants. Finally, Volumes V and VI comprise English language translations of the twenty-four Thai language training modules used in the development of *wechakorn*, community health paraprofessionals.

It is the sincere wish of Ministry of Public Health and Lampang Project leaders, and of the authors, contributors, and editors of the Lampang Health Development Project Documentary Series, that readers of these materials will find the lessons learned and experience gained in Lampang useful in their own work.

Prakorb Tuchinda .

Dr. Prakorb Tuchinda
Under-Secretary of State
for Public Health
Ministry of Public Health

July, 1981

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Deputy Under-Secretary of
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Lampang Health Development Project

Figure 1 Location of Project Site in Thailand

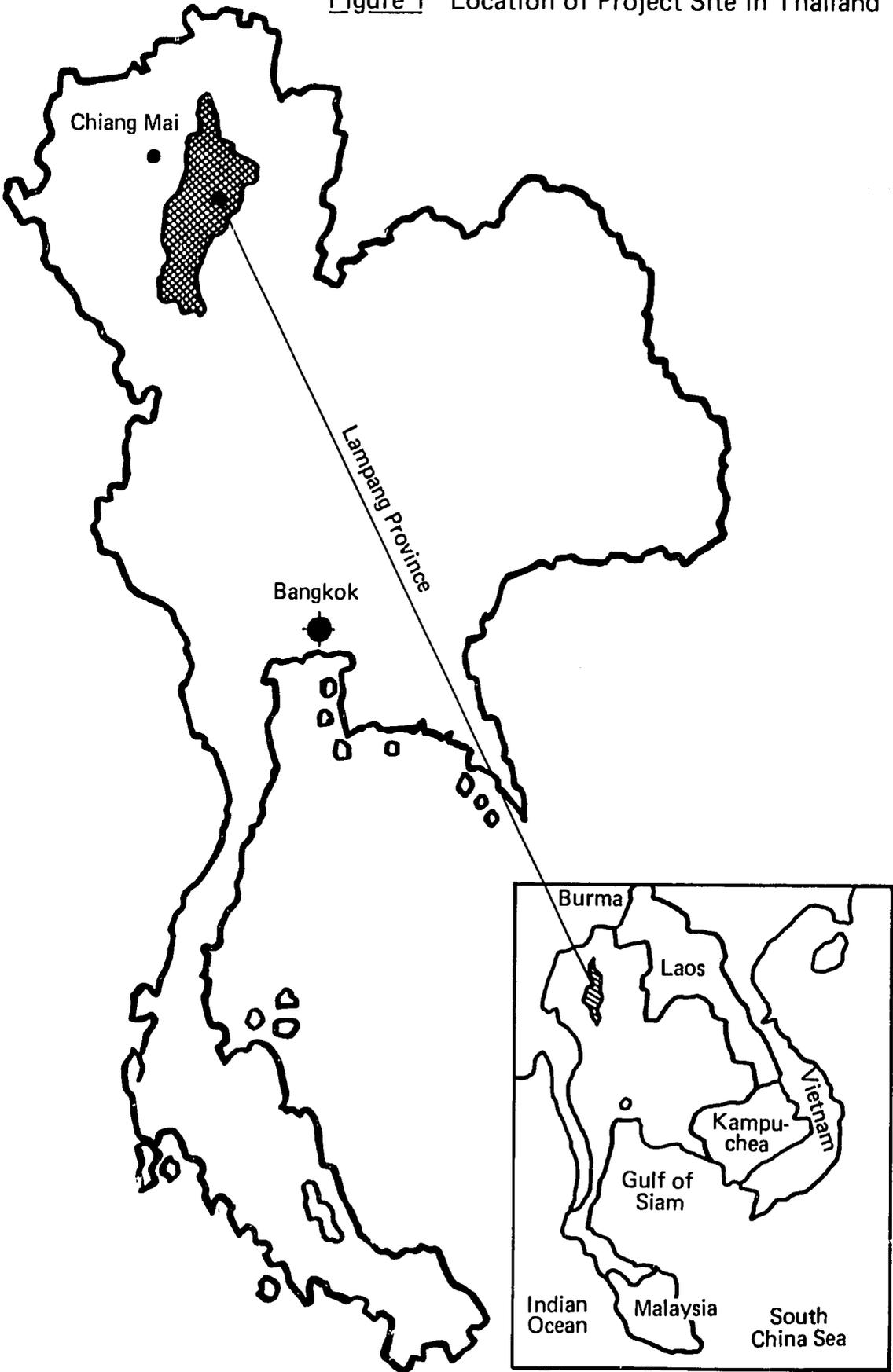


Figure 2 Map of Lampang Province with Project Intervention Areas, Control Area #1, and Control Area #2 in Adjacent Lamphoon Province

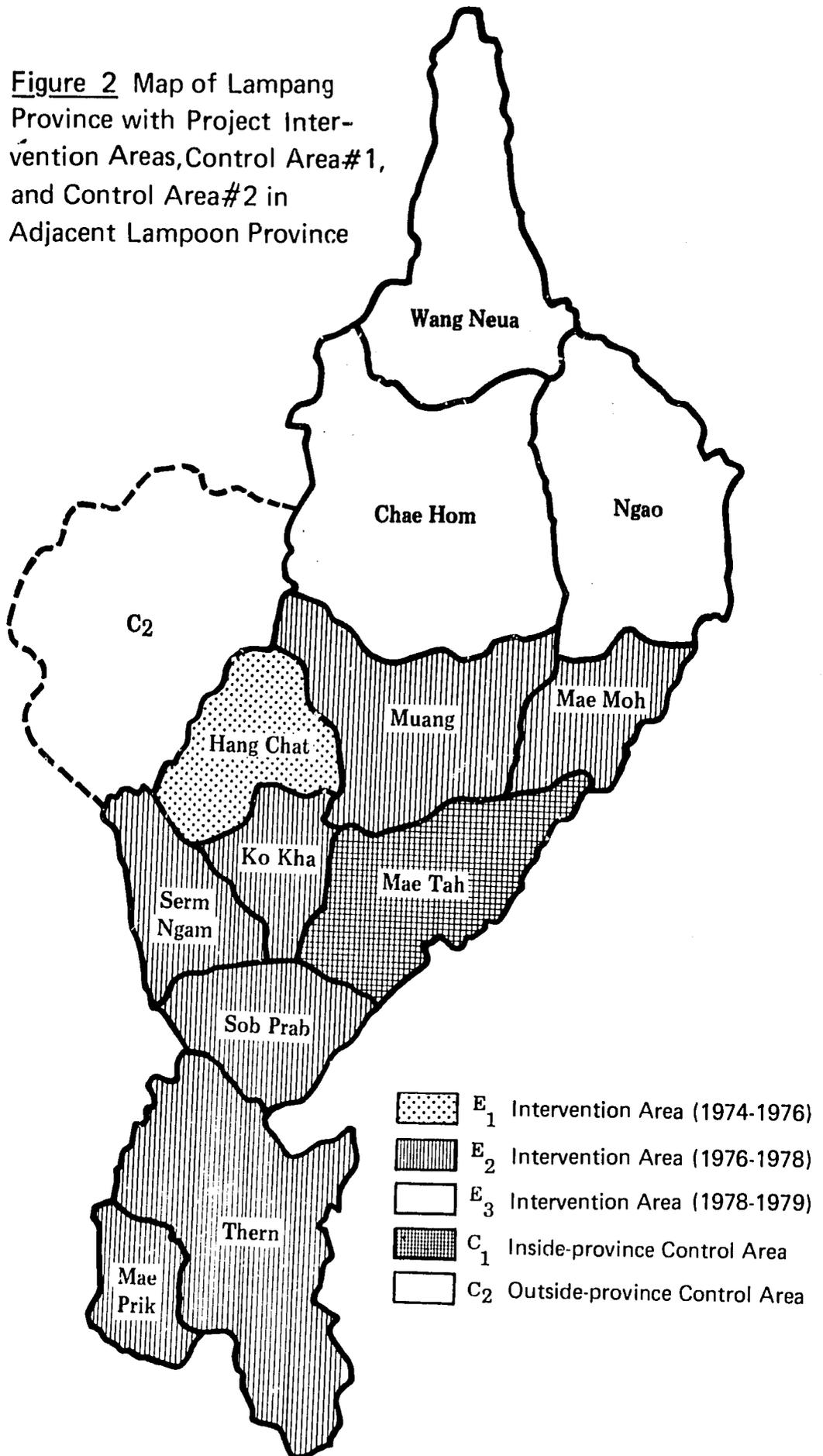
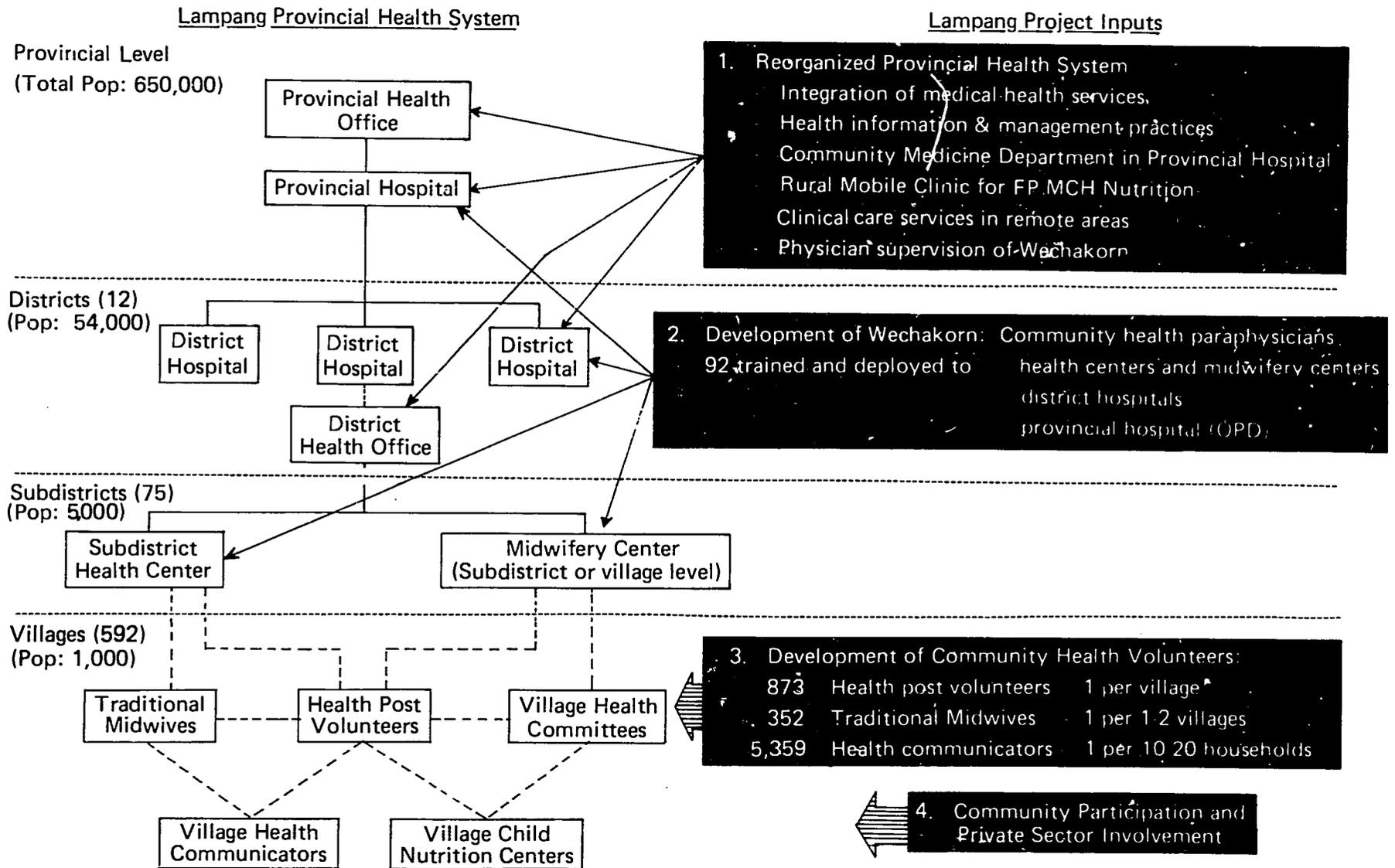


Figure 3 Lampung Provincial Health System and the Inputs of the Lampung Health Development Project



INTRODUCTION AND SPECIAL ACKNOWLEDGEMENTS

The wechakorn, or community health paraprofessionals, of the Lampang Health Development Project, have made a substantial contribution to strengthening the government health service infrastructure in Lampang, particularly at the subdistrict level where the greatest gap occurred in the government's ability to provide integrated medical and health services. The Lampang Health Development Project mobilized and trained wechakorn from three types of existing government health personnel: nurses, midwives, and junior health workers (sometimes called sanitation workers). Most wechakorn are assigned to serve at the subdistrict-level rural health centers, while some are assigned to the district hospital and a few are assigned to the provincial hospital to work as medical care screeners and family planning services providers.

At the rural health centers, wechakorn generally serve as the chief of the health center, supervising the work of other health personnel assigned there, providing integrated medical and health care services from the health center, and promoting local health programs through health center personnel and the health post volunteers and other elements of the primary health care networks in the villages of their respective subdistricts. The functional linkage between the wechakorn (and other health center personnel) and the health post volunteers and traditional birth attendants of the nearby villages is the basis for the partnership between the government health service system and the primary health care network which has evolved in Lampang.

Wechakorn were trained in a twelve month training program, organized by the Personnel Development Division of the Lampang Project, conducted at the Lampang Provincial Hospital and various district hospitals and rural health centers. Training staff included personnel from the Personnel Development Division of the Lampang Project, the Lampang Provincial Hospital, and the Faculty of Medicine, Chiang Mai University. The training approach was problem-oriented, and the methods applied were competency-based. About four months was allocated for the didactic phase which utilized twenty-four training modules, most of which are problem-oriented (with particular reference to those in Volume V on clinical care), and about eight months was allocated to the preceptorship phase which stressed competency-based approaches, learning by actual on-the-job practice under the direct supervision of a physician or of other health care providers at the respective training sites. This type of problem-oriented, competency-based training was found to be effective for all three types of health workers – nurses, midwives, and junior health workers – who entered the wechakorn training program. The best work attitudes and the lowest attrition rates, for rural health center wechakorn, however, were observed among those who had formerly served as midwives and junior health workers.

The twenty-four training modules contained in Volumes V and VI of the Lampang Health Development Project Documentary Series were written originally in the Thai language by personnel of the Lampang Project Personnel Division, the

Lampang Provincial Hospital, and the Faculty of Medicine, Chiang Mai University. In the early planning phase, technical assistance was provided by the Health Manpower Development Staff of the University of Hawaii for the orientation of authors and training of trainers. Following several revisions of the Thai-language modules during the course of the wechakorn training program, the materials were then translated from Thai to English for potential benefit to others, outside of Thailand, who are planning and implementing similar paraphysician – or mid-level medical and health care provider – training programs.

The major credits for Volumes V and VI have been earned by the original authors of the Thai-language modules and those who worked on the subsequent revisions. These professionals are listed as Contributors to Volumes V and VI in the following pages. Special acknowledgements are deserved by all those who participated in the extensive work of translating the Thai-language modules into the English language and reviewing of the modules.

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TABLE OF CONTENTS

DEDICATION	II
DOCUMENTARY SERIES OUTLINE	V
ACKNOWLEDGEMENTS	VII
FOREWORD	VIII
PREFACE TO DOCUMENTARY SERIES	X
INTRODUCTION AND SPECIAL ACKNOWLEDGEMENTS	XVII
CONTRIBUTORS TO VOLUME VI	XXI
VOLUME VI: TRAINING IN PUBLIC HEALTH	
MODULE 14 - PUBLIC HEALTH ADMINISTRATION AND PRIMARY HEALTH CARE	1
MODULE 15 - COMMUNITY HEALTH SERVICES: ORGANIZATION, MANAGEMENT AND SUPERVISION	17
MODULE 16 - MATERNAL AND CHILD HEALTH CARE	55
MODULE 17 - FAMILY PLANNING	101
MODULE 18 - NUTRITION	129
MODULE 19 - DENTAL HEALTH	159
MODULE 20 - ENVIRONMENTAL SANITATION	181
MODULE 21 - STATISTICS	203
MODULE 22 - EPIDEMIOLOGY	233
MODULE 23 - COMMUNICABLE DISEASE CONTROL	251
MODULE 24 - HEALTH EDUCATION	263

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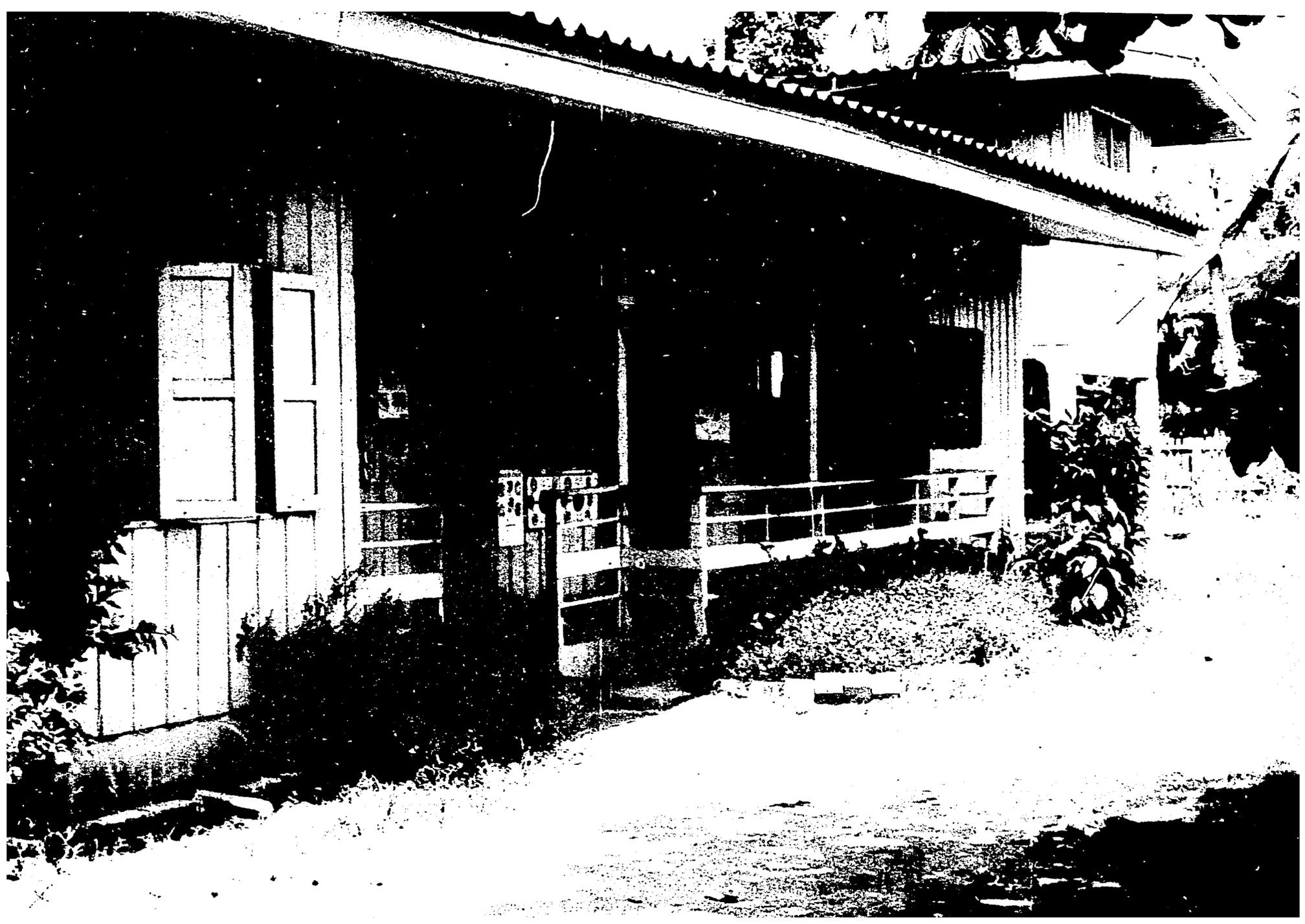
MODULE 14
PUBLIC HEALTH ADMINISTRATION
AND
PRIMARY HEALTH CARE

CHOOMNOOM PROMKUTKAO, M.D., DR. P.H.

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7





MODULE 14

PUBLIC HEALTH ADMINISTRATION AND PRIMARY HEALTH CARE

1. INSTRUCTIONAL OBJECTIVES

On completion of this course, the wechakorn will have an understanding of public health administration in developing countries, in general, and of the public health administration and primary health care system in Lampang Province, in particular. Specifically, the wechakorn will be able to:

- (1) Explain general systems of public health administration,
- (2) Explain the public health administration system established in Lampang Province by the Lampang Health Development Project,
- (3) Explain the organization chart for the Lampang Provincial Health Care System,
- (4) Explain the health information management system of Lampang Province, and
- (5) Explain the primary health care innovations of the Lampang Health Development Project.

2. INTRODUCTION

Public health personnel deployed at all levels must know about public health administration as it relates to their responsibilities so that the administration or the operation of the system can be carried out properly and efficiently according to the objectives of each organization within the system.

There are many definitions of administration. For example:

- "Administration is a process by which the potentials of man and of materials are synthesized and activated for the achievement of defined goals".
- "Administration is the guidance, leadership, and control of the efforts of a group of individuals toward some common goal".
- "Administration is the planning, facilitation, execution, evaluation and control of services".
- "The purpose of administration is to get the required job done with the least possible expenditure of time, energy and money that is consistent with the agreed-upon quality of work".

There are also many definitions of public health. The most popular one is: "Public health is the Science and Art of preventing disease, prolonging life, and promoting physical and mental health and efficiency through organized community effort for such programs as the sanitation of the environment, the control of communicable infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing ser-

VICES for the early diagnosis and preventive treatment of disease, and the development of the social machinery that will ensure to every individual in a community a standard of living adequate for the maintenance of health, so organizing these benefits as to enable every citizen to realize his birthright of health and longevity". (Winslow)

Public health administration is the organization and management of health facilities to achieve the desired goal with the least expenditure.

The component functions or activities involved in administration are: planning what needs to be done; organizing the formal structure of the agency; staffing the agency; directing the work of the agency and making decisions relating thereto; coordinating all staff activities; reporting to the executive and through him to those to whom he is responsible; budgeting and all other aspects of fiscal management and control (POSDCORB). The characteristics of the administrative process include (1) decision making, (2) programming, (3) communicating, (4) controlling, and (5) reappraising.

Public health administration is a continuous process of management and its complexity relates to various levels of administration – the higher the level of administration, the more complex it becomes. The style of management, of course, changes according to the community situation and the objectives of the organization. Among administrative skills, human or social skills are of utmost importance in management.

In organizing medical care or public health service programs, it is important to recognize that medical care for the majority is a perceived need that must be met. The approach must be based on the situation and be economically oriented. The quality and the quantity of service is of primary importance. Service must be available close to the villagers' homes. Other health services should be planned by the villagers with the support of government health agencies. Besides clinical and administrative roles, a district hospital doctor also trains and supervises health team members as well as health post volunteers. Furthermore, drugs, equipments and techniques used must be appropriate so that a community will accept, support, and help maintain health programs. A community cannot be developed rapidly if a health program functions in isolation; health programs must be an integral part of local multisectoral programs geared to the total development of the community.

3. PROVINCIAL HEALTH ADMINISTRATION AND THE LAMPANG PROJECT

The basic administration unit in the country is the province. Each province has a provincial health organization headed by a Provincial Health Officer who is directly responsible to both the Provincial Governor and the Undersecretary of State in the Ministry of Public Health. The Provincial Health Officer is officially in charge of both the provincial health office and the provincial hospital, and he provides for technical guidance to the network of rural health cen-

ters. There was previously a clear separation between the provincial hospital, which provided predominantly curative care, and the provincial health office, which was responsible for technical guidance and logistics support for the network of rural health centers which provide some curative, but mostly preventive services.

The Lampang Project has the following key features:

(1) Reorganization and strengthening of the provincial health service infrastructure by:

(a) Integrating the curative, disease prevention, and health promotion services, and coordinating and administering them under a single provincial health administration;

(b) Establishing a Department of Community Health Service within the Provincial Hospital; and

(c) Improving management and supervisory practices, in part by developing a practical management information system.

(2) Development of community health paraphysicians (wechakorn) to extend skilled curative services to all rural health centers.

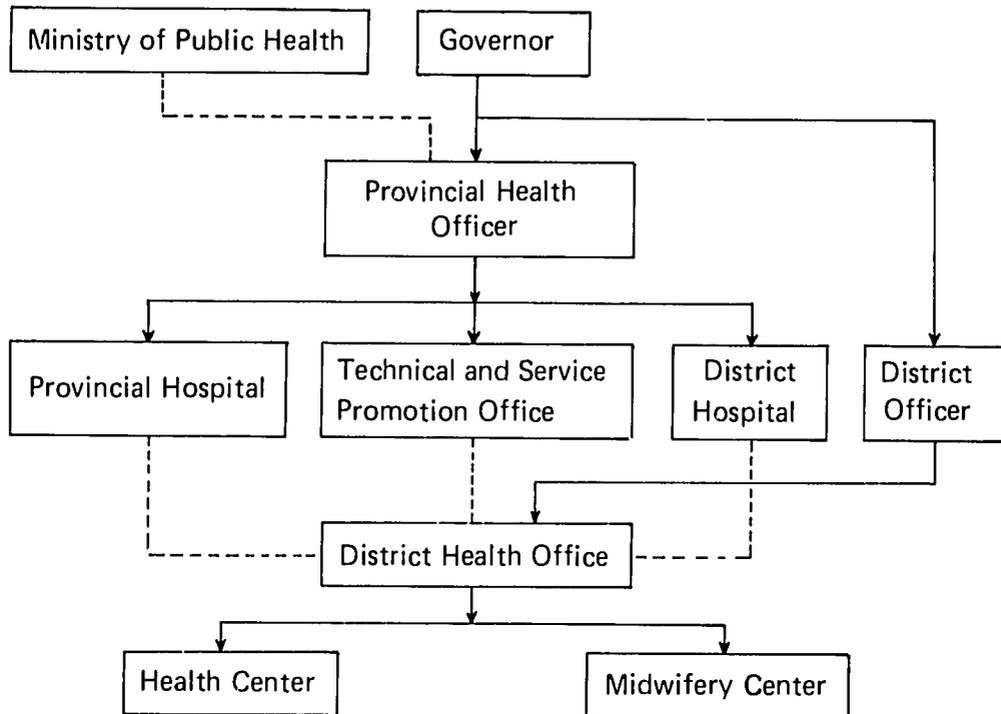
(3) Development of three types of community health volunteers for every village of the province. At least one health post volunteer and, where available, one "traditional birth attendant" are trained, making primary health care service and nonprescription drugs accessible in every village in the province. Health communicators are trained to assist the health post volunteers to provide advice, referral, and health information to every household.

(4) Stimulating community and private sector involvement. Community participation and support is actively sought through the formation of "village health committees", whose function is to select the volunteers and to provide local support to them once the volunteers are trained. The private health sector, such as drug stores, private clinics, private hospitals, and other private organizations participate in assisting the provincial health office and, collaboratively, providing services for community development. In addition a provincial coordinating committees at the provincial level and district advisory committees at the district levels are appointed, and "tambon councils" are oriented.

4. ADMINISTRATIVE RELATIONSHIPS BETWEEN MINISTRY OF PUBLIC HEALTH AND MINISTRY OF INTERIOR

The government administration is strongly centralized. One of the most powerful ministries is the Ministry of Interior, which has a strong governing unit throughout the country and reaches the lowest levels of administration. The Governor is responsible for the overall administration of a province and, under him the District Officer is responsible for the overall administration of a district. These two key personnel are appointed by the government at the central level. The Provincial Health Officer and the District Hospital Doctor

are appointed by the Ministry of Public Health. This may result in apparent dual authority and potential conflict, especially between the District Hospital Director (a doctor) and the District Health Officer or District Officer. The organization is shown as follows:



————— Administrative
 - - - - - Technical

Figure 14.1 Provincial Health Organization Chart

5. ADMINISTRATION OF PUBLIC HEALTH AT THE PROVINCIAL LEVEL

The provincial health administration involves three important units, namely the Provincial Health Office, the Technical and Health Service Promotion Office, and the Provincial Hospital. The overlapped authority of some health units creates administrative and coordination problems.

The provincial health office includes two units, an administration unit and a planning and evaluation unit, while the technical and health service promotion office has 6 units, including health promotion, communicable disease control, sanitation and environmental health, training and service promotion, medical services, and dental health.

The organization of the provincial hospital is divided into 6 units. These include general administration, technical services (including O.P.D., medicine, surgery, obstetrics and gynecology, EENT, anesthesiology, psychiatry, pathology, radiology, rehabilitation medicine, dentistry, pharmacy), nutrition, nursing, public health laboratory, and community health service.

6. PUBLIC HEALTH ADMINISTRATION AT THE DISTRICT LEVEL

Public health administration at the district level involves the district hospital and the district health office. The district hospital is directly under the provincial health office, while the district health office is under the district office of the Ministry of Interior.

The functions of the district hospital are primarily to provide curative services for the population and to coordinate with the District Health Officer in providing technical supervision and other supportive services for the health centers and midwifery centers.

The district hospital includes an administration unit, medical care unit, health promotion unit, sanitation and communicable disease control unit and, when possible, a dental health unit. The district health office is officially responsible for health centers and midwifery centers. The district health office is staffed by a District Health Officer whose background is most frequently that of a sanitation worker. Sometimes he is assisted by a Deputy District Health Officer or District Health Coordinator. The subdistrict health center is staffed by a wechakorn, a sanitary worker, a midwife, and a nurse aide. Wechakorn can be either a sanitary worker or a midwife. The midwifery center is usually staffed only by a midwife. Both the health center and the midwifery center provide basic health services at the tambon or subdistrict levels. The major activities include administrative work, provision of medical and health services, training and supervision of community health volunteers, supervision of volunteers and other work as assigned. They are the key personnel in providing logistic support and supervision to community health volunteers.

7. MANAGEMENT INFORMATION AND SUPERVISION

The district hospital receives supplies allocated yearly from the provincial health office as budgeted by central administration at the ministerial level, and it also receives administrative supervision from the provincial health office, specifically the technical and health service promotion unit. It receives technical supervision from the Department of Community Health of the Provincial Hospital. The district health office provides technical and administrative supervision as well as supplies to health centers and midwifery centers, the district hospital provides technical guidance and supervision to health and midwifery centers. The volunteers receive technical supervision from the assigned health center or midwifery center. However, supervision from health and midwifery center personnel can only be assured when personnel competence, incentives, transportation, and appropriate responsibility and authority are provided and are fully supported by senior administrators.

The evaluation and monitoring of health programs is an integral part of public health administration. Health information for routine activities feedback should be clearly channeled. Reports and statistics should be routinely

analyzed and the information summarized for practical planning and evaluation. The health information management system established for the Lampang Project is as follows:

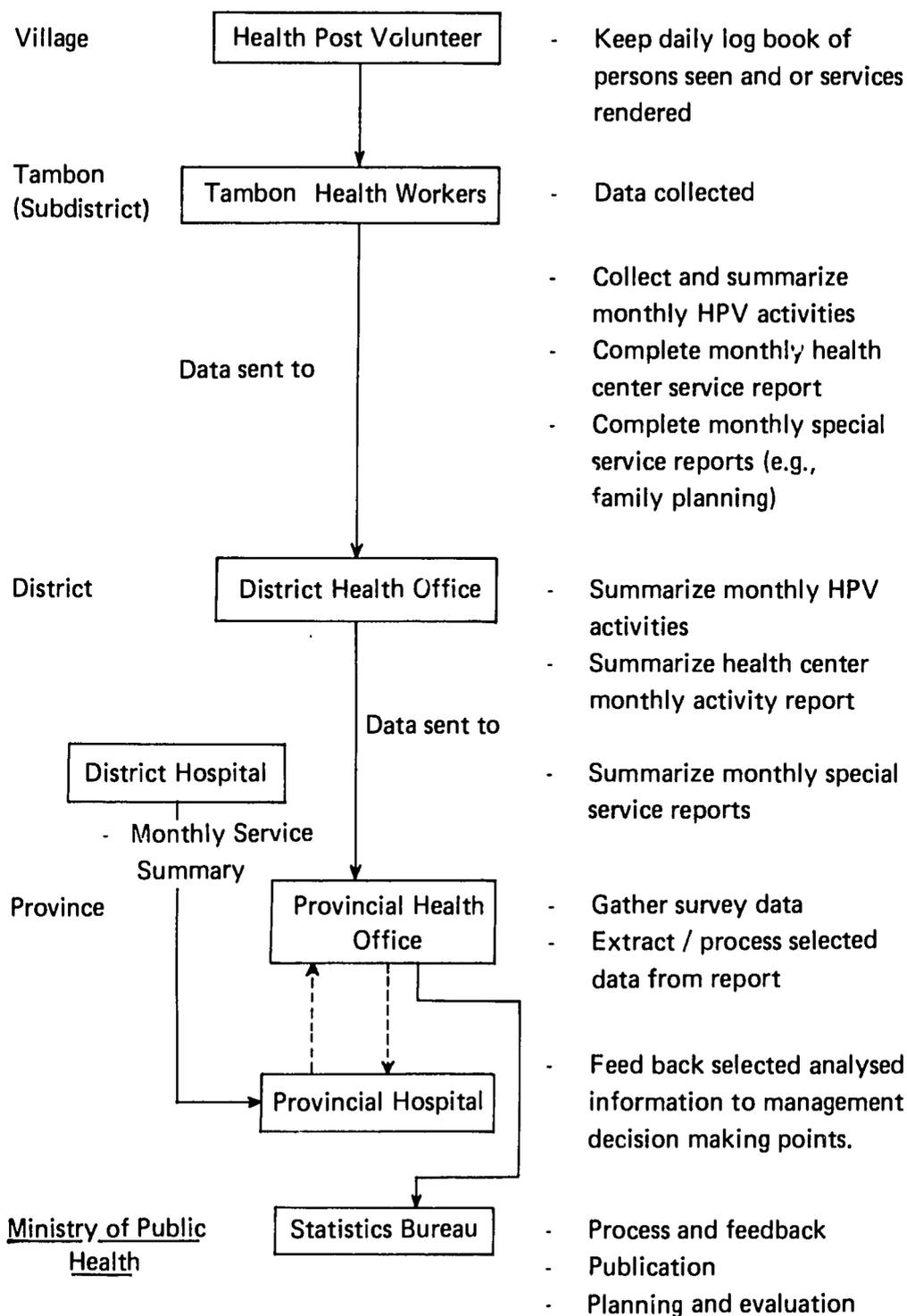


Figure 14.2 Health Information Management System

8. REFERRAL SYSTEM AND SERVICES

The village level community health volunteers (HPV, TBA, VHC) provide primary health care services for villagers under the support and supervision of the village health committee, the tambon council, and the local health personnel (wechakorn, sanitary workers, or midwives). Complicated cases beyond the capabilities of these personnel are referred to the health center or midwifery center and later to the district hospital or provincial hospital, as indicated. The health center as well as the midwifery center provides basic health services, including medical care, mother and child health care, family planning, communicable disease control, health education, school health services, sanitation, nutrition, laboratory, statistical data and reports and household drugs promotion. The district hospital provides primary medical care and some secondary medical care, while the provincial hospital provides secondary medical care and some tertiary medical care. Health promotion and disease prevention services are emphasized more at peripheral health units, while curative services are emphasized at higher level health units, where there are more sophisticated facilities. This system provides a two-way referral system, as shown below:

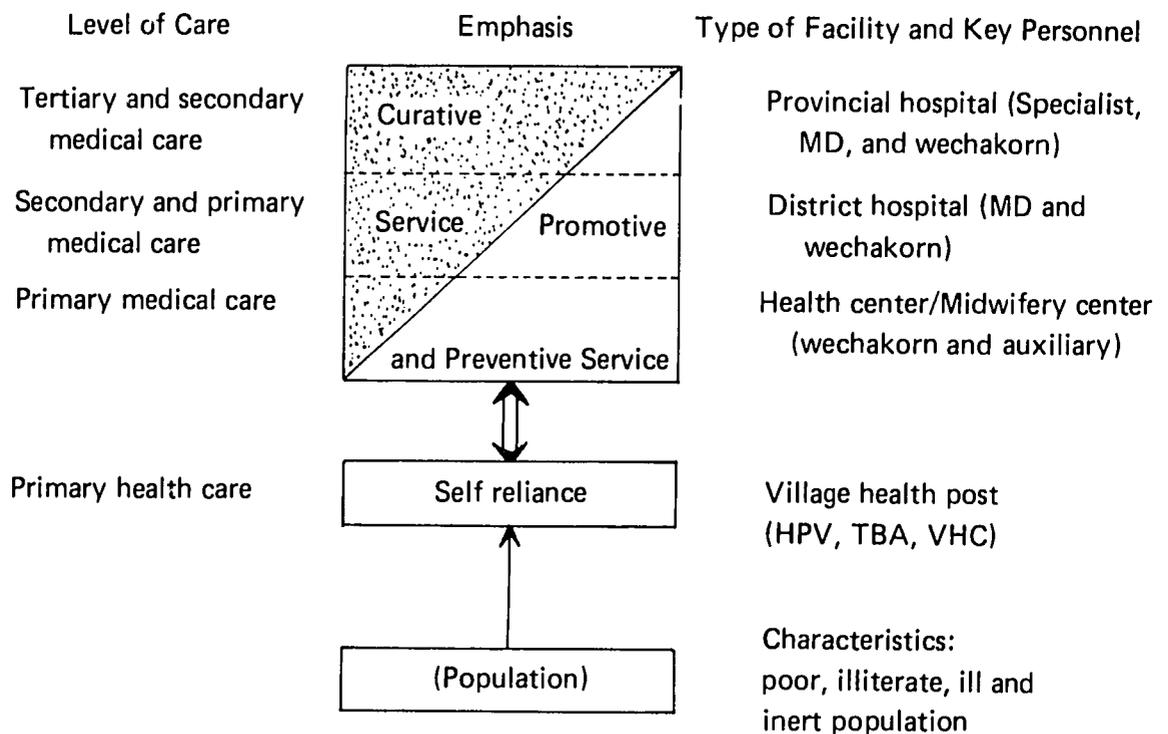


Figure 14.3 Levels of Care Available at Various Types of Facilities and Referral System

As can be seen above, patients must flow through, or be referred to the appropriate level of health care according to the seriousness or complexity of their illnesses and the availability of existing health facilities. Comprehensive care focuses not only on the patient's illness but also on his family, his commu-

nity, and his environment. Therefore, this kind of care requires a health team consisting of the community health volunteers, the wechakorn and other paramedical personnel, and physicians, both generalists and specialists. A referral system is effective only when coordination, the recording system, professional competence, and human relationships are optimal.

9. PRIMARY HEALTH CARE

Health resources in Thailand are very limited and they are mostly available in big cities. Rural areas face major health problems, although most are preventable, such as infectious diseases and malnutrition. Rural areas have poor health service coverage and a shortage of trained curative health personnel. The Ministry of Public Health has attempted to alleviate the situation by launching pilot projects such as the Pisanulok Projects and the Saraphi Project and demonstration projects, such as the Lampang Project. The Primary Health Care approach is used to help a community organize its available resources for health and community development and intervention programs as desired by the community itself, and linked to government health services for needed support and technical supervision. The trial of utilization of village volunteers in health programs has been attempted for many years, and progress has been satisfactory. The World Health Organization coined the term "primary health care" and promotes it throughout the world. Thailand defines "primary health care" as follows:

"Primary Health Care is a public health approach to the integration of health promotion, disease prevention, medical care, and rehabilitation through community involvement and cooperation with the government sector for achievement of health objectives, using basic resources mostly from the local area and appropriate technology which integrates easily into the daily life, culture, tradition, and society of the local population, and results in resolving health problems of acute perceived need. Its implementation is connected to the overall local development activities and to the public health service system's support of those activities, acceptance of referrals from the local area, and strengthened communication with the local population".

Guidelines for consideration in implementing local primary health care (PHC) programs are as follows:

- (1) PHC should be consistent with everyday life, culture, tradition, and social conditions of the local community.
- (2) PHC should be connected with government health services through reliable and consistently supportive logistics and referral systems and through strengthened communications.

- (3) PHC should promote and connect with other local development activities such as agriculture, education, etc.
- (4) Local people should participate in identifying local health problems and join in setting up appropriate health activities to meet the needs of the community.
- (5) Resources available in the local area should be suitably utilized for PHC in connection with an appropriate health technology which is inexpensive in cost.
- (6) PHC should be implemented in such an integrated pattern that it should be fitted to the needs of local people, emphasizing health promotion, disease prevention, medical treatment, and rehabilitation in that order.
- (7) PHC activities should be conducted primarily by local personnel who are suitably trained.
- (8) PHC activities should be carried on with all due regard to the security, safety, and unity of the whole country, especially in sensitive areas where an opposing ideology is trying to intervene.

The Lampang Project uses 3 kinds of community health volunteers – the health post volunteer (HPV), the village health communicator (VHC), and traditional birth attendant (TBA) – to help their neighbors with support from the village health committee, tambon council, and local government health personnel. Health communicators and health post volunteers are selected by the village health committee or by village leaders with the assistance of local health personnel. Optimal utilization of village health volunteers depends on proper selection, adequate logistics and technical guidance, and acceptance and encouragement from health team members.

Thailand has experienced some problems of logistics; therefore, some provinces have tried to apply the “health cooperatives” concept in creating community support and self-reliance. The result is quite promising.

The overall comparison of the shortage of health facilities before and after the introduction of the PHC approach using village health workers and wechakorns can be shown as follows:

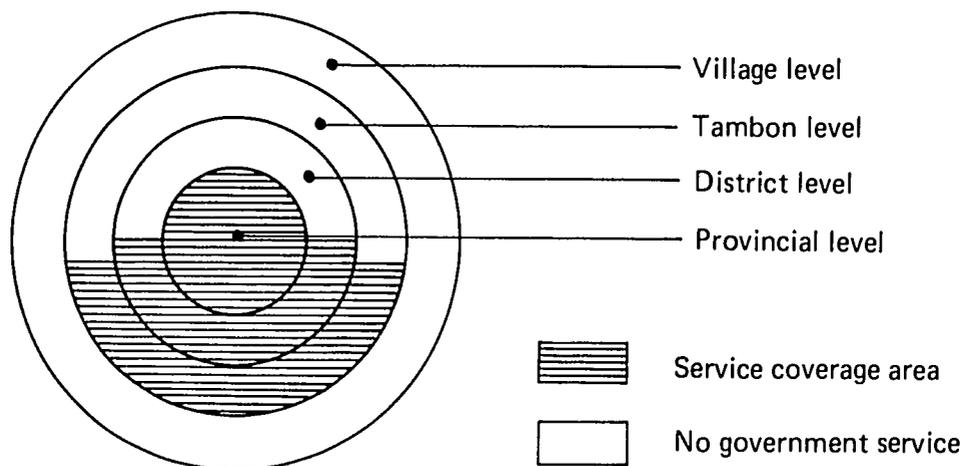


Figure 14.4 Availability of Health Services Before Implementation of the PHC

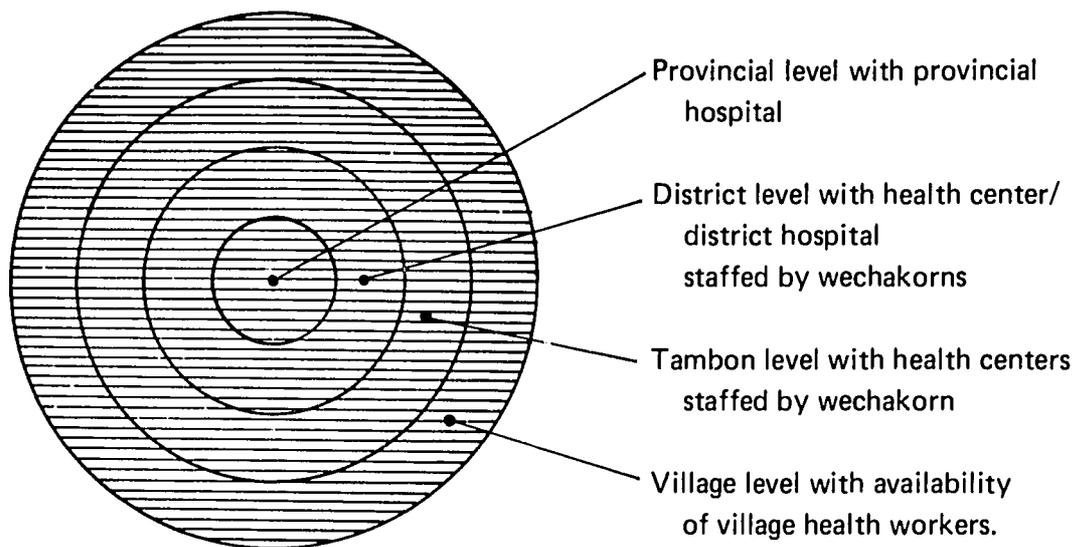


Figure 14.5 Availability of Health Services After Implementation of the PHC Approach

It is believed that the primary health care approach will bring "Health for all by the year 2000," because primary health care workers and government peripheral health units jointly provide the basic health needs of a community, including nutrition, health education, safe drinking water, immunizations, simple medical treatment, essential drugs (both modern government household drugs and traditional medicines and herbs) mother and child health care, family planning, environmental sanitation, mental health services, control of endemic diseases and drug abuse, and dental health programs. These services will meet the needs of a community.

10. EVALUATION

The health services administration should evaluate its impact to see whether it has achieved the objectives or not. Before the evaluations the organization must have clear and measurable operational objectives or targets. If the objectives, the targets, and the criteria are not clear, the evaluation will be of little value or cannot be done at all.

In addition to indicating whether the organization has achieved its targets, evaluation also helps to indicate problems of program implementation and of the health system itself. This is useful for planning improved methods, for setting new objectives and targets, and for monitoring the operation of programs. The evaluation can be conducted continuously, as in the management information system, at different levels or it can be done periodically, according to the particular needs. The evaluation process may use persons from outside or within the organization, or both, but the evaluators must be objective and know or understand the organization very well.

10.1 Evaluation of the quantity of services

For example, the Lampang Province has set a target to provide D.P.T. immunizations to 70% of children aged below 6 years by the end of 1979. Therefore, the evaluation activity must determine what percent of his target population received D.P.T. vaccination by the end of 1979.

10.2 Evaluation of the quality of services

This can include such things as evaluation of the effectiveness and appropriateness of a method used. This may involve studies of those providing and of those receiving services. If a wechakorn at a health center cannot provide needed services because the cases are beyond his or her capability, he or she must refer the patient to the district hospital or provincial hospital. Evaluation questions would be: How many referrals are completed? How correctly and properly does the wechakorn treat patients (performance evaluation)? How much is his practice accepted by the community or by other health personnel (acceptance evaluation)? and, How often are cases treated by the wechakorn reviewed by a physician and discussed with the wechakorn, as this also reflects the quality of supervision.

10.3 Evaluation of impact

Evaluation of the impact of services to the community involves many indices such as birth rate, death rate, disease specific morbidity and mortality rates, or the measurement of community health status, such as nutritional status of children under 6 years of age.

A wechakorn who is head of a health center must exercise his authority responsibly and perform his technical skills competently so that both personal and community health services can be assured. Administrative skills, like clinical skills, are not inherent, they are learned, and perfected with practice.

MODULE 15
COMMUNITY HEALTH SERVICES
ORGANIZATION, MANAGEMENT, AND SUPERVISION

ANAND CHAROENPUKDEE, M.D.

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MODULE 15

COMMUNITY HEALTH SERVICES

ORGANIZATION, MANAGEMENT, AND SUPERVISION

1. INSTRUCTIONAL OBJECTIVES

On completion of this course, the wechakorn will be able to:

- (1) Describe the role and functions of wechakorn in developing community health services,
- (2) Describe the role and functions of other health service personnel and of community health volunteers (health post volunteers, health communicators, and traditional birth attendants) in developing community health services,
- (3) Provide technical guidance and support to other health workers in community health programs, and
- (4) Provide technical guidance and technical support to village health committees and village health post volunteers in conducting local health activities.

2. RURAL HEALTH FACILITIES

Wechakorns will be assigned to work at health centers, district hospitals, or at the Provincial Hospital. Most wechakorn will be assigned to health centers usually located in subdistricts. Therefore, only health centers are discussed, but this discussion may be adapted to other situations.

The main problem wechakorn face is the need of villagers for curative services. Providing illness care services requires both medical knowledge and medical skills. Problems of inadequate budget, medical supplies, transportation, and other logistics, as well as the shortages of public health personnel can be obstacles to successful public health operations. Wechakorns should fully utilize community health volunteers as team members.

If a wechakorn has a problem he cannot solve with these resources, he must seek advice from a public health official at a higher level.

2.1 Organization of Health Centers

2.1.1 Personnel at health center. A health center usually has one wechakorn, one junior health worker, and one midwife (in some health centers there is also a nurse aide). The subdistrict health center is generally responsible for a population of 5,000. This small staff cannot provide regular or sufficient services of health promotion, disease prevention, or community development, unless assistance is secured from the community health volunteers.

2.1.2 Location of Health Center. Some health centers are located at considerable distance from the community. This makes it difficult to provide adequate services, especially if the villages in a subdistrict are widely separated.

2.1.3 Medical & Health Services. Because of the former limited knowledge and skills of health personnel combined with limited medical supplies and curative service, it is necessary for him to reestablish people's trust in such services, performing the needed service competently. The number of people using clinical care services will increase, however the wechakorn must also provide health promotion and disease prevention services.

2.2 Community Attitudes Towards Medical & Health Services

Generally when people are sick they buy drugs from drugstores, or go to unqualified local healers, or use services from private clinics; only a small number of people use the services provided at government health centers. The reasons for this are that the public health personnel's skill levels are low, there are not enough medical supplies, or there is no public health person available at the required time. Wechakorns must establish community trust and confidence in health center services, and they must seek more community cooperation. They must convince the public that community health services are of, for, and by the community.

2.3 Environmental Sanitation and Community Development

Important problems of environmental sanitation include housing sanitation, disposal of rubbish and excreta, the supply of safe water, and control of rats, flies, and mosquitos. It may take a decade to improve these sanitary conditions since improvement will depend on economic conditions, education, social development and other factors. The wechakorns should be able to take initiative in coordinating the work of various units for improving environmental sanitation and for other community development efforts.

2.4 Special Health Problems

Some communities have a high prevalence of specific disease problems, such as tuberculosis, diarrhea in children, leprosy, skin disease, parasitic infections, malnutrition, and so on. Wechakorns must provide services which are related to the particular problems of their communities and must find means to prevent such problems, in addition to providing health education and health promotion services.

2.5 Facilities and Equipment

Because the wechakorns may have to practice at newly opened health centers, they must know how to arrange the facilities and equipment in a way suitable for the work to be done. Improving the facilities and equipment may require cooperation, and perhaps even donations, from people in the community.

3. PROBLEM AREAS IN PROVIDING SERVICES

3.1 Health Service Personnel Training

Because the wechakorn will probably be more highly qualified than other personnel of the health center, he must attempt to organize training for

working colleagues in order to improve their knowledge and ability to assist in providing necessary health services. Such training can be in the form of “learning by doing”, that is, on the job training, or in the form of short courses. The wechakorn can, of course, ask for assistance from his supervisors or from the provincial health office or other organizations in providing this training.

3.2 Provision of Appropriate Services

The provision of health services should meet the particular demands of the community. Service schedules and time allotments should be flexible to meet the needs of all the people. Curative services should be used as the “opening edge” for introducing a range of needed public health service operations.

3.3 Provision of Equipment and Medical Supplies

Equipment and medical supplies must be both adequate and appropriate for the capacity of the health facility. The wechakorn may contact the subdistrict council and other government and private organizations for assistance in securing equipment and supplies.

3.4 Conducting Public Health Programs

The wechakorn must be actively involved in planning and conducting campaigns to solve public health problems. For example, vaccination programs for diphtheria, whooping cough, and poliomyelitis; programs to provide safe water supply; and, attempts to control mosquitos and rats are all activities requiring the best efforts of the wechakorn. He should coordinate these efforts with school officials, village scouts, young men’s and women’s associations, and other local groups and agencies.

3.5 Community Health and Development Activities

The wechakorns must understand community organization and the social mechanisms of rural society. They should apply their knowledge of anthropology and sociology in rural community development for progress in, particularly, public education, occupation development, and other means for increasing family income. Wechakorn should help develop community awareness of their health needs and help to solve their health problems with available resources and appropriate technology. Wechakorn should provide full support in local community development activities.

3.6 Training of Community Health Volunteers

Wechakorns should help identify, select, and train community health volunteers to assist in various activities. Volunteers include health communicators, health post volunteers, traditional birth attendants, and others. After the training, the wechakorn should follow up by visiting the volunteers, providing encouragement and technical guidance, giving advice and helping to solve problems, recognizing the volunteers’ abilities, and acknowledging his or her achievements.

4. DEVELOPING HEALTH CENTER WORK SCHEDULE

A wechakorn needs to establish a daily work schedule. A suggested daily work schedule is given below. This schedule, of course, can be adapted to suit individual situations and community health needs and demand for services.

Monday - Thursday

8.00 - 11.00	General Outpatient Clinic
11.00 - 12.00	List medical supplies Collect data Provide services on health promotion, disease prevention, and environment sanitation
13.00 - 14.00	Consult with staff in problem solving Train health personnel
14.00 - 15.00	Work on school campaign for specific health problem
15.00 - 16.30	Reporting Prepare equipment for use next day

Friday

8.00 - 11.30	General Outpatient Clinic
11.30 - 12.00	Clean and store equipment
13.00 - 15.00	Special Clinic (such as antenatal or postnatal care, family planning, mother and child health care)
15.00 - 16.30	Check supplies, drugs, equipment Reporting Prepare orders for supplies, drugs and equipment

5. ASSIGNMENT OF RESPONSIBILITIES

Providing public health services requires team work for optimum coordination and efficiency. The assignment of responsibility should be associated to the extent possible, with the assignment of authority. The assignment of duty and responsibility may be for such tasks as monitoring levels and ordering supplies and equipment, record keeping and reporting, conducting special campaigns as well as regular services, such as school health, community development, nutrition, immunization, and child nutrition centers.

The wechakorn must keep in mind that although he has assigned activities to his team members, he still has to take responsibility for such activities. He still must follow up to see how the team members are getting on with their jobs and how supervision and technical guidance should be provided.

6. DETERMINE COMMUNITY NEEDS AND DEMAND FOR SERVICES

6.1 Community Services

In providing public health services to the community, it is necessary to know what its problems are, what the community wants, how help can be given to the community, how to cooperate with other organizations, and what organizations are available to assist. Wechakorn must conduct surveys to determine community needs and demand.

One method of survey is to analyze patient registration cards or children's health cards. These cards provide information about disease problems in the community, and what kind of immunizations are required by children. The wechakorn may ask the villagers what services or facilities they want. For instance, do they want a village-based child nutrition center? What services should be provided by the health facility? What kind of family planning services are preferred? Also, the wechakorn may conduct community health surveys, such things as sanitation, water supply, waste disposal, housing conditions, nutrition and diet. Influential persons or groups in the community should be consulted concerning surveys and community health services.

6.2 Setting Priorities

It is well known that resources are limited, and that all problems cannot be solved at the same time. It is, therefore, necessary to set priorities for dealing with health problems. Villagers may feel that they seriously want certain services, but health personnel may think such services are not really necessary for the villagers. For example, villagers may want clinical care services to cure diarrhea or intestinal parasitic infection, but health personnel may think that the improvement of sanitation should be achieved on a priority basis.

In determining priorities, therefore, health personnel must consider each problem thoroughly. As a general principle, villagers first want curative services. Thus, health personnel must provide such services adequately and efficiently in order to provide effective treatment with dramatic clinical results and without complications. When medical care services are provided for diseases that destroy the local economy or disturb the daily routine of villagers, the provider of these services will be quickly accepted by the community and he can then expand services. The next step then, is to establish disease prevention or health promotion programs such as immunizations, improvement of water supply and waste disposal, and nutrition and health education. After that, a rural community development program for increased income and better education and health should be started with community participation.

7. ADMINISTRATIVE SYSTEM

The wechakorn is the chief of the health center and is responsible for all work of the health center. The wechakorn should also be close to the commu-

nity and village officials and other influential people who understand the problems of the community. In this way, health planning can be organized upwards from the subdistrict or village. After the plan has been prepared and the organization for implementation established, it must be presented to the district health officer, the director of the district hospital, and the provincial health officer. If any special information from the health center is required by the provincial health office, the administrative line must be followed by requests made through the district level (district health officer) to the health center so that efficient administration can be achieved and so communication breakdowns can be prevented.

As chief of the health center, the wechakorn must be the first person consulted regarding questions about the center. He must know what data are available in his area. He is the person who must help solve local difficulties of the health workers and midwives under his responsibility when they seek advice. The wechakorn must review and reports before presenting them to his chief or immediate superior.

We often find the problem that personnel lack interest in preparing reports. This may be because the person preparing the report lacks information or because of inadequate follow up. Wechakorn must follow up activities and know the results by enquiring himself, by writing letters, or by any other effective method. Follow up and knowing the results show the superior that the wechakorn is interested in his work.

8. HEALTH CENTER AND DISTRICT HOSPITAL AT THE SCOPE OF SERVICES

The wechakorn must be a leader at the health centers and the district hospital in providing integrated health services. On any one day, there are many activities within the health facility. There may be clinic services outside the facility, or there may be a mobile clinic going to the facility, or to places such as temples or health posts. The services of the health center or district hospital can be divided into services for individuals and services for the family and community.

8.1 Services for Individual Patients

Individual or personal health services include such things as the treatment of malaria, antenatal and postnatal care, family planning services, child health examination, and immunization. These can be either out-patient or in-patient services. If the wechakorn admits patients for treatment in the health center, personnel must be assigned to provide patient care, including preparation of equipment, rooms, and food for patients and their relatives.

8.2 Family Services

For example, if a wechakorn finds a case of tuberculosis, he must make a home visit to find out how many people live in contact with the patient or which other houses had contact with the patient. And who has received

BCG vaccinations. He advises the patient's family and other close contacts to have medical checkups. Or, if a wechakorn identifies children with serious malnutrition, he must visit those children at home to observe dietary intake and food habits of the family. Such observations are very useful for the wechakorn to advise in solving such problems properly.

8.3 Community Health Services

Community services include school health programs, improvement of environmental sanitation, community development, disease eradication campaigns, and community health education. Many of these services can be largely conducted by community health volunteers, but the wechakorn must be able to help in the organization and to work in cooperation with these volunteers. Therefore, there should be maps of villages or subdistricts and data showing population characteristics (sex, age, members). Maps should include symbols to identify locations of pregnant women, women practicing birth control, pre-school children with malnutrition, houses with and without sanitary latrines, health post volunteers' homes, health communicators' homes, traditional birth attendants' homes, and homes of persons with infectious diseases such as tuberculosis, malaria, leprosy. There should also be data showing births, deaths, and infant mortality, and data on the target populations and program targets for planned services for comparison each year with actual achievement. Such information will enable all those concerned to easily understand the situation of the community and the health service achievements.

9. ADMINISTRATION OF HEALTH CENTERS

As chief of the health center, the wechakorn is responsible for such administrative services as the acquisition of supplies and medical equipment, recording and reporting, financial management, rating staff on performance, and supervision of health center worker, including organization of working schedules. Since the wechakorn has to perform many duties, he must assign some responsibilities to other personnel; for instance, the midwife could be responsible for finance, the junior health worker for general administration, and a nurse aide for supplies.

9.1 Leadership Principles

So that colleagues will clearly understand his position and duties, the wechakorn must have an official letter or order from the appropriate health authority, stating that the wechakorn has been appointed to practice at the specified health center, that he has received training and practice, and that he has been assigned to be in charge or to be chief of the health center. This official letter or order must be shown to all the personnel of the center.

The health center to which the wechakorn is assigned may have nurses, junior health workers, or midwives who have been working there for a long time; thus, there may be some feeling of jealousy that the government has appointed the wechakorn as chief of the center. The wechakorn should

attempt to politely but firmly explain that the government's objective and their common objective is to improve health services. The wechakorn should then encourage (and enforce) that all health personnel cooperate in working as a team without creating any barriers.

The wechakorn must develop the characteristics of a leader and he or she must be able to motivate village leaders, especially the village headmen to cooperate and support activities which will improve the health status of villages and community development of the village. The wechakorn must explain the objectives of his or her job. He or she must ask for cooperation, advice, suggestions, and comments in operating his or her project.

The wechakorn should find an opportunity to meet with the health officer for discussions of his or her duties and the projects planned for the community. He should also ask for comments and advice from his working colleagues. A wechakorn starts being a leader at that moment, but he must remember that politeness, sincerity, and flexibility are the main important principles to which he must adhere.

9.2 Defining Working Relationships and Job Descriptions

The wechakorn must clearly assign duties to health center workers. For example, if a junior health worker received training in sanitation, this type of work should be his principal assignment. Of course, the junior health worker must have sufficient knowledge to perform such a job effectively.

Do not assign duty in a way which may cause misunderstanding. The time for job assignments should be as soon as the wechakorn knows who is good at doing what. Do not put off making job assignments so long that personnel get bored with waiting. After assigning duties, the wechakorn should follow up regularly so that personnel can have confidence that their work is understood and appreciated.

The wechakorn must clearly write down details of program implementation, personnel on duty, schedules and working hours, service data, and duties of each person. If job descriptions are written, each person can understand their duties clearly, as well as the policy of the wechakorn. Clear job descriptions will avoid confusion and rather promote cooperation and coordination.

9.3 Developing Work Schedules

Personnel sometimes waste too much time. They may come to work late or go to lunch and do not come back. Although this may not seem to be a big problem, the consequence can be that personnel are not available when needed to see patients, or to see that children are weighed and receive vaccinations. The organization of work schedules should be done in consultation with the personnel. After reaching agreement, follow up to ensure adherence to the schedule.

9.4 Providing Encouragement and Moral Support

The wechakorn should listen with interest to problems raised by his personnel and should give advice as freely as possible. Sufficient time should

be given to each specific problem. The wechakorn should acknowledge the efforts of his personnel and should compliment them for good performance. But, he should always express compliments to working colleagues with sincerity. If he has any comments or suggestions for his colleagues, he should politely remind them that they are all part of the same health team, working "hand in hand" for the improvement of the community.

The wechakorn must regularly organize meetings for consultation with personnel, and he or she must try to attend every meeting. He or she should listen to new ideas and try experiments suggested by personnel which may create improvements.

The wechakorn should take an interest in the personal lives of his working colleagues, and should provide some assistance when this is not in conflict with the rules. He should have an informal relationship with his working colleagues and, at the same time, should always be fair with them.

The wechakorn should give compliments or prizes to outstanding personnel and reprimand those who perform wrongly. Finally, the wechakorn should provide pre-service orientation or in-service training for every new worker.

10 GUIDELINES FOR PROBLEM SOLVING APPROACH

Some problem-solving approaches are mentioned including difficulties from health colleagues, patients or their relatives, location of the health center, community leaders, and vehicle.

Wechakorns face difficulties from health officers, or from nurses, midwives or sanitarians who are under their responsibility

<u>Problem Faced</u>	<u>Background Reasons</u>	<u>Solution To Problem</u>
Wechakorn faces difficulties from his personnel or other subordinates	Existing personnel refuse to accept wechakorn as their boss	Existing personnel have to be trained and supervised by wechakorns when they have not received sufficient training or when there is nobody else to provide advice or suggestion or explanation on curative treatment
	Yes → Existing personnel want to have authority in that health center and do not want any change.	
	No ↓	
	Wechakorn is not local person.	Existing personnel who might be trained and supervised by wechakorn should be advised before that the acceptance of advice or the acceptance of the chief is good and that the chief need not to be a person from the local area.
	No ↓	
	Wechakorn who is from other profession, may have lower socioeconomic status than existing personnels.	Existing personnel should be told that they should have a good attitude toward the chief although he is from another area or from a different socioeconomic status

Conflict

Existing personnel who used to perform duty as chief does not want changes.

Wechakorn may not be a local person. Existing personnel may be from different areas and wechakorn may have lower socio-economic status than other personnel.

First Attempt to Solve Problems

Wechakorn informs personnel that he is assigned to take responsibility for all personnel and their duties.

Explain about profession/duty/responsibility/relationship. Ask for cooperation from village headman for introducing wechakorn to villagers.

Existing personnel (junior health worker or midwife) refuses to accept wechakorn as chief or supervisor.

Second Attempt to Solve Problems

Ask provincial health officer or representative to contact the health center again, either by writing a letter or by visiting.

Ask for assistance from provincial health officer, village headman or influential persons in community.

Required Problem Solving

Provincial health officer must again confirm the wechakorn's position and duty either by writing or by a visit.

Assign duty to existing personnel to work under wechakorn's supervision. Duty must agree with the interest and skill of these personnel. Wechakorn should convince other personnel through reason to accept his ideas.

Prevention

Be sure that provincial health officer or his representative has contacted the health center before wechakorn's deployment. In some cases the visit of provincial health officer is necessary. Wechakorn's position and responsibility must be understood by all before deployment. Wechakorn must treat working colleague as friends as well as professional colleagues. Wechakorn must be aware of problems which arise and must take action. Wechakorn should provide medical and health services as needed by a community. Community demand must be fully recognized.

People try to use service at all times or ask for use of transport

<u>Problem</u>	<u>Reason</u>	<u>First Attempt to Solve Problems</u>	<u>Second Attempt to Solve Problems</u>	<u>Required Problem Solving</u>	<u>Prevention</u>
People try to use service at all times (do not come according to organized schedules).	People (or patients) want to use services when they are free and when it is convenient for them.	Wechakorn must serve strictly according to schedules. Outside of official hours, wechakorn will see only acute or emergency cases. Provide other services as stated in schedule.	Wechakorn consults with village headman or authoritative person who can inform villagers.	Ask villagers to cooperate in using services according to organized schedules, unless it is very urgent.	If there is an ambulance or other transport, the use of such transport must be done in accordance with the policy and in case of emergency only.
People who live far from health center ask for use of transport which wechakorn has for taking patients to hospital.	To use transport of health center (if health center has transport or ambulance).	Consult with junior health worker and try to find out how serious a condition the patient has If it is necessary to use transport, permission to use transport is allowed. If patient is a child, only mother is allowed to accompany on the journey.	Consult with administration personnel if it is proper to charge transport fee by asking village headman to use such money as a donation for the expense of transport. This must be done with careful consideration.		

Demand for a wechakorn to be stationed in another village

<u>Problem</u>	<u>Reason</u>	<u>First Attempt to Solve Problem</u>	<u>Second Attempt to Solve Problem</u>	<u>Required Problem Solving</u>	<u>Prevention</u>
The health center is located in one village and there is a demand for a wechakorn to be stationed in another village.	People want facilities and continuing care. Health post volunteers and health communicators want to have wechakorn helping their village.	Organize mobile unit to visit village regularly. Announce the organized schedules to authoritative personnel concerned, health post volunteers and villagers. Follow the mobile service policy strictly. Government tries to provide some assistance for emergency cases (such as transport, ambulance or even helicopter, in sensitive areas.) Use public relations programs.	Organize more training and talks for health communicators, health post volunteers to help them provide villagers with curative treatment. Health communicators and health post volunteers must try to increase their activities in their villages. Give more health education during the mobile clinic service. Improve communication system with health post volunteers. In some villages, a radio system may be used for medical consultation from remote areas.	People in the area under the wechakorn's responsibility feel that the medical and health services are adequately supported and supervised by the government.	Should consult with Provincial Health Officer. Provincial Health Officer or representative should consult with chief of administration in that area. Must be sure that health office has reported clearly on wechakorn's duty to district officer. For transport utilization (if necessary) must have agreement or permission from Provincial Health Officer. Effective public relations program.

Patients and/or relatives are not satisfied after wechakorn's treatment

<u>Problem</u>	<u>Reason</u>	<u>First Attempt to Solve Problem</u>	<u>Second Attempt to Solve Problem</u>	<u>Required Problem Solving</u>	<u>Prevention</u>
Patients and/or parents or relatives of patients do not recover or are not satisfied after wechakorn's treatment due to their misunderstanding or ignorance on medical problems and treatments.	Low educational background. Drugs or methods of treatment are new and unfamiliar to patients or relatives.	Explain to patients how wechakorn can help them . Compare the results of cases treated by traditional method and by modern method, with examples . Explain clearly to patients the treatment and how to use drugs.	Try to explain by using many easy examples. May use pictures or drawings in explanation for easier understanding . Give examples of patients who incorrectly treat themselves by pointing out the effects of such treatment and ask them to be examples for villagers. These patients must be persons whom villagers know.	Patients practice according to given advice, treatment, and the use of drugs. Patients recover or are cured.	Health education for people's understanding on what is going to be done. Health education should be conducted before wechakorn takes up his duty. Give health education in detail about intramuscular or intravenous injections. Explain how modern treatment can be used to cure sickness, prevent disease, and promote health.

Parents do not permit wechakorn to cure their children

<u>Problem</u>	<u>Reason</u>	<u>First Attempt to Solve Problem</u>	<u>Second Attempt to Solve Problem</u>	<u>Required Problem Solving</u>
Parents and/or guardians of children do not permit wechakorn to cure their children because they fear treatment and/or results of treatment.	Parents do not want their children to get hurt (example, from injection). Parents do not want to see their children suffer. Parents do not understand necessity of such treatment or vaccination.	Help parents to understand why treatment is needed. Explain that such treatment is necessary for maintaining life and health. Ask health auxiliary to carry baby without having parents around while treating baby. Explanation must be given to parents.	Give opportunity to parents to consider the treatment risks and results of treatment. Advise a child's parents to ask other children's parents whom wechakorn has treated with success. Ask village headman or respected person to confirm the talk with parents.	Parents or guardian of children help wechakorn or health center personnel including immunization and health promotion.

Indigenous medical practitioners refuse to accept wechakorn

<u>Problem</u>	<u>Reason</u>	<u>First Attempt to Solve Problem</u>	<u>Second Attempt to Solve Problem</u>	<u>Required Problem Solving</u>	<u>Prevention</u>
Indigenous medical practitioners refuse to accept wechakorn or tries to convince other people not to accept wechakorn.	<p>Indigenous medical practitioner may not know what the wechakorn is trained for.</p> <p>Indigenous practitioners may be affraid of losing their patients (and losing their income), including the loss of respect from villagers.</p>	<p>Invite indigenous medical practitioners to meet wechakorn and his team. Give them confidence that wechakorn and his team will provide curative services and other health services.</p> <p>Invite and practice as above. Use patient referral system, such as accepting patients referred by them. At first wechakorn may refer patient (depend on patient) who is believed to be suffering from superstitions or spiritual charms. The indigenous practitioners or spiritual healers will be recognized and can treat the patient psychologically.</p>	<p>Seek advice and consultation from indigenous healers, and leaders of community in order to solve this problem</p> <p>Seek advice and consultation as above, and retain the same practice in patient referral system as before</p>	<p>Personnel at health center and indigenous healers, cooperate with each other to work on public health activities of village. Accept patients who are referred by indigenous healers.</p>	<p>Wechakorn must introduce himself to indigenous medical practitioners and traditional healers, when he first arrives. It will be good if wechakorn is introduced either by village headman, community leaders or subdistrict council. Wechakorn must try to make indigenous healers and illegal practitioners understand that he will treat people with modern methods. Traditional healing methods can still go on without his objection.</p>

Patient referral system between traditional healer and wechakorn

<u>Problem</u>	<u>Reason</u>	<u>First Attempt to Solve Problem</u>	<u>Second Attempt to Solve Problem</u>	<u>Required Problem Solving</u>
Patient is taken to health center while in acute or serious condition and after indigenous practitioners can no longer cure the patient.	Traditional healers, herbalist, or other indigenous health practitioner gain prestige that they can treat all kinds of sickness, no matter how serious. Sometimes patients waste their time with those practitioners and go to see the wechakorn when it is too late to solve the problem.	Invite indigenous practitioners to health center and explain to them as above. Refer patients whose sickness is caused by psychological factors to indigenous medical practitioners, such as traditional healers, or spiritual healers. Patient referral system should be operated both ways, i.e , from indigenous healers to health center and vice versa, but the patients referred to indigenous healers must not be seriously ill.	Explain to village headman and local leader about collaborative roles. Should hold meeting with indigenous leaders to seek advice and consultation on problem solving. Emphasize early treatment. This should be mentioned when giving health education.	Personnel of health center and indigenous healers should cooperate in working on public health activities. Encourage indigenous practitioners to refer their patients who are beyond their ability to health center.

11. SUPERVISION

Supervision refers to the process which supports and controls work for implementation of policy and planning in order to achieve program objectives with maximum efficiency. Supervision is based on effective communication between a chief and members, done either directly or indirectly through the supervisor, for assistance or problem solving. The objective of supervision is to assure that the work is carried out according to the plan and that operation techniques are followed in order to achieve targeted results and to increase both quantity and quality of products.

The supervisors in Lampang may have a consultant role in providing technical guidance, but are not in authoritative line. Therefore they are not entitled to give any orders. For example, a supervisor gives advice on solving problems but should not solve problems for them. He gives support and advice without involving himself in authoritative exercises.

The supervisor should possess technical skills, human relationship skills, leadership skills and teaching skills. The supervisor should be technically capable, possessing broad knowledge and experience. For example he must know public service regulations, principles of administration, policy, plans and objectives of the organization, and statistical information. The supervisor must fully understand and have experience with the relevant health programs. It is necessary for him or her to have good human relationships, and to create respect, cooperation, and loyalty. His personal characteristics should include self-confidence, reasonableness and openness to compromise, adaptability to new situations, self-control, democratic attitudes, tolerance, equanimity, polite and well dressed, flexibility, possessing Bhromvihara 4 Buddhist doctrine (loving-kindness, compassion, sympathetic joy, and equanimity) he should be unselfish, optimistic, sympathetic, and should not create conflict with professional colleagues. He or she should also have leadership characteristics, including demonstrating wisdom and good personality. For example, assisting professional colleagues, being fair to everyone, devoting time to office work, and being unselfish. His characteristics in teaching are, for example, recognizing learning objectives, possessing knowledge of subject content, knowing the psychology of learning, selecting proper learning experiences and audiovisual aids suitable for the learning atmosphere and the trainees' backgrounds.

There are many techniques of supervision. Any single method, or many methods together, can be used. For example, inspection of "what is wrong" (not "who is wrong") and the promotion of staff efficiency by providing technical advice, creating new ideas and confidence, giving incentives and promoting staff morale. The supervisor should also provide support and logistics for routine activities, control quality and quantity of work, and coordinate activities between administrative and operations personnel.

After completing his duties, the supervisor should record the result of supervision on the proper forms and analyze data obtained from supervision in

order to write suggestions for the administrative division, which will be the means (or alternative) for future problem solving. Another thing is that the supervisor must go out often to provide regular supervision and follow-up.

<u>Number</u>	<u>Activity Supervised</u>	<u>Suggested Indicators</u>
1	Operational Planning	<p>1.1 The house listing and operation map. (How many households and how large is the local population?)</p> <p>1.2 The planning of medical and health services in the health centers such as antenatal care clinic, well baby clinic, family planning clinic, general clinic, first aid and other services.</p> <p>1.3 The planning of outside activities such as home visits, school health programs, supervision of volunteers, etc.</p> <p>1.4 The planning of follow up services such as pre-natal care, infant and pre-school children service, and services for referred cases.</p> <p>1.5 Yearly, monthly, weekly and daily plan or schedule.</p>

Figure 15.2 Supervision Guideline

<u>Number</u>	<u>Activity Supervised</u>	<u>Suggested Indicators</u>
2	Management of Office and Clinics, Map and Statistics.	<p>2.1 The environmental sanitation around health centers, including sanitation of toilet, water and waste disposal, and other environmental improvements and other as examples for villagers.</p> <p>2.2 Maintenance of fences, roads, flagpole, and demonstration vegetable gardens.</p> <p>2.3 Monitoring and procurement of supplies.</p> <p>2.4 Operation maps available.</p> <p>2.5 There are posters on health education which are suitable for place, time, and priority programs.</p> <p>2.6 There is up-to-date statistical information available.</p> <p>2.7 There are lists of all pregnant women in the area.</p> <p>2.8 There are weekly operation time tables.</p> <p>2.9 There is a listing of names of personnel and their activities.</p> <p>2.10 Equipments, instruments and medical supplies are well arranged in good order ready for use.</p>

<u>Number</u>	<u>Activity Supervised</u>	<u>Suggested Indicators</u>
3	Creativity, Leadership, and Responsibility	3.1 Ability to initiate new principles, strategies and techniques.
		3.2 Satisfactory work improvement and problem solving. Research ability and successful implementation of new project.
		3.3 Good intention and determination to work on assigned duty or problem with successful achievement.
		3.4 Willingness for assignment, and dependability.
4	Cooperation with Committee, Community and Other Organizations	4.1 Able to approach villagers and working colleagues at all levels.
		4.2 Receive cooperation from community and organizations.
		4.3 Able to practice health team concept.
		4.4 Increased health service utilization.
5	Human Relationship	5.1 Able to work with superior, professional colleague and subordinates.
		5.2 Able to contact, communicate or cooperate with community or relating organizations.

Figure 15.2 Supervision Guideline (cont.)

<u>Number</u>	<u>Activity Supervised</u>	<u>Suggested Indicators</u>
		5.3 Have good manners and be admired by people in general.
		5.4 Give assistance to other people as necessary.
6	Technical Skills	6.1 Preparation of medical supplies, clean and ready for use of equipments.
		6.2 Apply techniques in using instruments, equipment for services such as immunization, first aid, home visit, and school health.
		6.3 Possess knowledge on details of such services.
		6.4 Application of equipment for routine practice.
7	Records and Reports	7.1 Understand and able to record data, maintain registration cards, and correctly tabulate data and fill in reporting forms.
		7.2 Understand, complete, and submit monthly reports as appointed.
		7.3 Understand the supervisory system for health volunteers and supervise on health volunteers' record and report.

Figure 15.2 Supervision Guideline (cont.)

<u>Number</u>	<u>Activity Supervised</u>	<u>Suggested Indicators</u>
8	Administration, Finance and Bookkeeping	8.1 There are correct book keeping records, cash statements, and donations listed.
		8.2 Report of monthly expenses must be presented as appointed.
		8.3 There is record of official letters and they are well kept.
9	Maintenance of Medical Supplies, Equipment, Materials	9.1 There are suitable and safe spaces for materials, equipment, and instruments.
		9.2 Equipment is well maintained. All necessary equipment should be ready for use all the time.
10	Patient Referral System	10.1 There are records of patients referred and received, numbers of admissions, and a completed patient referral record including diagnosis, treatment and follow up.
		10.2 Number of referral or follow up cases.
		10.3 Number and plan of action for referred or admitted cases.

Figure 15.2 Supervision Guideline (cont.)

12. EVALUATION GUIDE FOR HEALTH CENTER WORK

The evaluation of health center work refers to the collection of medical and health information of a health center, and analysis of such information and its interpretation in terms of set objectives. This normally includes the following.

(1) Confirmation of the completeness and accuracy of data already collected.

(2) Reviewing the planning of medical and health services, including setting priorities and operational targets.

(3) Assessment of health information concerning community health needs, and the number of health personnel, facilities, supplies and equipment.

(4) Reviewing evaluation methods and indicators used. They should be clear, definite, and easily measurable.

12.1 Scope and Indicators of Evaluation

Guidelines for evaluation can consist of the following items:

— 12.1.1 Medical Health Services.

(1) The organization of the health service, departmentalization and functions.

(2) The number of health service units, their location and capacity. For example, how many health centers, midwifery centers, schools, temples, or village health volunteers are there?

(3) The standard of health services provided by that health service unit.

(4) Number of patients utilizing services per day including such things as number of postnatal and prenatal visits, well baby visits, and the immunization and family planning services coverages of the target population.

(5) Facing problems such as shortage of drug supplies shortage of medical equipment, shortage of personnel or inadequacy of training and supervision.

— 12.1.2 Attitudes of the Community Towards Health Services. This refers to the relationship of the community and the health personnel, to the attitudes of village leaders towards health officers, towards given services, and to the cooperation in the operation of the health center or hospital.

— 12.1.3 Environmental Health Conditions. This generally covers identification of local vectors, and sanitation of houses, food, water, market, garbage disposal, and water, air and land pollution.

— 12.1.4 Problems of the Community. This includes problems or problem resolution relating to culture, such as local superstitions, laws, and attitudes; problems of economics; problems of education; specific public health problems, as indicated by high morbidity and mortality rates, birth rates, death rates, and fertility rates.

— 12.1.5 Service of Health Facilities. This includes such indicators as coverage of target population; coverage of important problems; community ac-

ceptance and utilization of services; provision of adequate services; and service organization and technology.

12.1.6 Budget and Other Resources.

12.2 Reporting

The reporting of evaluation should be done and submitted periodically, containing sufficient detail, with suggestions or alternatives. A sample of a form used follows as figure 15-3. Completed reports should be sent to:

- (1) Supervisor.
- (2) District Health Officer.
- (3) Medical Director of the District Hospital.
- (4) Provincial Health Officer.

12.3 Conclusive Evaluation

The factors mentioned above can be useful guides for evaluation of service operations. They can also be indicators on how efficiently the wechakorn and other health workers are working. If there is any change occurring in his health center, the wechakorn should report to the person in charge so that the provincial health office and hospital director will know how health center and district hospital staff can help people in providing medical and health services. This evaluation can be an instrument to help the wechakorn to get some support from his superior.

Supervisor Position
 Location of Health Facility Number of Supervision/Year
 Day Month Year Number of Personnel

Activity Assessed or Evaluated	Total Possible Marks	Marks Received
1. Office Work		
1. Administration, Finance, Book-keeping	14	
2. Creativity, Leadership and Responsibility	12	
3. Cooperation	12	
4. Operational Planning	10	
5. Human Relationships	10	
6. Maintenance of Medical Supplies, Equipment, and Materials	10	
7. Management of Clinic, Office, Maps, Statistics	8	
8. Technical Services	8	
9. Records	8	
10. Patient Referral System	8	
Sub Total	100	
2. Quantity and Quality of Work		
1. Mother and Child Health	20	
2. Family Planning	20	
3. Immunization	20	
4. Nutrition	20	
5. Medical Treatment and Dental Health Care	20	
6. Supervision	20	
7. Sanitation	20	
8. School Health	16	
9. Health Education	14	
10. Community Development	10	
11. Laboratory	10	
12. Household Drugs Promotion	10	
Sub Total	200	
Grand Total	300	

Figure 15.3 Form for Follow up and Evaluation of Health Facility

13. GUIDANCE FOR WECHAKORN'S REPORT WRITING

13.1 Format

Normally there are reporting forms which must be submitted monthly or quarterly by the health center. Apart from these forms there are separate reports of each activity which are reported either in records or health center reports. Headings of reports which will be mentioned here for reports other than routine reports. If the person in charge indicates that the additional reports are necessary, they must be produced.

13.2 Content

Content of special reports which wechakorn may be asked to prepare include:

13.2.1 Health Problems. This refers to important problems, such as:

- (1) Number of patient suffering from specific communicable diseases, life threatening diseases, or other serious diseases.
- (2) Problems of environmental sanitation.
- (3) High risk problems.

Note : This is intended to quickly point out problems occurring in each area to the person in charge. It should not be used as a substitute for routine report required because it may create duplication or other problems with the routine governmental reporting procedures.

13.2.2 Training of Personnel.

- (1) Type of training and objective
- (2) Number, profession or duty of trainees
- (3) Place and equipment
- (4) Period of time used in training
- (5) Follow-up of trainees

13.2.3 Medical Supplies and Equipment

- (1) Type and Number of drugs on hand in dispensary room. How many drugs are available? How many drugs are on order?
- (2) Difficulties in transport and delivery (such as lack of vehicle, rainy season, loss of property, etc.)
- (3) Budget concerns.

13.2.4 Plans or Operations:

- (1) New programs or activities to be presented after the last report.
- (2) Progress of various programs or activities in operation.
- (3) Operations plan for emergencies such as flood and other disasters.

13.2.5 Special Problems:

- (1) Administration and personnel problems.
- (2) Transportation problems

- (3) Acceptance and attitude of community towards health center.
- (4) Other problems (if any)

4. REFERRALS FOR PATIENTS WHO CANNOT BE ADEQUATELY TREATED AT HEALTH CENTER

14.1 Place of Referral

As planned, complicated cases will be referred to district or provincial hospitals or private clinics. The wechakorn should fill in the referral form and follow up the case. Cases may be referred back to the wechakorn for follow-up treatment. The wechakorn can also refer the patient to health post volunteer and vice versa.

14.2 Time for Referral

(1) When diagnosis of patient's illness or treatment is beyond wechakorn's ability to provide with his knowledge, skill, and available facilities, equipment and supplies.

(2) When the patient's life is in danger and the patient needs more sophisticated treatment for survival.

(3) When the wechakorn thinks the patient should consult a physician urgently.

(4) When it is stated in the wechakorn manual and when it is ordered by the Provincial Health Officer or by another medical doctor.

(5) When the supervisor so advises.

To decide when to refer patients for further treatment, the wechakorn must consider these guidelines carefully. If possible, clinical observation for a short period of time may be helpful to determine whether to refer a patient. Experiences obtained from training and practice will be very helpful in treatment of emergency cases before proceeding with the needed referral. Do not hesitate to refer a patient when in doubt.

14.3 Rationale for Referrals

(1) The wechakorn is the person responsible for health activities of community and individual cases.

(2) If a case is referred late, the result may not be as good as it should be.

(3) If a patient should die, this may cause a professional or social problem and may even have legal implication.

(4) Appropriate utilization of health facilities is most cost effective (efficient).

14.4 How To Refer Patients

14.4.1 Transportation. In a remote area, the referral of a patient may cause problems because of inconvenient communication or there may be no transportation available to carry the patient. In this case, referral of a patient can be done either by renting a car or by providing a health center/district hospital vehicle. The patient should be requested to pay for car rental. The

district hospital may have a vehicle, but the health center has none. In case that vehicle is provided for patient referral, regulations should be strictly followed. Non-emergency cases can use the bus or other local transport.

14.4.2 Referral Forms. The format and content of patient referral cards is set forth on the following pages.

14.4.3 Follow-Up. After referring a patient with a completed form, the wechakorn should follow up and study the findings or results from the card which is posted to him by the referring health service unit. If the wechakorn does not receive any news or information from the patient or from the health service unit, he should try to contact either the patient or that health service unit. Communication should not breakdown. At the same time, if a hospital or health facility refers a patient to the wechakorn for further treatment, the wechakorn must report the result of treatment to the hospital or health facility or send referral forms to them. It must be remembered that patient referral involves two-way communication.

Patient Referral Card For Further Treatment "In Official Conduct of Ministry of Public Health"		(Fold 2)	This Referral Card To Be Taken To (For Referring Health Unit's Use Only)	
Please Refer To Sub district District Province			General Number Internal Number X - ray Number Date of Examination / /	
General Number of Health Center/District Hospital (Fold 1) Referral Card Number Date of Referral / /				
1	Patients Name Age Nationality Married/Single/Widowed/Separated/Monk House Number Village Sub-district District Lampang Province Occupation Father's Name Mother's Name Spouse's Name Reason For Further Treatment			
Report of Clinical and Treatment Date / / Blood Pressure / mmHg. Temperature		Summary of Treatment		
		- Final Diagnosis - Laboratory / X - ray Findings - Treatment - Results		
		(turn)		

FIGURE 15.4 PATIENT REFERRAL CARD

Report of Admission of Patient for Further Treatment at.....
 (Use When Patient is Admitted for Further Treatment)

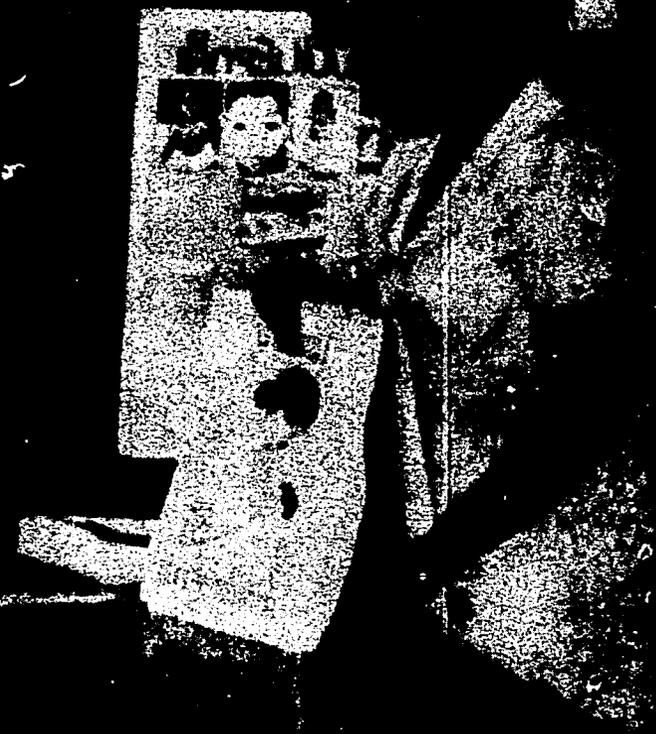
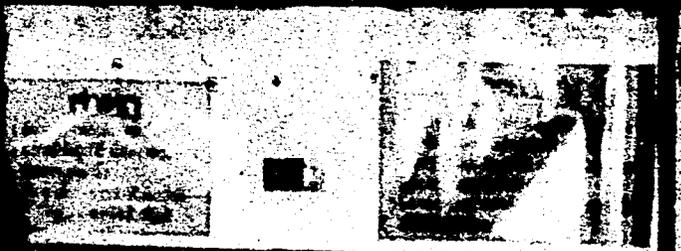
Date of Patient Admission	Patient is Referred From (✓)				Patient's Name and Surname	Patient's Address				Provisional Diagnosis	Result of Further Treatment (Report When Patient is Discharged)			
	Hospital (state)	Health	Center (state)	Midwifery Center (state)		House Number	Village	Sub-District	District Province		Type of Health Facility		Final Dignosis	Has the referral card been sent to referring unit or not
											OPD	IPD		

MODULE 16

MATERNAL AND CHILD HEALTH CARE

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MODULE 16

MATERNAL AND CHILD HEALTH CARE

1. INSTRUCTIONAL OBJECTIVES

After completing this module, the wechakorn will be able to:

- (1) Identify parts of internal and external genital organs and explain their functions,
- (2) Explain the physiology of normal menstruation,
- (3) Explain the physiology of normal pregnancy and labor,
- (4) Explain the cause and diagnosis of high risk pregnancy and labor,
- (5) Perform the diagnosis and treatment of the following complications of pregnancy and labor:
 - Toxemia of pregnancy
 - Antepartum hemorrhage
 - Postpartum hemorrhage
 - Abortion
 - Premature labor
 - Postmaturity
 - Prolonged labor
 - Stillbirths
- (6) Attend and assist normal delivery,
- (7) Perform diagnosis and assist in abnormal labor,
- (8) Manage antenatal care services, and
- (9) Care for the newborn infant, including provision of immunizations.

2. ANATOMY AND PHYSIOLOGY OF THE FEMALE

The female genital organs are divided into two major parts:

2.1 The External Genital Organs

The mons pubis is the upper part of the external genital organs. It is located next to the pubic symphysis over which the fat is covered with skin and the pubic hair. The amount of fat deposited in and around the mons is under the influence of female sex hormones. The size of the mons pubis varies according to the age of the woman.

The labia majora are located below the mons pubis. In the virgin, labia of both sides are attached to each other at the midline and the vaginal opening cannot easily be seen. In parous women, however, this is not the case because the labia are separated. The labia of both sides join at the upper portion and this area of joining is called the anterior commissure. The joining at the lower part is called the posterior commissure, and this may be torn during delivery of an infant. In the tear is extended downward to the anal sphincter, the woman may not be able to control her bowel movements. Feces may pass into the va-

ginal canal as the result of an old tear in severe cases, and this may cause vaginal infection.

The perineum is formed by three major muscles in this area:

(1) The levator ani is located between the anus and the vaginal opening. It forms the floor for the pelvic organs. A tear or relaxation of this muscle may be one of the causes of uterine prolapse.

(2) The sphincter vagina is located around the vaginal opening. If this muscle is torn, the vaginal opening (or introitus) becomes wider.

(3) The sphincter ani is located around the anus. If this muscle is torn the woman will not be able to control her bowel movements.

The labia minora are centered between the labia majora. The covering skin is very soft and has no hair. The upper portions of both sides join together and cover the clitoris. The lower portions join with the posterior commissure.

The clitoris has a rod shape and is about 2 - 4 cm long and 3 - 4 mm wide, when there is no erection. When there is sexual excitement and erection occurs, the size will be larger and longer. This area has a lot of blood supply, and tearing may cause heavy bleeding. In some cases, blood loss from an anterior tear of this area may be so great as to lead to death of the woman.

The vestibule is the area between the labia majora of both sides. The area is covered with mucous membrane. There are two openings in this area, the vaginal opening and the urethral orifice. There are two types of glands located in the area, Skene's glands and Bartholin's glands. Bartholin's glands may become encysted, infected or abscessed.

The hymen is a paper-thin tissue around the vaginal opening. In some cases, the tissue may completely cover the opening and this is called an imperforated hymen. In this case the menstrual blood cannot pass through the vaginal opening and the blood will be collected in the vagina, uterine cavity and, in some cases, up to the fallopian tube. The main symptom is low abdominal pain. The condition in which blood is collected in the vaginal canal is called hematocolpos, and blood collection in the uterine cavity is called hematometra. The treatment is surgical, by opening and reshaping of the hymen and drainage of the collected old blood.

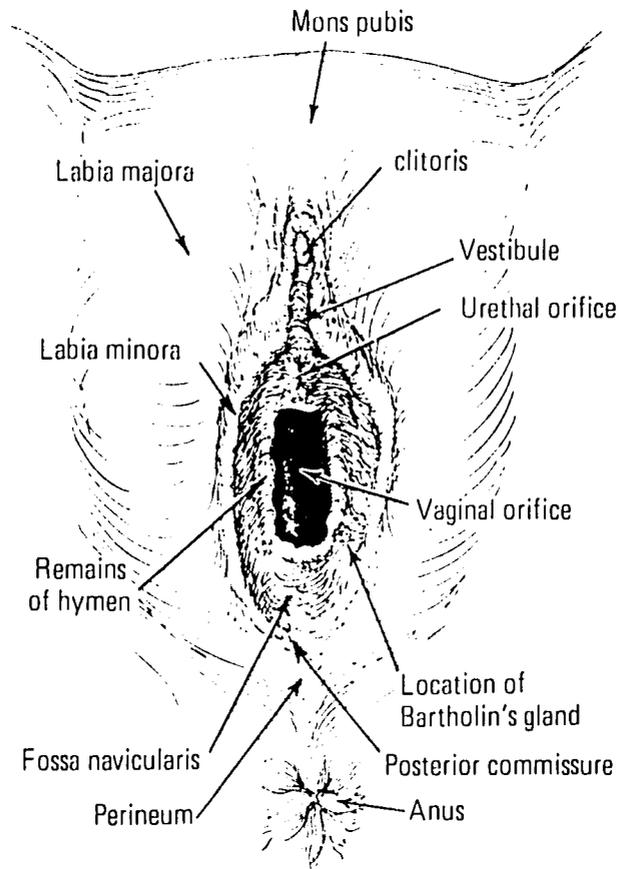


Figure 16.1 External Female Genitalia

2.2 Internal Genital Organs

The vagina is a canal through which menstrual blood passes every month and through which spermatozoa pass into the cervical canal, uterine cavity, and fallopian tube where fertilization takes place. The vagina is also the birth canal. Its depth is about 8 cm measured anteriorly, and about 10 cm measured posteriorly. The vaginal wall is covered with a mucous membrane called stratified squamous epithelium. This type of epithelium sloughs off regularly and becomes part of a white discharge from the vagina. Beneath the epithelium is the muscle. At the upper end of the vaginal canal is the cervix, the mouth of the womb. The part of the cervix protruding into the vagina is called the portio. The area around the portio is the fornix. The posterior fornix is close to the lowest part of the abdominal cavity, called the cul-de-sac. Blood or abscess in the cul-de-sac may be drained through the vagina. Puncturing the cul-de-sac by a needle to help in diagnosis is called culdocentesis. Incision of the cul-de-sac is called colpotomy; pus can be drained or surgery, such as tubal ligation and resection, may be performed through the incision.

The uterus is pear shaped, with the small part pointing downward. Its size is 6 - 8 cm long, 4 cm wide, and 2 cm thick. The uterus has no use other than for pregnancy. Its removal has no harmful effect on a woman. The non-pregnant uterine cavity has a capacity of only about 3 - 4 cubic cm; a pregnant uterus, however, will distend to contain 3,000 - 5,000 cubic cm. The uterine wall is divided into three layers. The outer layer, or serosa, is the continuation

of the layer covering the abdominal cavity or peritoneum. The middle layer is called the myometrium; here muscles are interlaced through adjacent muscles in order to perform effective contraction during labor and to control bleeding after delivery. The inner layer is called the endometrium. The thickness of this layer varies in conjunction with the menstrual cycle. It is thin at the beginning of the menstrual cycle and becomes thickest about 3 days before menstruation begins.. The endometrium is composed of endometrial glands and stroma. Separation of the endometrium causes vessels to tear and bleed. This is the situation that occurs during menstruation. After bleeding, estrogen will stimulate growth of the endometrium and prepares it for a fertilize ovum (egg). During pregnancy the endometrium is much thicker than in the non-pregnant state. The uterus may be divided into 5 parts:

(1) The fundus uteri is the part above the line between the inner ends of the fallopian tubes (or uterine tubes). Slightly below the junction between the tube and the uterine body is the origin of the round ligament, the insertion of which is at the labia majora. The function of the ligament is to partially immobilize the uterus during pregnancy. The normal size of this ligament, except in pregnancy, is about the size of a pencil.

(2) The uterine corpus. Contraction of this part is most important in the process of labor and delivery. Poor contraction of the uterine corpus will prolong labor and is the main cause of postpartum hemorrhage. The muscles are interlacing and their contraction is involuntary.

(3) The isthmus uteri is the area dividing the cervix and the uterus. During pregnancy and labor, it becomes the lower uterine segment.

(4) The cervix uteri is the lower end of the uterus. There is a small canal in the middle, called the cervical canal, connecting the vaginal uterine cavities. The cervical canal is about 2 - 3 cm long. The outer end has an opening called the external os, close to the vagina. In nonpregnant women, the os is small and has a round shape. After delivery the shape changes as a result of a transverse tear. There is usually a mucous plug in the canal. At the time near ovulation, the mucus is thin. The mucus passes through the vagina, mixing with menstrual blood. The opening of the canal during menstruation, abortion, and delivery (puerperium) gives a chance for ascending infection. The mucous plug is formed of discharge from the glands in the cervical canal. The upper end of the cervical canal is the opening into the uterine cavity, and is called the internal os. The internal os is usually closed except during menstruation, abortion, labor, and delivery (puerperium).

(5) The uterine tube (fallopian tube) is connected to the uterus on both sides. The tubal canal is connected with the uterine cavity. The uterine tube is about 6 - 10 cm long and about the size of a straw. The lateral end has an opening called the fimbria. The fimbria is naturally close to the ovary and is partially connected to the ovary. The fimbria opens into the peritoneal cavity. The muscles in the tubal wall of the uterine tube contract periodically. The inner wall of the tubal canal is lined with many small villi. Movement of the

villi facilitates the passage of the ovum toward the uterine cavity. Fertilization between the ovum and spermatozoon usually takes place in the tubal canal near the fimbria. The fertilized ovum will travel for about 3 days before it reaches the uterine cavity where it will move around for about 6 more days before implantation.

The ovary has a shape and size like the outer half of the thumb. An ovary is about 2 - 3 cm wide and 1 cm thick. There are two ovaries, one on the left and one on the right. Only one (or only a part of one) ovary is enough for normal function if the other one has to be removed. Ovaries are attached to the uterus by the ovarian ligaments proper and the mesosalpinx, anteriorly and posteriorly respectively. There are thousands of follicles in the ovary. The ovum is in the follicle. The follicle produces estrogen which stimulates growth of the genital organs. From puberty through one's sexually productive life there is production of this hormone, but there is no ovulation until the woman reaches the age of about 13. There is only one ovum in a follicle. The process of the follicle releasing the ovum is called ovulation. The estimated time of ovulation is 14 days before the first day of the next menstrual period. After ovulation the follicle becomes the corpus luteum. The corpus luteum produces progesterone. Combined with estrogen, the hormone stimulates growth of endometrial glands to be ready for implantation. After ovulation, the ovum will pass through the fimbria into the tube. If there is a spermatozoon from sexual intercourse or from artificial insemination, and if fertilization and implantation occur, pregnancy will follow. If there is no spermatozoon, the ovum will be discharged with the menstrual flow.

The broad ligament is covered by two layers of the peritoneum, and the uterine body is situated in between. The two layers of peritoneum on both the left and right sides of the uterine body form a flap called the broad ligament. Between the two layers of the broad ligament there are blood and lymph vessels to supply the uterus. At the lower portion, the two layers form a thick band of tissue in order to suspend the uterus. This tissue is called the cardinal ligament.

The adnexa is the portion of the internal genital organs near and on both sides of the uterus. The adnexa includes the ovaries and the tubes.

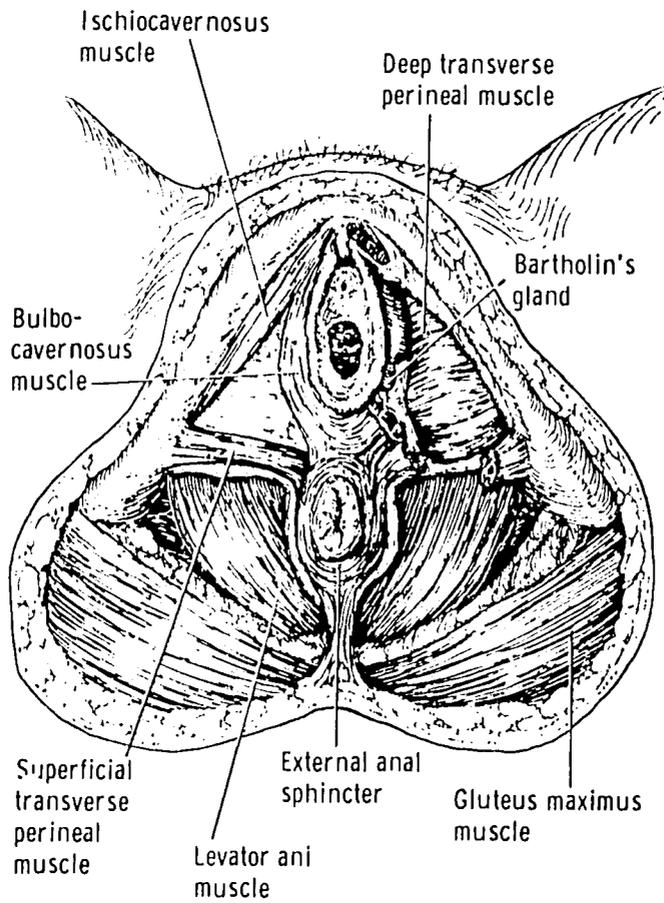


Figure 16.2 Pelvic Muscles of the Female Perineum

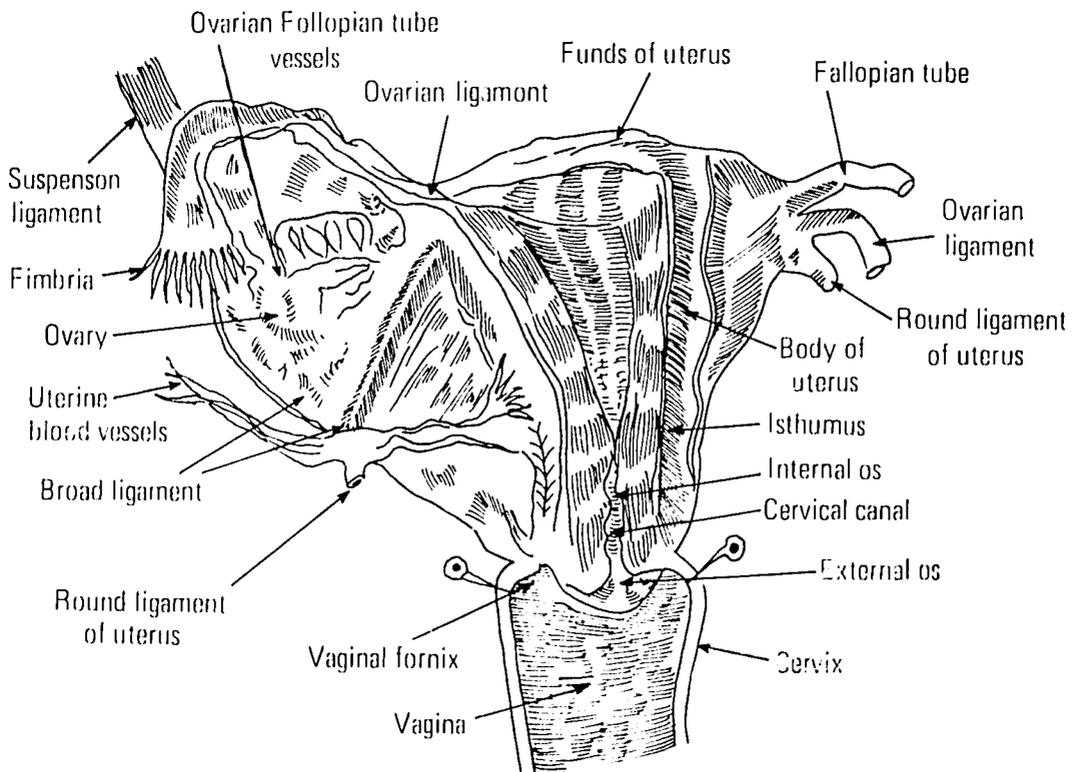


Figure 16.3 Internal Female Genitalia (Frontal View, Midsection)

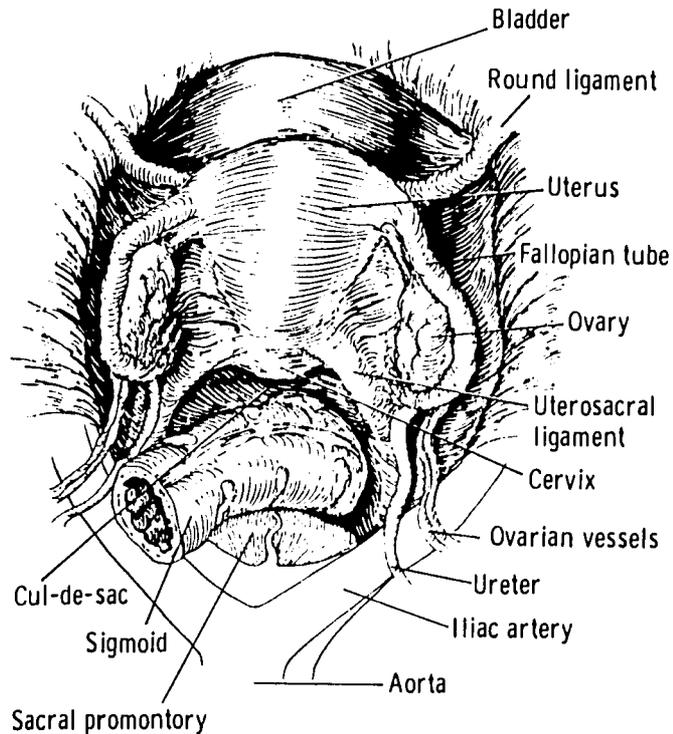


Figure 16.4 Internal Female Genitalia (Top View)

2.3 Pelvic Organs Adjacent to the Genital Organs and Breast

2.3.1 The urinary bladder. The urinary bladder is in the pelvic cavity, above and in front of the uterus and urethra. A full bladder can be felt by vaginal examination or by abdominal palpation, and can be mistaken for an ovarian cyst. Therefore, it is necessary to empty the bladder before a pelvic examination. Catheterization, however, should be avoided because the risk of bladder infection from catheterization is quite high. Voiding before pelvic examination will be enough to serve the purpose. A full bladder also can increase the pain and duration of labor. Prolonged labor is associated with vesico-vaginal fistula due to prolonged compression of the bladder by the fetal head. Leakage of urine is a troublesome condition and may cause chronic vulvitis due to urine irritation. Surgical repair is indicated in such a case. The procedure, however, requires an experienced surgeon.

2.3.2 The rectum. The rectum is behind the uterus. The opening of the rectum is called the anus. The anus is at the lower part of perineum. In prolonged labor, the pressure from the fetal head may cause recto-vaginal fistula. In such a case, the stool (feces) will be able to pass through the vagina. The treatment is surgical.

2.3.3 Breasts, or mammary glands. Breasts are considered parts of genital organs. They are composed of fat and glands. There are 15 to 20 mammary glands that produce milk. At the tip (apex) of the breast there is a nipple where the baby can suck for the milk. Around the nipple is a brown area called the areola. This area becomes dark brown during and after pregnancy. The

breasts are slightly enlarged during pregnancy and for 6 weeks or more after delivery. Due to distention of the skin covering the breast, the veins underneath may be seen. Frequently, a bit of milk is discharged from the nipple during pregnancy. These symptoms and signs are helpful in making an early diagnosis of pregnancy.

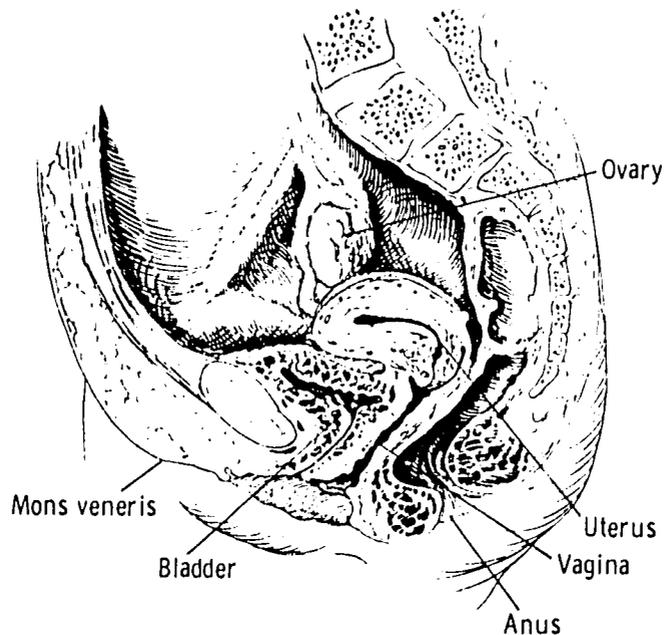


Figure 16.5 Internal Female Genitalia (Side View, Midsection)

2.4 Functions of the Major Female Genital Organs

2.4.1 Vagina. The functions of the vagina include the following:

(1) Menstrual blood passes through the vagina. (2) Spermatozoa pass through the vagina to the fallopian tube. (3) The newborn is delivered through the vagina.

2.4.2 Uterus. The uterus is the source of menstrual blood. After fertilization, the uterus lining is where the egg implants and it is the place for development of the fetus, which lasts about 266 days. Delivery normally occurs 280 days after the first day of the last menstrual period. Forty weeks, or a 280 day period, therefore, is considered as "full term." Contraction of the uterus is the most important function of the uterus, as it provides the expulsive force for delivery of the fetus. In practice, the word full term is classified by weight of the newborn. A full term baby weights 2500 grams or more. A baby weighing 2499 grams or less is called premature.

2.4.3 The fallopian tubes. The fallopian tube, or the uterine tube, is the canal for the ovum to travel toward the uterus. Fertilization, if it occurs, usually takes place in the outer one-third of the tube. The fertilized ovum spends about 3 days traveling in the tube before it reaches the uterine cavity where it becomes embedded (implantation).

2.4.4 The ovaries. Each ovary produces female hormones and ova. Ovary is required for ovulation.

2.5 Female Sex Hormones

The ovary produces estrogen and progesterone under control of the pituitary gland. The pituitary gland produces: (1) Follicular stimulating hormone (F.S.H) which stimulates production and maturation of follicles in the ovary. (2) Luteinizing hormone (L.H.) which stimulates ovulation and stimulates the corpus luteum.

If pregnancy takes place, the corpus luteum will be maintained by a pituitary hormone (prolactin, or luteotrophic hormone) until the placenta produces hormones that can replace the function of the corpus luteum. Without fertilization, prolactin production will stop about 3 days before the beginning of the next menstrual period and the corpus luteum becomes the corpus albicans. The functions of estrogen are the following:

(1) Stimulates development of genital organs, (2) Stimulates secondary sex characteristics, e.g., changes of puberty, such as occurrence of pubic hair and axillary hair, enlargement of the breasts, (3) Stimulates the inner layer of the uterus (endometrium) to become proliferative, (4) Stimulates the muscles of the uterus to contract, and (5) Stimulates the breasts and mammary ducts.

The functions of progesterone are the following:

(1) Turns endometrial proliferative phase to secretory phase, (2) Delays uterine muscle contractions, and (3) Stimulates the mammary glands.

3. PERIODS IN THE LIFE OF A WOMAN

3.1 Puberty

Puberty begins with the onset of menstruation. Initially, menstruation is irregular. Menstruation may be accompanied by low abdominal or back pain. Menstruation may be delayed for a period longer than one month. The amount of menstrual blood may vary. After 1 to 2 years, menstruation usually becomes regular. Irregularities of menstruation after the initial period may require medical consultation.

Fat tissue accumulates in the areas of breasts, buttocks, pubis, and thighs. The female figure takes shape. But absence of female hormones delays these changes. Pubic and axillary hair develop. Psychological changes occur – e.g., modesty, interest in opposite sex, behaving like a woman in attitude and conversation.

3.2 Reproductive Period

The period from puberty (12 to 13 years old) until menopause (when there is no more menstruation usually at 45 to 47 years of age) is called the reproductive period. The ovaries, uterus, and other genital organs function effectively. Ovulation usually takes place every month and the date of ovula-

tion is usually on the 14th day before the first day of the next period, or roughly 14 - 16 days after onset of last menstruation. Blood supply of the endometrium will significantly increase after ovulation (secretion phase) in order to be ready for implantation if fertilization occurs. Without fertilization, the secretory endometrium will separate from the uterus. Menstrual blood flow is the result of this separation. Repeated cycles of menstruation are continued until there is pregnancy when menstruation temporarily ceases for a period of about 40 weeks, until delivery.

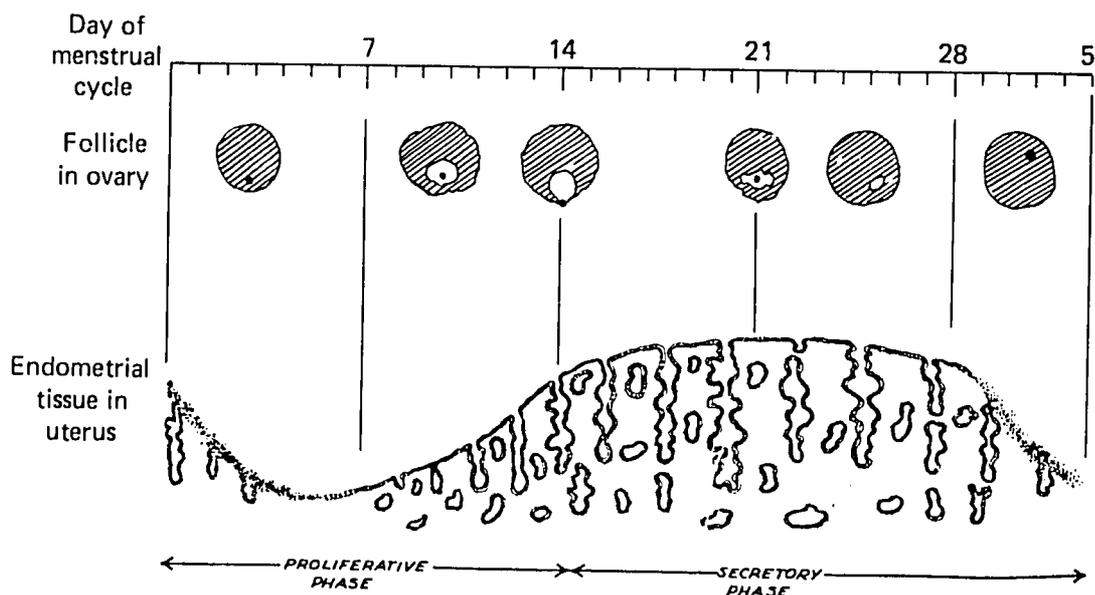


Figure 16.6 Menstrual cycle and changes of endometrium and follicle.

3.3 Menopausal Period

After cessation of menstruation, pregnancy cannot occur but sexual desire still exists. The average age of a woman at menopause is about 45 to 47 years old. There is regression of genital organs, and ovulation stops. There is a decreased amount of menstrual blood flow, and delayed menstruation. Psychological changes may occur, including emotional instability, irritability, sweating, headaches, dizziness, flatulency, and hot flashes. These symptoms usually occur periodically over a period of about 2 to 3 years. Occasionally there may be irregular bleeding or heavy bleeding which is caused by a thickening of the endometrium (endometrial hyperplasia). A diagnosis of pelvic inflammation or cancers of the genital organs should be ruled out in cases presenting with irregular bleeding from the vagina.

4. CHARACTERISTICS OF NORMAL MENSTRUATION

Normal menstruation occurs only during the reproductive period. Bleeding before or after this period is considered abnormal. Menstruation normally occurs every 28 ± 7 days. It usually lasts about 3 to 5 days. Normal mens-

truation does not last more than 7 days. There is no menstruation during pregnancy, except in unusual cases.

The amount of menstrual blood about 100 ml (2 to 3 pads) per day. There should be no blood clots, only dark blood.

There may be low abdominal pain or discomfort, especially 1 to 2 days before menstrual flow begins (premenstrual pain). Irritability, palpitation, breast engorgement, decreased urination, and insomnia are common accompanying symptoms of normal menstruation.

5. ANTENATAL CARE (ANC)

5.1 Objective of Antenatal Care

The objectives of antenatal care include the following:

- (1) Preparation of pregnant women, both physically and mentally, for pregnancy, labor, delivery, the period after delivery, and child care,
- (2) Detection of abnormal signs or symptoms that may signal abnormal pregnancy, especially toxemia, and
- (3) The ultimate goal of ANC is the safety of the child and the mother.

5.2 Psychology in Antenatal Care

Physical and hormonal changes during pregnancy usually affect the psychological stability of the pregnant woman. Social and economic factors are equally important. Desire to have a child of a particular sex may cause anxiety. Anxiety related to ignorance and fear of the unknown are normal. ANC provides opportunity for detailed explanations and answers to questions of the expectant mother. The mother should feel secure and confident in herself. Husbands play important supportive roles during these periods.

5.3 Basic Medical Knowledge for Pregnant Women

5.3.1 Exercise During Pregnancy. Exercise is normally useful for pregnant woman, especially exercise of abdominal muscles in preparation for delivery. The effective "push" at the time of delivery is accomplished by the woman: after taking a deep breath and holding her breath, she pushes down strongly. Practice of this physical effort is clearly useful. Excessive exercise, however, is not advisable. Walking is perhaps the most effective daily exercise for pregnant woman, especially for one who normally does office work only.

5.3.2 Nutrition During Pregnancy. A pregnant woman with an average body weight of 55 - 66 kg has a caloric intake requirement of 2,500 calories/day. This amount of calories should be obtained from 90 to 100 grams of protein, including eggs and milk, three hundred grams of carbohydrate, and 100 grams of fat. In the case of overweight women, carbohydrates should be decreased. Minerals such as iron are necessary for fetal blood (hemoglobin) formation. Calcium is needed for building fetal bones and teeth. Phosphorus and vitamin D are needed for calcium absorption. Generally, maternal food intake has no obvious effect on the weight of the fetus. Poor nutrition, however, may result in a small or premature newborn.

For example, a pregnant woman may take 1 to 2 eggs, fresh fruit, 90 to 100 grams of meat, a moderate amount of rice, and 200 mg of ferrous salt daily. She should take one or two meals of sea food per week. (It should be noted that only a small number of pregnant women in developing countries are able to follow this recommendation, due to socioeconomic condition).

5.3.3 Dental Caries. Dental caries should be treated during pregnancy if necessary. In some places, there is fluoride in the public water supply for healthy baby teeth. Pregnant women need fluoride after the sixth month of pregnancy. Fluoride tablet can be given.

5.3.4 Travel. Travel is not contraindicated during pregnancy except for women with histories of habitual abortion, premature delivery, or serious medical conditions, such as heart disease. Near-term women should avoid long journeys.

5.3.5 Coitus (sexual intercourse). Coitus is not contraindicated during pregnancy, except for habitual abortion. Coitus near term may cause premature delivery due to contraction of the uterus during orgasm of the woman. Rear position or intertrochanteric (between thighs) sexual intercourse is suggested to avoid pressure on the uterus.

5.4 Routine Procedures of Antenatal Care (ANC)

5.4.1 History Taking. The history of previous illnesses, abortion, pregnancy, and delivery is recorded in detail. Abnormal pregnancy, labor and puerperium may repeat itself in this pregnancy.

(1) Medical conditions. Illnesses of the pregnant woman and her family should be recorded, especially any diseases of kidneys, heart, or lungs. Appendicitis, pulmonary tuberculosis, diabetes mellitus, and hypertension are among the diseases that may adversely affect a pregnancy. A history of surgery and blood transfusions is also important.

(2) Menstruation. A record of the first day of the last menstrual period is needed to calculate the expected date of confinement. If a pregnant woman cannot remember the date, a gross estimate is made from the date of the first fetal movement felt by the woman. X-ray is also useful in estimating fetal age but should be used only when necessary because of the possible effect of radiation on the fetus.

(3) History of previous pregnancies, labor and delivery. Previous pregnancies, labors and deliveries should be recorded in detail, especially in abnormal cases. Places, times, methods, attendants, complications, weight, and sex of the newborns, condition after delivery, abnormal bleeding or infection, blood transfusion, child care and feeding, jaundice, present condition of the child, etc., are among the common questions asked during ANC. It may take time for women who have many children, but it is important to spend the time on this matter.

(4) Present illness. Abnormal signs or symptoms during the present pregnancy, such as bleeding, pain, abnormal urination, fatigue, head-

ache, etc., should be taken care of immediately.

5.4.2 General Physical Examination. Breasts, heart, lungs, thyroid, teeth, head and neck, extremities and reflexes are to be carefully examined. Weight and height are recorded along with abnormal physical findings, especially abnormal birth canal (bony pelvis).

5.4.3 Obstetric Examination. The art and techniques of obstetric examination should be learned in clinical practice. The following examinations are important.

(1) **Breasts.** Inverted nipples may be discovered during examination of the breasts. If so, the patient should be instructed to pull the nipple frequently or press in the area around the nipple to allow the nipple to project. Nipples can be cared for with clean, warm water. Bras and undergarments should not be too tight.

(2) **Weight.** Weight should be recorded on every visit to compare with the previous records. The average increase in weight is about 0.5 kg/week. Excessive weight gain or sudden weight gain requires close observation because toxemia of pregnancy may be the cause, even without pitting edema. Gestational diabetes may cause excessive weight gain.

(3) **Urine Examination.** A clean container is needed for urine to be examined. The specimen may be collected at home or at the clinic. The color, transparency, acidity, and specific gravity are checked. Midstream urine is more reliable urine. Pus cells in urine indicate a urinary tract infection which requires prompt treatment to prevent pyelonephritis. Catheterization of the bladder should be avoided since it may introduce or promote an ascending infection.

Albumin and sugar in the urine are also checked. Positive urine sugar requires a blood sugar examination. The appearance of albumin during early pregnancy is unlikely to be caused by toxemia, but it may occur in the case of hydatidiform mole.

(4) **Abdominal Examination.** The size of the uterus should increase correspondingly with the duration of pregnancy. Before 12 weeks of gestation the uterus cannot be palpated. At 5 months, or after 20 weeks, of gestation the top of the uterus is at about the level of the umbilicus. The uterine top (fundus) is at the xyphoid cartilage when pregnancy is at the 36th week. Descent of the fetal head into the pelvic cavity through the pelvic inlet (lightening) causes lowering of the uterine fundus.

The fetal condition is determined by palpation, and the findings are recorded.

(a) The lie of the fetus is usually vertical. A transverse lie is abnormal. A vertical lie with the fetal buttocks at the lower end of the uterus is also abnormal.

(b) **Presentation (leading part).** The head is the normal presenting part. The buttocks (breech) and shoulder are abnormal presenting parts.

(c) Position. The relationship between the presenting part and the mother is called position. There are left, right, anterior, and posterior positions.

(d) Engagement. The presenting part passes into the pelvic brim (inlet).

There are four standard maneuvers in routine abdominal examination of fetal position during pregnancy.

First Maneuver : Level of fundus and fetal pole.

Second Maneuver : Location of fetal back.

Third Maneuver : Identification of presenting part and engagement.

Fourth Maneuver : Determining of cephalic prominence.

In a first pregnancy (primigravida), engagement usually occurs after the 36th week of gestation. This is not always true for following pregnancies.

Fetal heart sound (F.H.S.) or fetal heart tone (F.H.T.) is best heard at the fetal back in the area where the fetal heart is located. The normal fetal heart rate is about 140/min. A rate higher than 160 or lower than 100, or a rhythm that is irregular, is considered abnormal. Abnormal FHS, FHT, or FHR may occur when the fetus is under pressure or in need of more oxygen: the condition is called fetal distress.

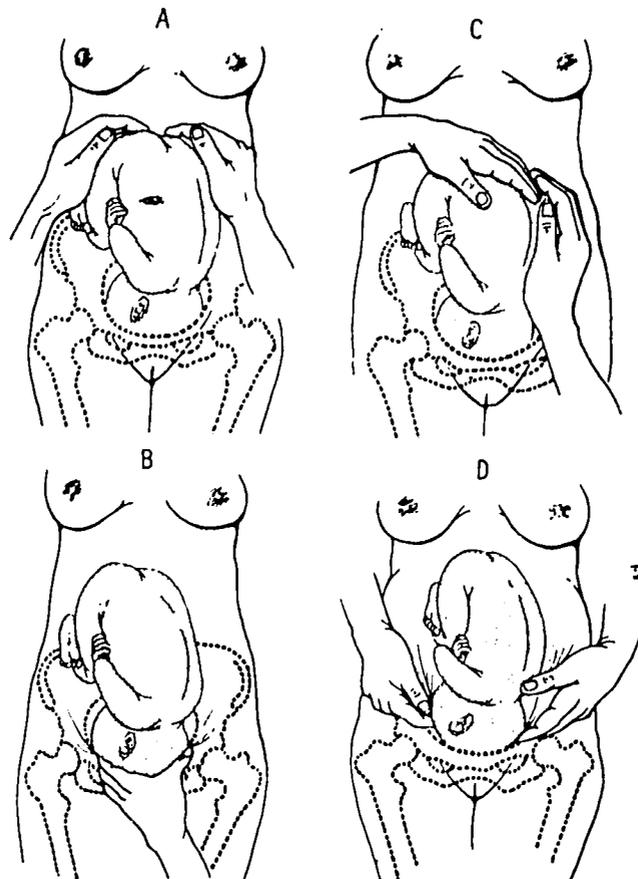


Figure 16.7 Four Maneuvers to Determine the Fetal Presentation, Position, and Engagement

(5) Laboratory Tests. The woman's blood type is checked on the first visit. Because Rh incompatibility is not common among the Thais, examination of the Rh factor may be omitted. Knowledge of blood group is required for blood transfusions. In real emergency cases, however, group "O" (or universal donor's) blood can be transfused without cross matching.

Syphilis is checked by V.D.R.L. or Wasserman reaction. The test is necessary in areas where syphilis still occurs. Blood should be checked for syphilis (V.D.R.L.) and treatment given before the 19th week of gestation when causative organisms (spirochetes) are unable to pass through the placental villi. Fetal infection may occur thereafter. Repetition of V.D.R.L. examination at the 32nd week of gestation is recommended. False positive tests may be caused by yaws or other spirochete infections.

Blood hemoglobin (Hb) concentration should be checked routinely. A hemoglobin level less than 10 gm% is the condition called anemia. In pregnant women, however, the blood and its hemoglobin may be diluted due to water retention (hemodilution). Hematocrit (the proportion of total blood volume that is red cells), is a common test used to detect anemia. Thais with poor health education and a low socioeconomic status frequently have relatively low hemoglobin (Hb) and hematocrit (Hct).

(6) X-Ray Examination. If the size of the fetus is suspected to be larger than the size of the pelvis, X-ray examination is helpful. Fetal position is also detected by X-ray. Danger of radiation from diagnostic X-ray is present but minimal. There has been no report of serious direct effects on the fetus, but one cannot be sure of the effect on the next generation. X-rays taken after the 16th week of gestation are considered relatively safe, but should be done only when necessary in selected cases. X-ray examination is also useful in the diagnosis of placenta previa and multiple pregnancy.

(7) Papanicolaou or Pap Smear. Pap smear should be done along with the pelvic examination on the first antenatal visit. Abnormal findings may be ulcers, tumors, leukorrhea and abnormal bony structures.

It is unfortunate that pelvic examination is not routinely carried out in many hospitals in Thailand. Most pregnant Thai women do not have antenatal care and most of them deliver at home. ANC visits should occur every 4 weeks until the 28th week, then every 2 weeks until the 36th week, and then every week until term.

5.5 Frequency and Constant of Antenatal Care Visits

Health education is important during ANC when the pregnant women has an opportunity to meet physicians, nurses, or wechakorn. Questions regarding health can be answered. The following topics are useful.

- (1) Physiological changes during pregnancy
- (2) Labor and delivery
- (3) Nutrition
- (4) Child care and feeding (breast feeding is recommended).

- (5) Baby clothing
- (6) Breast care
- (7) Family planning
- (8) Mental hygiene
- (9) Minor discomforts during pregnancy
- (10) Abnormal signs and symptoms during pregnancy that a woman should report to the clinic promptly.

Husbands should be given the same information and be oriented to be helpful in taking care of their pregnant wives.

6. PHYSIOLOGY OF LABOR

Labor is the process by which the fetus passes through the birth canal and is by uterine contractions. Normal labor occurs spontaneously when pregnancy is at full term and will accomplish delivery of the newborn without the use of instrumentation or drugs. Labor lasting longer than 24 hours is considered prolonged. The onset of labor may be initiated by:

- (1) Increase in the uterine content (fetus, placenta and amniotic fluid), and
- (2) Decrease of the blood progesterone level.

Premature labor occurs before full term, but a newborn is treated as a premature infant whenever the birth weight is lower than 2,500 grams.

6.1 Gravida and Para

- (1) Gravida means number of pregnancies, regardless of the outcome.
- (2) Para means number of full term and premature birth (weight 500 grams to 2,500 gm) deliveries.

For example, Gravida 4, Para 2, means the fourth pregnancy of a woman who had only two full term or premature deliveries. She might have had an abortion or an ectopic gestation in the other ones.

There is another method of recording previous pregnancies and outcomes. For example, Para 3 - 1 - 1 - 2 means the woman had 3 pregnancies, one was premature (the second number) and one was an abortion (the third number). And she has 2 living children (2 L.C.).

6.2 Lie, Attitude, Presentation, and Position of the Fetus

Lie is the relation between the fetal and maternal axis:

- (1) Longitudinal Lie (99% of pregnancies)
- (2) Transverse Lie (Under 1%)
- (3) Oblique Lie (Under 1%)

Attitude is the relationship between various fetal parts. The flexion attitude, when the fetal head and small parts are flexed is considered the normal attitude. Extension of the fetal head or deflexion attitude, is considered abnormal.

Presentation is the leading part of the fetus at the pelvic inlet. This part can be felt through the vagina.

- (1) Head presentation (occiput is the presenting part in normal labor).

- (2) Breech presentation (sacrum is the presenting part).
- (3) Shoulder presentation (transverse lie, scapula is the presenting part).

Position is the relation of the presenting part to the pelvis. The pelvis is divided into 4 parts.

- (1) Left Anterior - LA
- (2) Right Anterior - RA
- (3) Left Posterior - LP
- (4) Right Posterior- RP

For example, OLA means the fetal Occiput is at the Left side and front (Anterior) part of the pelvis (OLA = LOA). SLP means the fetal Sacrum is at Left side and back (Posterior) part of the pelvis.

6.3 Signs of Near Term Pregnancy

Lightening means the lowering of the uterine fundal level caused by the descent of the presenting part. It usually occurs two to four weeks before term, especially in primigravida women. The woman will be more comfortable then.

Effacement of the cervix is the shortening of the cervical canal. Total disappearance of the canal is called 100% effacement. In primigravida, effacement occurs before dilation. In subsequent pregnancies, dilation occurs before effacement. Effacement occurs the earliest stages of labor.

False labor pain is a pain caused by periodic contractions of the uterus in the last trimester of pregnancy.

Frequent urination may be due to limited distention of the bladder when the pelvis is partly occupied by the presenting part. This symptom has to be differentiated from cystitis or incontinence. It is occasionally confused with the leakage of amniotic fluid.

6.4 Diagnosis of True Labor

True labor pains are caused by periodic contractions of the uterus. These contractions increase in frequency, duration, and intensity. After each contraction, the uterine muscle fibers relax. The degree of relaxation, however, is less than that before the previous contraction. An action called retraction results when there is concomitant contraction of the upper part and relaxation of the lower part of the uterus. The line between the two parts is called the physiological retraction ring.

As labor progresses, the cervix dilates more and more, and the presenting part descends lower and lower. Near the time of delivery, contractions occur every 2 to 3 minutes. They are strong and last about 1 minute.

(1) Regular contractions with increased frequency, duration, and intensity;

(2) Effacement of the cervix and dilatation of the cervical os which can be felt by vaginal or rectal examination; and

(3) A mucous bloody "show" is seen in most cases. Bleeding at an earlier stage is abnormal and if it occurs, the patient should be observed closely. Premature onset of labor should be taken care of in the hospital.

(Nonengagement of the head at the onset of labor in the first pregnancy is also best treated at a place where caesarean sections can be done).

(4) Rupture of the membranes. Occasionally, there is premature rupture of the membranes which begins before the onset of true labor. This is abnormal, and it requires induction of labor if there is no spontaneous onset of labor within 24 hours after the membranes rupture.

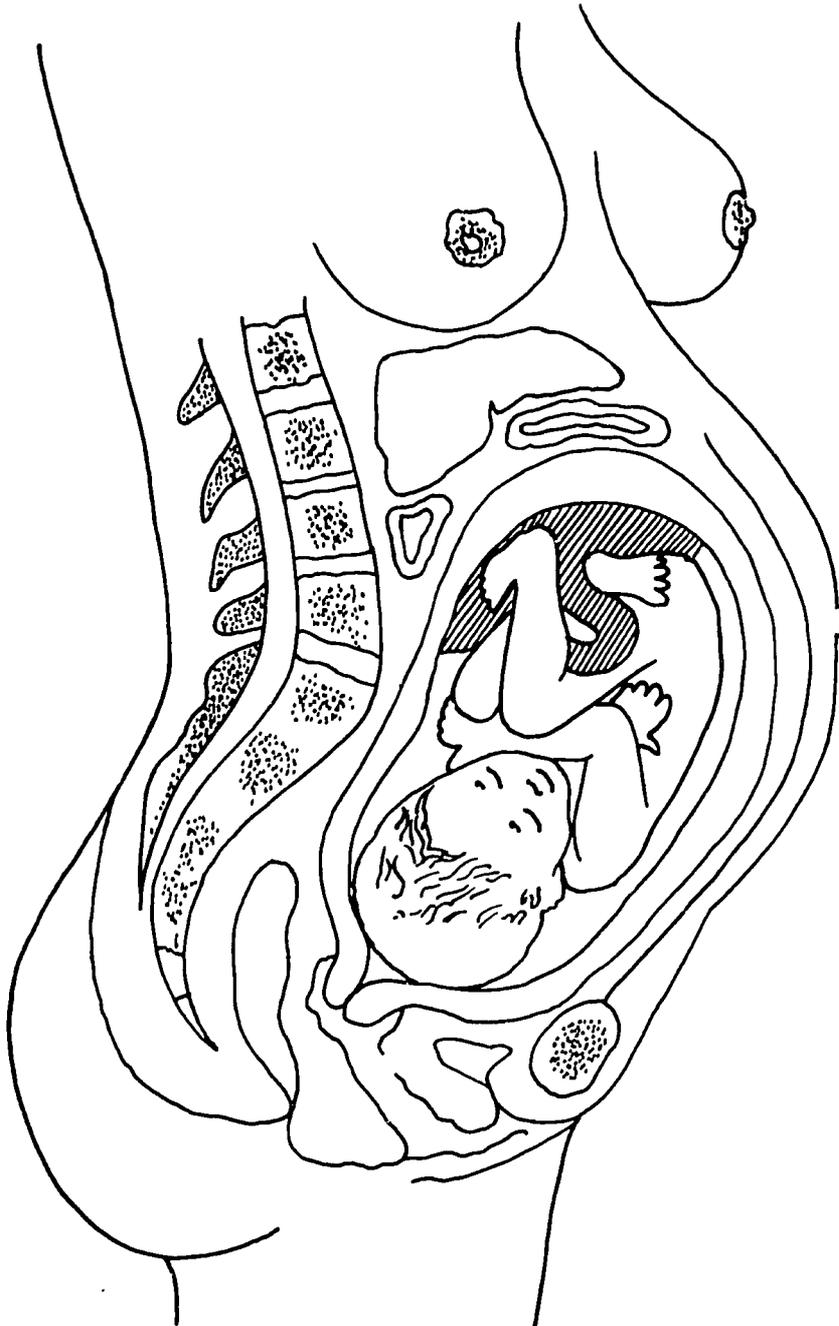


Figure 16.8 Full Term Pregnancy (Mid section oblique view)

6.5 Stages of Labor

6.5.1 First stage. The first stage begins with the onset of true labor pain until the cervix is fully dilated. The membranes usually rupture at this stage. Before rupture, amniotic fluid may collect near the fetal head; this is the “fore-water.” The first stage lasts 12 to 16 hours in primigravidas and 6 to 8 hours in multigravidas.

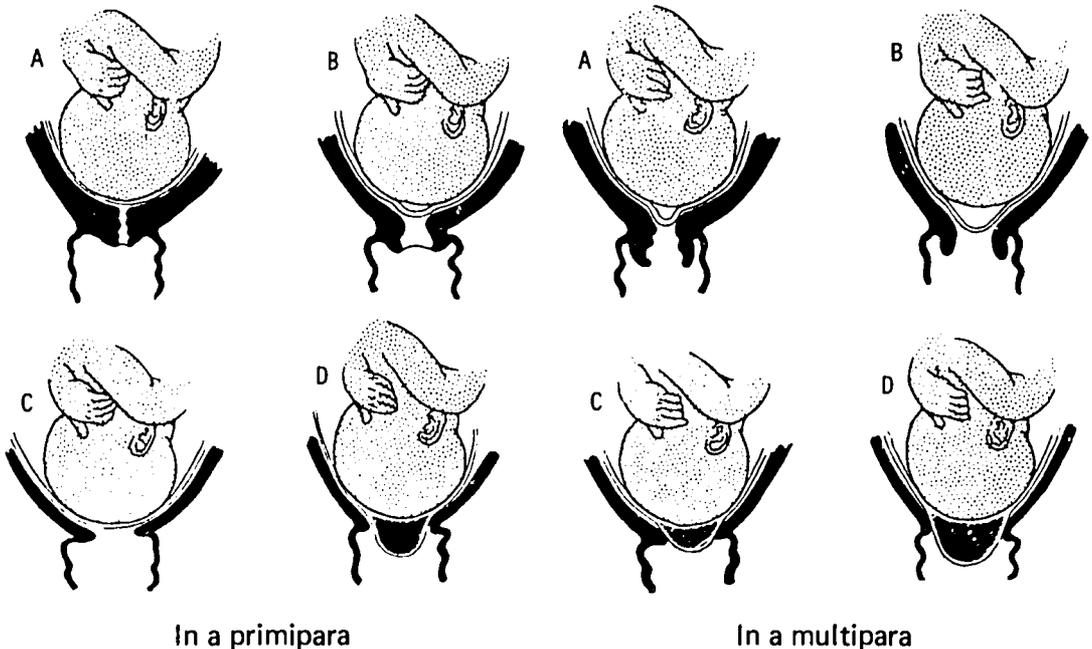


Figure 16.9 First Stage of Labor – Dilatation and Effacement of Cervix.

6.5.2 Second stage. The second stage begins when the cervix is fully dilated and ends when the newborn is delivered. In this stage, the contractions become stronger and stronger. The woman feels ready to push. She should be trained to push effectively by taking a deep breath, holding her breath, and pushing when the pain comes (when the uterus contracts). The attendant will observe distention of the perineum. Episiotomy (cutting of the perineum to enlarge the vaginal opening) can be performed at this stage. Delivery occurs, beginning with the head, then the shoulder and body of the infant. This stage lasts about 1 hour in primigravida and ½ hour in multiparas. The second stage is considered prolonged when it is longer than twice the usual time.

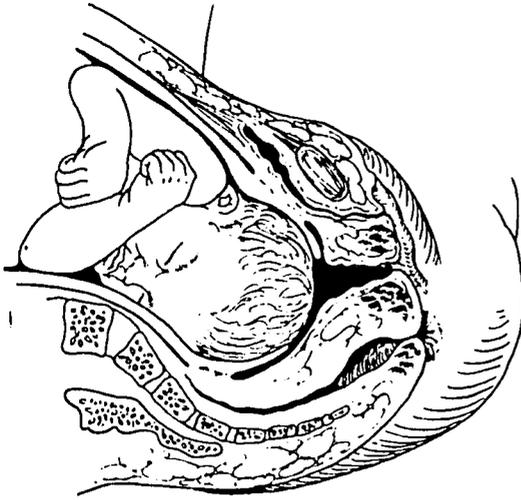


Figure 16.10 Second Stage of Labor – Engagement in LOA Position

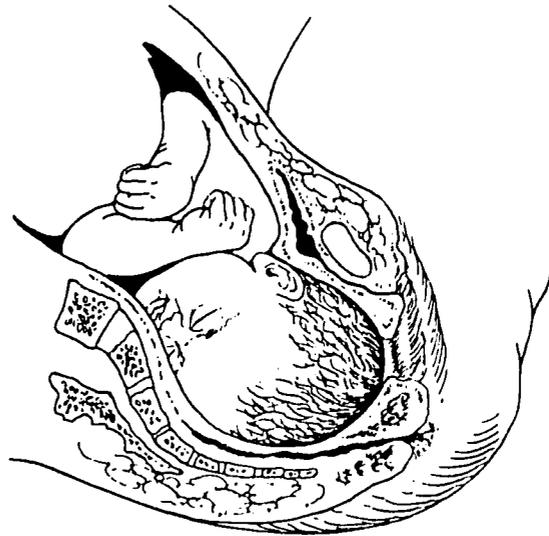


Figure 16.11 Second Stage of Labor -- Descent and Flexion.



Figure 16.12 Second Stage of Labor – Internal Rotation and Extension of Head



Figure 16.13 Second Stage of Labor – External Rotation

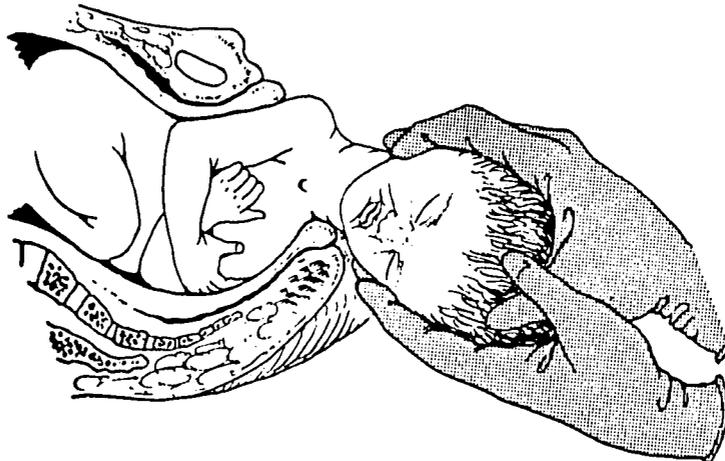


Figure 16.14 Second Stage of Labor – Delivery of Anterior and Posterior Shoulders

6.5.3 The third stage. The third stage of labor begins with delivery of the newborn and lasts until delivery of the placenta. This stage usually lasts 5 to 10 minutes.

<u>Stage</u>	<u>Primigravida</u>	<u>Multipara</u>
1st	12 - 16 hours	6 - 8 hours
2nd	1 hours	½ hours
3rd	5 - 10 minutes	5 - 10 minutes

Perineal laceration (tears) may occur in the second or third stage of labor. A first degree laceration means involvement only of the skin and vaginal mucosa. A second degree laceration means involvement of the perineal muscles but not the sphincter ani muscle. A third degree laceration means involvement of the sphincter ani muscle and rectal mucosa.

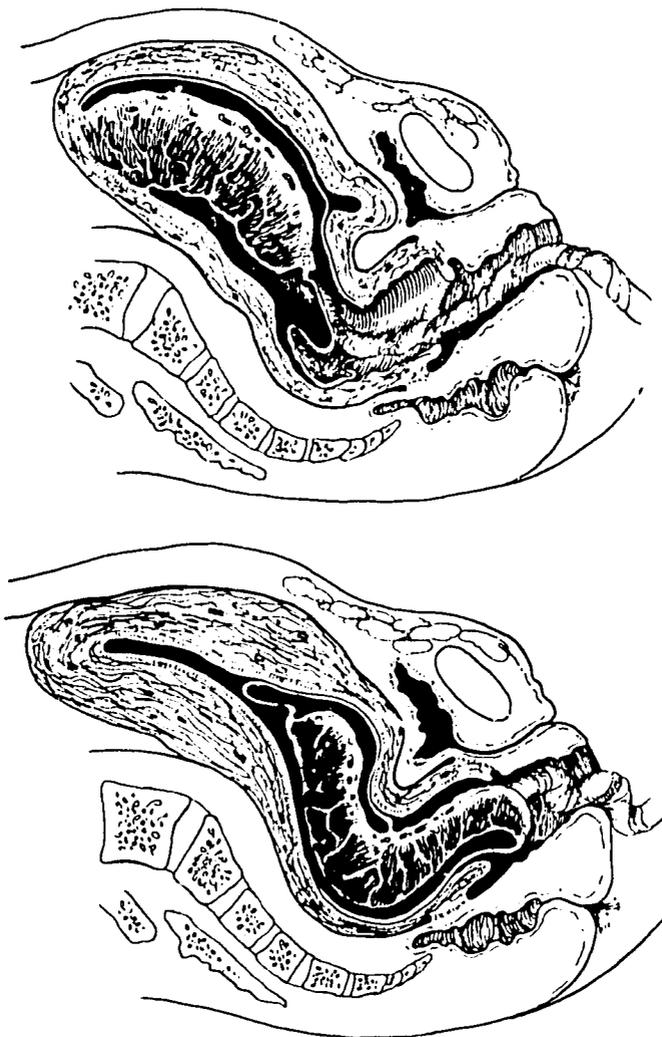


Figure 16.15 Third Stage of Labor – Separation of Placenta and Expulsion of Placenta

7. MANAGEMENT OF LABOR

Psychological support can be given from the beginning of pregnancy. Naturally, a woman may have anxiety and fear. Attention and understanding are required from medical personnel and family members, especially the husband. Close attendance and encouragement during labor are very helpful so the woman feels confident and secure. A first labor is almost always psychologically harder than subsequent labors.

Pain medication cannot completely cure labor pains, but it may give partial relief. However, overusage of pain medication may do harm to the newborn. This is especially true of morphine or its derivatives which are commonly used during labor in combination with tranquilizers. Local nerve blocks are also used to provide relief from labor pain.

Mechanisms of normal labor include the following:

- (1) Engagement (the presenting part passes into the pelvic inlet),
- (2) Descent,
- (3) Flexion (of the presenting part),
- (4) Internal anterior rotation (occiput turns under symphysis),
- (5) Extension (of the presenting part),
- (6) External rotation, and
- (7) Expulsion (of the newborn and placenta).

Descent occurs in all steps.

7.1 Management of the First Stage of Labor

The following should be done on arrival:

- (1) General physical examination,
- (2) Abdominal palpation, and
- (3) Vaginal or rectal examination (except bleeding cases).

If the pains are not strong, the woman may be allowed to walk. She is asked to avoid drinking water or eating during labor because anesthetics may have to be used. IV fluid (5% dextrose in water) is used if required.

The attendant should regularly observe:

- (1) Uterine contractions (intensity, duration, and frequency).
- (2) Descent and dilation. The level of the presenting part is palpated and recorded in relation to the ischial spines. The distance from the spines to the pelvic brim (inlet) is about 5 cm. The level is then recorded as station -1 to -5 for 1 to 5 cm above the spines respectively. The distance from the spines outward to reach the vaginal outlet is also about 5 cm. The level of the presenting part is then recorded as +1 to +5.

Descent normally occurs gradually but steadily. Delay of descent may be caused by cephalopelvic disproportion or poor uterine contractions. Labor is abnormal when there is no descent in about a two hour period despite normal uterine contraction.

The dilatation of the cervix normally occurs very slowly from 0 to 4 cm (about 8 hours in primigravida), but then occurs more rapidly, about 1.2 cm

per hour, thereafter, until full dilatation (10 cm).

(3) Presence of abnormal vaginal bleeding. Vaginal bleeding in the first stage of labor is considered abnormal. If it occurs, the case should be referred to the doctor.

If the amniotic fluid has a thick, green pea soup-like appearance, this may be the sign of fetal distress, especially when accompanied by increased fetal heart rate (over 160), decreased fetal heart rate (under 100), or irregular rhythm of the fetal heart. If fetal distress occurs, immediate delivery is required.

(4) Fetal heart rate (FHR), fetal heart sound (FHS) or fetal heart tone (FHT) should be checked regularly between uterine contractions. The normal rate is 120-160 beats/min.

(5) Physical and mental condition of the mother. Blood pressure, pulse rate, and body temperature of the mother should be checked every 4 hours. Fever (over 38°C) during labor should be reported. As psychological support is needed at all times during labor, the woman should not be left alone. Bedside rails should be used during sleep. The attendant should listen to her attentively. Encourage her by supportive words and actions. Routinely explain the current situation, actions needed, and medications given.

7.2 Management of Second Stage Labor

The beginning of the second stage should be recognized by regular vaginal or rectal examination during first stage labor. Close attendance is required during the second stage.

7.2.1 Assisting Delivery with a Cephalic Presentation. With or without episiotomy, after extension the head will pass through the vagina. Extension of the head is augmented by the attendant's hand pushing upward at the lower part of the perineum (Ritgen's Maneuver). After spontaneous delivery of the head, the attendant uses two hands, holding the fetal head on each side and gently pulling the head outward and downward until the anterior shoulder appears. Hard pulling may damage the nerves coming through neck bones and passing through the axillae (brachial plexus). After delivery of the anterior shoulder, the head is then gently lifted upward, and the posterior shoulder is then delivered. The body will follow immediately. The attendant then carefully holds the newborn head down, with one hand grasping the two infant feet tightly. A rubber bulb is used to clear the airway through the nasal and oral cavities. The umbilical cord is tied and the cord is cut between the 2 knots. Identification is carried out (presently, by taking foot prints) of the newborn, and some method of further identification between the woman and her newborn is used (such as small name cards around the wrists of both mother and infant). One percent (AgNO₃) silver nitrate solution is routinely dropped into the newborn's eyes to prevent eye infections.

7.2.2 Repair of Perineal Tears. A first degree tear usually requires no sutures. In a second degree tear, "OO" cat gut suture is used for the muscle and silk suture is preferable for the skin. In a third degree tear, the sphincter must be sutured before the perineal muscles and skin. This case requires an ex-

perienced person, otherwise complications such as fistula or stool incontinence may develop.

Twenty-four hours after the repair of a second degree tear, the patient is allowed to walk. But a patient should be in bed for at least 3 days after a third degree repair. A low residue diet is recommended. Medication can be given to promote temporary constipation for a few days, followed by a mild laxative.

7.3 Management of the Third Stage of Labor

The followings are signs of placental separation:

- (1) Uterine fundus rises with contraction,
- (2) Umbilical cord moves down, and
- (3) Blood gushes from introitus.

Delivery of the placenta can be facilitated by moderate pressure on the fundus after the signs of separation are detected. Strong pressure on the fundus before placental separation occurs may cause partial separation and severe bleeding thereafter (third stage bleeding). Pulling of the umbilical cord is also not recommended. Hard pulling of the cord in the case of a retained placenta may cause inversion of the uterus.

Examination of the placenta is important. Remember the following:

(1) The whole surface of the placenta is divided into 10 to 15 small sections (cotyledons). Examination of the placenta is needed to check whether any cotyledons are missing or retained in the uterine cavity. Retained cotyledons may cause heavy bleeding 10 to 14 days after delivery (delayed postpartum hemorrhage).

(2) Any abnormal placental tissue or blood vessels should be examined.

(3) By lifting the placenta, the membranes can be examined for completeness. Retained membranes may promote infection, but it is rarely the cause of bleeding.

(4) The umbilical cord and its vessels should be examined. Normally there are 2 arteries and 1 vein.

Postpartum bleeding is prevented by the use of ergot extract or pituitary extract in pure or synthetic form. The most commonly used ergot is methergine; pitocin, and syntocinon are the synthetic forms of oxytocin. The action of ergot on the uterine muscle stimulates a hard and long contraction, while syntocinon provides moderate and rhythmic contractions.

Ergot is contraindicated before delivery of the placenta since it may cause sustained cervical contraction and trap the placenta in the uterus. It is definitely prohibited before fetal delivery since it may cause uterine rupture.

8. THE PUERPERIUM

Puerperium is the period of recovery (about 6 weeks) after delivery. During this period, the uterus is returning to normal size (involution); there is lactation (breast feeding is strongly recommended); and the physical and mental

recovery of the mother takes place. Family planning is usually discussed during this period.

Immediately after delivery, the uterine weight is about 1000 grams and the size is about 18 x 12 x 10 cm. Only two weeks thereafter, the length of the uterus is reduced from 18 to 9 cm and the weight is only 100 grams.

One week after delivery the uterine fundus can be palpated at the level of the pubic symphysis. On average, the fundal level decreases about 1 cm every day. The cervix and the vagina undergo a similar change of involution during the puerperium.

Protocol 16.1 Maternal and Child Care

<u>Condition or Signs of the Patient's Problem</u>	<u>History/Physical Examination/ Laboratory Examination</u>	<u>Problem and Solution</u>
History of Amenorrhea	----- yes --- Nausea or vomiting/frequent urination (without infection) Breast engorgment	yes--->Pregnancy A.N.C.
	----- yes --- Amenorrhea less than 5 months/ heavy or moderate per vagina bleeding	yes-->Incomplete Abortion Refer to M.D.
	----- yes --- Pregnancy more than 5 months/ heavy or moderate bleeding per vagina	yes-->A.P.H. Placenta previa Abruptio placenta Refer to hospital
	----- yes --- Near term or term pregnancy (40 weeks), normal finding	yes-->Delivery assisting
	----- yes --- Pitting edema/headache/dizziness/decreased amount of urine/chest pain/ high blood pressure <140/90 mmHg/ Albumin in urine	yes-->Toxemia of Pregnancy Refer to hospital
After delivery (1st day - 6 weeks)	----- yes --- Bleeding per vagina/retained placenta	yes-->Postpartum hemorrhage Retained placenta Refer to hospital
	----- No --- Incomplete delivery of placenta	yes-->Third stage bleeding Retained placenta Refer to hospital
	----- No --- Enough children, intention to delay next pregnancy Poor health	yes-->Family planning (see Family Planning Module)
	----- No --- Pale/weak/loss of appetite/ chronic disease	yes-->Treatment or refer.
Newborn	----- Yes -----	Child care.

9. BASIC MCH SKILLS

9.1 Physical Examination : Diagnosis of Early Pregnancy

9.1.1 Recognize early symptoms and signs of pregnancy :

- (1) Amenorrhea
- (2) Morning sickness
- (3) Frequent urination
- (4) Breast engorgement
- (5) Increased blood supply in the pelvis, as recognized by a bluish discoloration of vaginal mucosa and cervix and an enlarged and soft uterus
- (6) Positive pregnancy test (Detectable 4 - 6 weeks after last menstrual period (LMP))

9.1.2 Recognize signs to make definite diagnosis of pregnancy:

- (1) Fetal movement felt by examiner
- (2) Fetal heart sound audible
- (3) X-ray film shows fetal bones

9.2 Health Promotion and Disease Prevention : Antenatal Care

- (1) History taking and calculation of expected date of confinement (EDC)
- (2) Systemic physical examination
- (3) Abdominal palpation
- (4) Pelvic examination
- (5) Laboratory examination – e.g., urinalysis, hemoglobin or hematocrit, VDRL and X-ray
- (6) Health education for the mother
- (7) Detection of high risk pregnancy
- (8) Identify pregnancy complications

9.3 Expected Date of Confinement

Normal duration of pregnancy is 280 days or 40 weeks, or 10 lunar months beginning from the first day of the last menstrual period (LMP). Estimation of delivery date can be done by:

- (1) Naegele's Rule (LMP - 3 months + 7 days)
- (2) Quickening (the first movement of the fetus felt by the mother)
- (3) Size of the uterus or level of the fundus
- (4) Fetal size, body and head
- (5) X-ray detection of ossification centers in long bones (used only when necessary).

9.3.1 Naegele's Rule. This is the most commonly used method. For example, a woman whose LMP is on the 15th day of April, 1980 would be expected to deliver on January 22, 1981. Unusual menstruation during pregnancy may cause confusion. Calculation is difficult or impossible when the mother cannot remember her LMP. By this calculation, only about 5% of pregnancies end on the calculated date. The rest will generally end within 7 days

before or after the date. A first pregnancy tends to be shorter than subsequent pregnancies.

9.3.2 Quickening (the first fetal movement). This sign is useful when the mother cannot remember her LMP. In fact, the fetus begins to move very early in life but the movements are not strong enough to be felt by the mother. The first fetal movement is usually felt by the mother after the 16th and 18th week of gestation in multipara and primigravida respectively.

9.3.3 Fundal Height. The level of the uterine fundus in relation to the umbilicus and xiphoid process of the sternum is used in estimation of duration of pregnancy. The distance from the symphysis to the umbilicus is divided into 3 portions, while the distance from the umbilicus to the xiphisternum is divided into 4 portions.

Duration of Pregnancy

Before 12 weeks

- At the end of 12 th week
- 16 th week
- 20 th week
- 24 th week
- 28 th week
- 32 nd week
- 36 th week
- 40 th week

Level of the Fundus

Not palpable abdominally

- At pubic symphysis
- 1/3 above symphysis
- 2/3 above symphysis
- At umbilicus
- 1/4 above umbilicus
- 2/4 above umbilicus
- 3/4 above umbilicus
- Down to 2/4 above umbilicus due to lightening but the abdominal wall is distended laterally.
- Lightening is more common in primigravida.

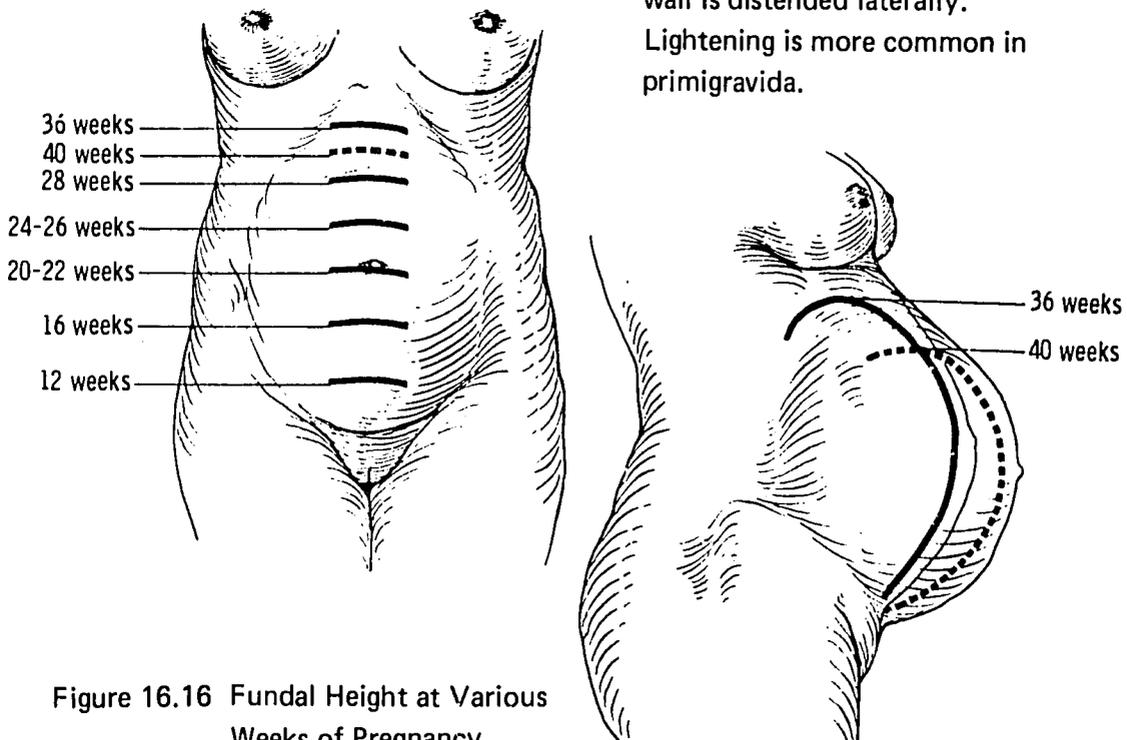


Figure 16.16 Fundal Height at Various Weeks of Pregnancy

9.3.4 Fetal Head or Body Size. The normal length (height) of the newborn is 50 cm. The normal weight at birth is about 2800 - 3000 grams. Fetal head or body size can be used to roughly estimate the duration of pregnancy.

The normal attitude of a fetus at term is universal flexion. Flexion of the head is important so that the smallest circumference will initially pass through the pelvic inlet. The head diameter increases approximately 1 cm every month after the 5th month of pregnancy. The diameter at term is about 19 cm. Correct measurement of this diameter before delivery is not easy even with the use of X-ray. It can be estimated from vaginal examination.

9.4 Over-Term Pregnancy

Pregnancy longer than 42 weeks is considered over-term or postmature. This occurs in about 4% of all pregnancies.

9.5 Routine Prenatal Care

The goal of antenatal (or prenatal) care is to promote healthy newborns and healthy mothers, particularly through prevention or early detection of medical problem and early treatment.

9.5.1 Preventive Care. Prevention is better than cure. There are many complications during pregnancy that can be prevented, and many diseases can be detected early. Toxemia of pregnancy is a good example. Following clinical advice, a woman comes to be examined earlier than usual when she feels unusual symptoms.

Some medications are used as preventive measures. The common medications are :

(1) Multiple vitamin tablets or capsules

(2) Iron tablets (1 tablet three times daily after meals). The woman should be informed of the change in stool color.

(3) Folic acid tablets. This medication is used to prevent folic acid deficiency anemia but it is not considered as iron. The most common type of anemia in Thailand is iron deficiency anemia.

Chloroquine tablets might be needed by given to women in malaria-infested areas, and tetanus toxoid immunization is encouraged to protect both the mother and the newborn.

Nutrition education for the mother is given during pregnancy and puerperium, including lessons on feeding the newborn (see Nutrition Module).

Important Note : Almost all drugs have some effects on the fetus. Some drugs, especially the anti-nausea drugs, may cause fetal deformities. The following drugs, however, are considered relatively safe during pregnancy : aspirin, chloroquine, iron, folic acid, penicillin, and tetanus toxoid. Tetracycline, on the other hand, is contraindicated during pregnancy. It is best to make sure before giving any drugs to pregnant women, especially new drugs.

9.5.2 Treatment of Common Complications and Minor Discomforts :

(1) Anemia. This is the most common condition found during pregnancy. Diagnosis can be made by routine examination of hemoglobin or hematocrit. The type of anemia can be identified by blood smear. The most

common type of anemia in Thailand is iron deficiency anemia. Therefore, iron tablets should be used routinely. Stool examination to exclude hookworm in cases of severe anemia is recommended. Megaloblastic (large cell) anemia is treated with folic acid. Patients with severe anemia of any type during pregnancy should be referred to a physician.

(2) Chronic Cough. Coughing longer than a period of one month requires further investigation. Pulmonary tuberculosis should be excluded by sputum examination or chest X-ray. New cases should be referred to a physician or to the Tuberculosis Control Center.

(3) Shortness of Breath (Dyspnea). Heart failure should be excluded by physician especially when the shallow breathing symptom is accompanied by pitting edema and palpable liver and spleen.

(4) Burning Urination. This symptom is almost always caused by cystitis or urethritis. Catheterization may be a cause.

(5) Morning Sickness (Nausea). The symptom begins early in pregnancy and usually disappears after the 12th week. The symptom can be minimized by :

(a) Avoiding fatty or spicy food. Hard and relatively mild food is recommended, such as baked or boiled rice, or glutinous rice which is comparable to crackers.

(b) Taking small amounts of food more frequently.

(c) Upon awakening in the morning, sudden rising from bed should be avoided since it may cause dizziness.

Severe symptoms of nausea or vomiting need the attention of a physician. Anti-nausea medication may be required in such a case. Hospitalization is advised in a severe case that requires intravenous (IV) fluid therapy.

(6) Heartburn. This symptom may occur during the last weeks of pregnancy due to the enlarged uterus pressing on the intestines causing delays in the passage of food through the system. Heavy meals should be avoided.

(7) Constipation and Rectal Piles (Hemorrhoids). These problems are improved by :

(a) Intake of fresh vegetables and fruits,

(b) Intake of adequate drinking water, and

(c) Adequate and regular exercise, such as a daily walk for some distance.

(8) Fungus Infection of Vagina. A woman may complain of white vaginal discharge with itching around the introitus and perineum. One percent gentian violet solution is applied in such a case. Antifungus suppositories (nystatin, mycostatin) are also used, but these are relatively expensive.

9.6 Recommend Family Planning Services

Pregnancy is contraindicated (or not suitable) for women with the following types of history.

- Grand multipara (more than 8 pregnancies)
- Repeated postpartum hemorrhage
- Repeated stillbirths
- Repeated toxemia of pregnancy
- Repeated Caesarean section
- Infective pulmonary tuberculosis
- Heart failure
- Diabetes mellitus (Delivery of 4,000 grams or more newborn is suggestive of the disease)

9.7 Recognize High Risk Pregnancy

The following are high risk factors that may be revealed in the history-taking, physical examination, or laboratory examination.

9.7.1 History:

(1) Age less than 16 years or more than 35 years, especially in primigravida.

(2) Previous Pregnancies and Labors

Last pregnancy more than 10 years before this one

Grandmultipara

Caesarean section

Difficult previous delivery

Retained placenta

Antepartum or postpartum hemorrhage

Habitual abortion (more than 3 spontaneous abortions)

Stillbirth or neonatal death

Toxemia of pregnancy

Dystocia or prolonged labor

(3) Previous Illness

Heart failure

Diabetes mellitus

Pulmonary tuberculosis (a chronic cough that lasts longer than 2 - 3 weeks should be investigated)

9.7.2 Physical Examination:

Shorter than 145 cm

Deformities, especially of the legs or pelvis

Very pale

High blood pressure (over 140/90 mmHg)

Edema (check for albuminuria)

Transverse lie or breech presentation

Vaginal bleeding

Important Note: A vaginal or rectal examination in cases of antepartum hemorrhage is very risky and, therefore, is contraindicated unless surgical treatment is available, blood is prepared, and the procedure is carried out by an experienced person.

9.7.3 Laboratory:

- Anemia (confirmed by low hemoglobin or hematocrit)
- Pulmonary tuberculosis (sputum culture, X-ray)
- Albuminuria (may be accompanied by hypertension or edema)
- Diabetes (positive urine sugar)

10. PREVENTION AND MANAGEMENT OF SERIOUS COMPLICATIONS OF PREGNANCY

Serious complications of pregnancy include the following:

- (1) Toxemia
- (2) Antepartum hemorrhage
- (3) Infection
- (4) Premature delivery
- (5) Prolonged labor
- (6) Stillbirth

It is estimated that, the incidence of high risk pregnancy is about 15% and the incidence of serious complications is about 10%.

10.1 Prevention of serious complications

10.1.1 Screening and Referral. Cases that should be referred immediately include all high risk cases and all serious complication cases. Signs that should be given special attention during antenatal care (ANC) include hypertension, edema, albuminuria (especially with hypertension or edema), paleness (anemia), transverse lie or breech presentation.

10.1.2 Guidelines for Referral. There are cases that the wechakorn can take care of during ANC, but for whom hospital delivery is recommended:

- (1) Younger than 15 years of age
- (2) Older than 35 years of age, especially if primigravida
- (3) Last pregnancy longer ago than 10 years
- (4) Grandmultipara
- (5) Caesarean section for previous delivery
- (6) History of retained placenta, antepartum or postpartum hemorrhage, prolonged labor, or other pregnancy or labor difficulties
- (7) Shorter than 145 cm
- (8) Deformed pelvis
- (9) Premature leakage of the amniotic fluid (premature rupture of the fetal membranes); Wechakorn can care for cases without fever, but cases with fever should be sent to the hospital.

Other cases require immediate referral for ANC to be performed by a physician:

- (1) Habitual abortion
- (2) History of repeated stillbirth or neonatal death

- (3) Pulmonary tuberculosis
- (4) Heart failure
- (5) Diabetes mellitus
- (6) Definite hypertension (140/90 mmHg), (to be considered definite hypertension, this measurement should be taken over an interval of at least 6 hours)
- (7) Thyrotoxicosis (toxic goiter)
- (8) No fetal movement for 48 hours, or fetal heart beat not audible

10.1.3 Cases that require hospital care immediately:

- (1) Excessive vaginal bleeding, especially with low abdominal pain. Passing of numerous grape-like cysts is even more significant.
- (2) Marked paleness
- (3) Hypertension (over 140/90 mmHg), edema, and albuminuria. The presence of only 2 of these signs is enough to indicate immediate referral to hospital.
- (4) Positive sputum examination for pulmonary tuberculosis
- (5) Transverse lie, breech presentation, prolapsed arm in labor
- (6) Small or moderate amount of vaginal bleeding with constantly hard uterus
- (7) Vaginal spotting in early pregnancy, accompanied by low abdominal pain on one side, with or without signs of intra-abdominal hemorrhage (hard abdominal wall, pale complexion, and no sign of external bleeding)

11. PROCEDURES FOR ABDOMINAL EXAMINATION

11.1 Inspection:

11.1.1 Size. An unusually large abdomen may be found in cases of polyhydramnios (more amniotic fluid than usual), multiple pregnancy, or unusually large fetus.

11.1.2 Shape. Pendulous abdomen or diastasis recti may be the cause of poor abdominal pressure during labor. A transversely ovoid shape may be suggestive of transverse lie, and a triangular shape with the apex downward may be suggestive of frank breech.

11.2 Palpation

The fundus should be palpated to determine its level and to feel the upper pole of the fetus (head or breech). The fetal back and lower pole should also be palpated, and the presenting part is palpated to find out whether most of the presenting part will pass through the inlet. This can be done by the examiner standing at the bed side, facing in the same direction as the patient (for the previous 3 palpations the examiner would be facing the opposite side). One hand is placed on each side of the presenting part. The tips of the fingers then point toward midline along the inguinal canals. The closer the tips of the two hands come together, the less the degree of engagement. The occiput and

sinciput (anterior fontanel) may be palpated. In the deflexed attitude (face, brow, or sinciput presentation) the cephalic prominence is palpated. The closer the prominence to the fetal back, the greater the degree of extension. The methods of palpation described above are called Leopold's Maneuvers.

Overriding of the head over the pubic symphysis may be suggestive of cephalopelvic disproportion.

11.3 Auscultation (listening to the fetal heart sound)

The fetal heart sound (FHS) can be heard most clearly through the fetal back or shoulder. In a cephalic presentation, the FHS is usually best heard in the lower part of abdomen. In a breech presentation the site is higher or above the level of the umbilicus in a full-term fetus.

The fetal heart rate is normally about 120 - 160 beats/min. It is a significant sign of the living fetus and its status. As described previously, changes in fetal heart rate may suggest fetal anoxia (fetal distress). Fetal distress may also produce meconium stained amniotic fluid. If there is a very thick abdominal wall, or during strong contractions, the FHS may not be heard. Contraction of the uterus is the cause of temporary anoxia of the fetus. Tetanic contraction is, therefore, dangerous.

Pulsation of the aorta may be heard through a fetoscope or stethoscope. The FHS can be heard when the examiner places an ear at the appropriate site on the abdomen. The instrument that is used to detect FHS as early as the 12th week of gestation is called a Daptone.

12. PROCEDURES FOR ASSISTING NORMAL LABOR

Labor is considered normal when the mature fetus is in a cephalic presentation, flexion attitude. The durations of normal labor are 6 to 8 and 12 to 16 hours in multipara and primigravida respectively. In the broad sense, normal labor should imply a normal pregnancy history (without high risk factor).

12.1 First Stage:

(1) Clean the vulva, pubis, and upper part of the inner sides of the thighs. Pubic hair need not be shaved. Enemas are given except in the case of antepartum hemorrhage. The patient should be bathed.

(2) If labor pains are not too strong, walking may be helpful physically and psychologically.

(3) NPO (nothing by mouth, except small amounts of water)

(4) The bladder should be emptied frequently. Catheterization is not recommended because of the risk of infection.

(5) I.V' 5% D/W (dextrose 5% in water) drip may be helpful in relatively prolonged labor.

(6) The patient should be attended at all times.

(7) A morphine derivative (pethidine 50 - 100 mg IM) may be used with or without tranquilizers (valium, phenergan). Good judgment is required before using any drugs during labor.

(8) The attendant should observe the intensity, duration, and frequency of uterine contractions.

(9) Fetal heart rate should be checked every hour at the beginning of first stage and every 10 to 15 minutes when delivery is imminent. The color of amniotic fluid is also observed.

(10) There should be a vaginal or rectal examination every 3 hours early in first stage labor, then every hour or when appropriate.

(11) Abnormal findings should be reported to the attending physician. Hospital referral may be required.

12.2 Second Stage :

(1) Arrange position for delivery.

(2) Clean (scrub) the vulva area, paint or spray with antiseptic solution, cover the area with sterilized sheets to expose only the vulva.

(3) After the cervix is fully dilated, rupture the membranes if needed.

(4) Perform episiotomy, after local anesthesia.

(5) After fetal delivery, give syntocinon 10 units IM.

(6) After placental delivery, ergot 1 amp. IM.

(7) Abnormal conditions such as prolonged labor should be reported.

12.3 Third Stage :

A case of retained placenta after one hour should be referred to a physician. Early referral is needed in cases of severe hemorrhage.

(1) Observe signs of placental separation

(2) Apply fundal pressure

(3) Examination of the placenta

12.4 Fourth Stage :

The so called fourth stage is ended when there is not heavy bleeding, and only red lochia (lochia rubra) is observed. The mother should be observed for about 2 hours after bleeding stops. Uterine contraction, bleeding, blood pressure, and pulse rate are checked. Family planning may be discussed at this time if the woman shows her interest.

13. PROCEDURES FOR EXAMINATION OF THE NEWBORN

(1) Observe respiration, skin color, and bleeding (especially at the umbilical cord).

(2) Observe any congenital abnormalities (such as cleft palate, hare lip), eyes, ears, extremities, genital organs, anus, etc.

(3) Auscultation of the heart and lungs.

14. PROCEDURES FOR DIAGNOSIS OF TOXEMIA OF PREGNANCY

The medical history, physical examination and lab tests will reveal the following in cases of toxemia of pregnancy :

- (1) History of previous toxemia
- (2) Warning signs of preeclampsia, or eclampsia, such as headache, blurring vision, chest pain, decreased urine output, and edema
- (3) Blood pressure more than 140/90 mm Hg
- (4) Edema of both legs
- (5) Albuminuria
- (6) Convulsion (refer to hospital immediately)

15. PROCEDURES FOR RETAINED PLACENTA

This condition can be divided into retention before placental separation and retention after separation. A retained placenta before separation is caused by the invasion of the placenta deep into the basal part of the endometrium or even down to the myometrium. Retained placenta after separation is caused by poor uterine contraction, cervical contraction, or full bladder. A diagnosis of retained placenta can be made by fundus compression.

The immediate danger from a retained placenta is heavy bleeding particularly in the case of partial placental separation. Delayed complications are hemorrhage and infection. A retained placenta before separation is treated by manual removal under anesthesia, or hysterectomy if manual removal cannot be carried out. Retention after separation is treated by emptying the urinary bladder, applying fundal pressure, manual removal, or waiting until disappearance of the cervical contraction. Syntocinon may be used (10 units IM or IV drip). Manual removal under anesthesia is needed in some cases. Management in hospital is required.

16. PROCEDURES FOR REPAIR OF EPISIOTOMY WOUND

An episiotomy, or a tear deep into the muscle must be repaired. The lithotomy position is more convenient if the woman is not in this position at the time of delivery. Scrubbing the vulva again is recommended. If possible, the sheets, gown, and gloves should be changed. (To avoid repeated hand scrubbing, the gown should be removed first and the gloves should be carefully removed so that the hands are not contaminated.)

Instruments that may be needed include the following:

- (1) Needle holder (1)
- (2) Noncutting needle for muscles and cutting needle for skin
- (3) Scissors (1)
- (4) Arterial forceps (2)
- (5) Toothed forceps (1)
- (6) Tampons (2 - 3)
- (7) Chromic catgut (00)
- (8) Silk (00)

To suture the vaginal muscles, use interrupted stitches; in the mucosa, use continuous stitches.

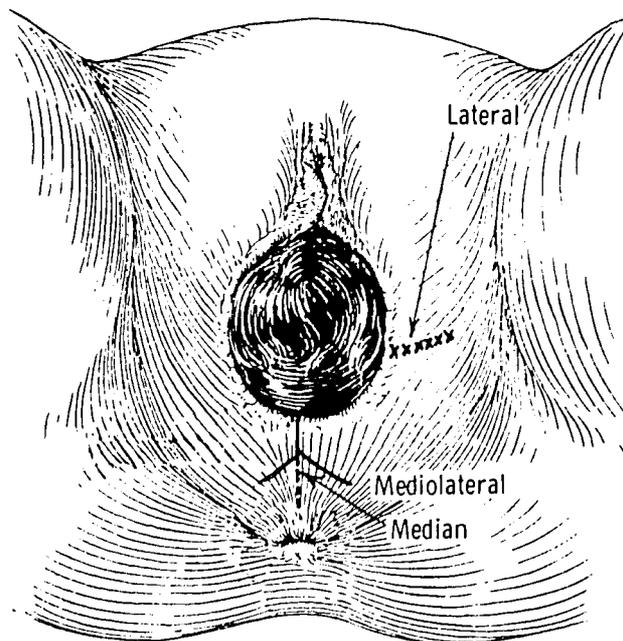
For skin closure use interrupted silk stitches. For subcutaneous stitches use catgut suture.

To stop bleeding:

- (1) Massage uterus to expel blood clots in the uterine cavity.
- (2) Insert tampon, its tail may be clamped to the sterile sheet above.
- (3) Begin the suture deep into the bottom of the tear.

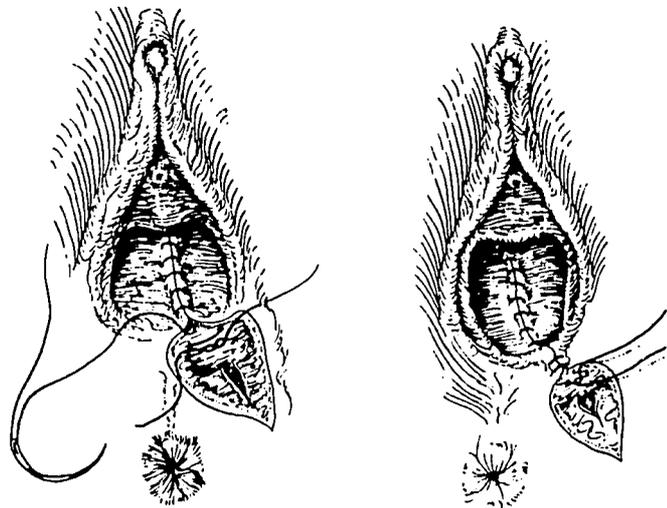
The basic principle of this procedure is to stop bleeding and to close spaces where collection of blood clots may be the site of infection. Approximation of tissue (cut or torn) is also an objective. Approximation generally occurs naturally when the woman brings her thighs together.

After the repair is completed, do not forget to remove the tampon. Massage the uterus again. Use a pad to absorb the lochia.

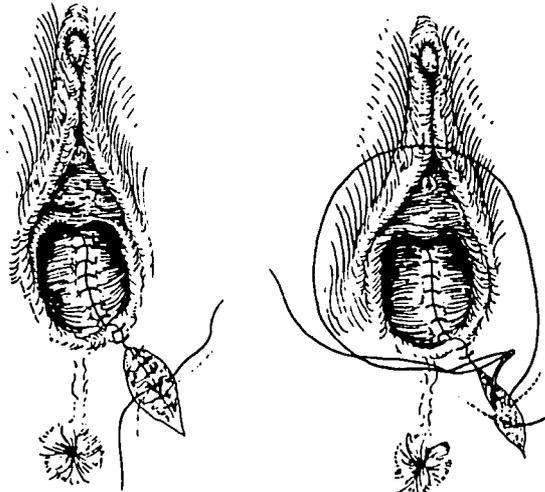


1. Right Medio - Lateral
2. Median
3. Left Medio - Lateral

Figure 16.17 Three Types of Episiotomy



1. Continuous suture of mucosa with inverted suture of perineal body
2. Mucosal suture continued in skin and tied with inverted suture



3. Closure of levator ani and perineal musculature
4. Skin closed subcutaneously

Figure 16.18 Repair of Episiotomy

17. PROCEDURES FOR CARE OF THE NEWBORN

(Child Care or Well Baby Clinic)

- (1) Health education for the mother
- (2) Immunization
- (3) Follow up the child for growth and development
- (4) Nutrition counseling

17.1 Health Education.

In 1971, death of Thai infants occurring during the first year of life were distributed as follows:

During the first 6 days	11.3%
7 - 27 days	14.9%
28 - 59 days	15.9%
2 - 6 months	38.3%
7 - 11 months	15.2%
Unknown	4.4%

17.1.1 Causes of Neonatal Deaths (during the first 4 weeks):

- (1) Premature birth (birth weight less than 2500 gm)
- (2) Difficult labor and delivery (dystocia)
- (3) Generalized infection
- (4) Malnutrition
- (5) Tetanus neonatorum (mostly due to nonsterile cutting of the umbilical cord)
- (6) Respiratory tract infection

17.1.2 Deaths during the Second to Sixth Months. Breast feeding provides adequate antibodies for many diseases. Breast milk is better than cow's milk in many other ways. Causes of death during the second to sixth month include:

- (1) Respiratory tract infection (e.g., pneumonia),
- (2) Gastrointestinal tract infection (nausea, vomiting, and diarrhea), and
- (3) Vitamin B1 deficiency.

17.1.3 Deaths during the Sixth to Twenty-fourth Months. Malnutrition and infection are the main causes of death in this period.

17.1.4 Deaths during the Second to Fifth Years. The causes are the same as those for the 6th to 24th months. Protein malnutrition delays brain growth.

17.1.5 Deaths during Fifth to Fifteenth Year. The main causes are infection and accidents. Most of the causes are preventable.

17.2 Immunizations

Immunization is one of the most important services provided by wechakorn. Wechakorn have to emphasize the importance of immunization to their colleagues. Prevention is always better than cure.

Guidelines for infant and child immunization in rural area are:

<u>Age</u>	<u>Vaccination</u>
Newborn	BCG.
1 month	DPT + oral polio vaccine
2 months	Same as 1 month
9 months	Same as 1 month
4 - 5 years	DPT + booster dose of oral polio vaccine

There may be different methods or programs of immunization, but the following suggestions are universal:

(1) The period between two immunizations of the same type should be at least 1 month.

(2) Immunization should be postponed if the child is having fever (B.T. over 38°C).

(3) Every child needs immunizations.

(4) Every immunization should be recorded and followed up.

17.3 Growth and Development

17.3.1 Growth. Growth is the result of increasing number of body cells, especially during the early years (2 - 3) of life. Later, growth is the result of enlargement of the cells. Weight and height are the most practical indicators of growth. They should be recorded regularly every month up to 3 years of age, then every 2 - 3 months.

Malnutrition, infection or parasitic infestation may delay growth. Heredity and race are less important factors in growth.

School teachers and health post volunteers may be helpful in keeping records of school children and of preschool age children provided scales are available to accurately check weights.

Unusual delays in growth should be taken care by wechakorn as follows:

- (1) Investigation for chronic infection
- (2) Investigation for anemia
- (3) Inquire about history of chronic diarrhea
- (4) Investigation for malnutrition and parasitic infestation
- (5) Advice on appropriate nutrition
- (6) Socioeconomic problem

17.3.2 Development of the Child

Development of the child means changes in movements or behavior in accordance with increasing age. Growth and development are related. Basic principles of development are:

(1) Development depends upon a child's nervous system. One cannot train a child to perform activities before the child is ready. For example, the child may not be able to control urination (voiding) or bowel movements unless development of the internal sphincter of the urethra or anal sphincter is complete.

(2) Development is a continuing process, from the intrauterine period until adult life.

(3) Development begins at the upper body and progresses downward; hands are developed before legs, for example.

(4) The sequence of development in children is more or less the same, but the rate of development can be quite different.

Normal Development

<u>Behavior (Activities)</u>	<u>Age</u>	
	<u>Average</u>	<u>Range</u>
1. Smile	5 weeks	4 days - 7 weeks
2. Grasping	5 months	4 - 6 months
3. Sitting without assistance	6 months	4 - 12 months
4. Speaking (one word)	11 months	8 month - 4 years
5. Walking	13 months	6 months - 4 years
6. Control of urination	18 months	1 - 5 years
7. Dressing	3 - 4 years	2 - 5 years

Speaking, control of urination, and walking are reliable indicators of the development of the child. Refer delayed-development children to physicians.

17.4 Nutrition Counseling

Advice all mothers on

- (1) Nutrition of infants and children.
- (2) High protein diet highly recommended during pregnancy.
- (3) Allow the children adequate play with friends, and promote exercise.

Demonstration and various other methods of education are used to promote understanding and practice of appropriate food selection and preparation. The mother is generally the most important person in this regard. She should be contacted first, but other members of the family should not be neglected.

Special attention to nutrition is required at the following times:

- (1) At 1 year of age
- (2) When the child is ill
- (3) At weaning period
- (4) In cases of unusually slow growth

The underlying causes of nutrition problems are financial and educational. Problems of poverty and inadequate education have to be solved along with health problems.

Malnutrition. (see Nutrition Module) After 4 months of age, the child needs other food to supplement breast milk. Although the incidence of malnutrition among Thai children is relatively high, most of the cases are not serious. Only the average body weight is lower than normal.

A malnourished child is usually associated with either upper respiratory tract infection, pneumonia, pertussis, diphtheria, measles, chickenpox, gastrointestinal tract infection or diarrhea, pulmonary tuberculosis, or intestinal parasitic infestation.

Wechakorns are responsible for helping to prevent these diseases by educating the parents:

- (1) Cleanliness is always stressed, especially in food preparation.
- (2) Provide supplementary foods in addition to breast milk.
- (3) Immunizations can prevent pulmonary tuberculosis, measles, diphtheria, pertussis, and polio.
- (4) Prevention and treatment of diarrhea and dehydration are essential for maintaining good nutrition. Wechakorns can advise mothers to prepare clean water, to mix in salt and sugar, and to use this solution in case of diarrhea. IV fluid should be available at all time. If an ORS (oral rehydration salt) packet is not available a home-made ORS constituted of ½ teaspoon of table salt, 2 tablespoons of sugar and one bottle (750 ml) of boiled water should be taken.

MODULE 17
FAMILY PLANNING

NOPADOL SOMBOON, B.Sc. in Pharm., M.D., Dip. in Obst. (N.Z.)





MODULE 17

FAMILY PLANNING

1. INSTRUCTIONAL OBJECTIVES

After completion of this module, the wechakorn will be able to:

- (1) Describe the anatomy and physiology of female reproductive organs.
- (2) Diagnose conditions for which oral contraceptive pills are contraindicated, as follows:
 - Liver disease
 - Diabetes mellitus
 - Heart disease
 - Hypertension
 - Kidney disease
 - Allergic disease
 - Vascular disease
 - Breast tumors
 - Thyrotoxicosis or Hyperthyroidism.
- (3) Diagnose conditions for which IUD insertion is contraindicated as follows:
 - Pelvic inflammatory diseases
 - Pregnancy
 - Cervical cancer
 - Uterine myoma
 - History of abnormal uterine bleeding
 - Uterine anomalies
- (4) Explain or advise about contraceptive methods, as follows:
 - Oral contraceptive pills
 - IUD
 - Condom
 - Injectable contraceptives
 - Coitus interruptus
 - Abstinence
 - Cervical cap
 - Vaginal diaphragm
 - Vaginal douche
 - Spermicidal agents
 - “Safe period”
 - Combined methods
 - Vasectomy
 - Female sterilization
- (5) Provide service and give advice about different methods of family planning.

2. WHY HAVE FAMILY PLANNING ?

Family planning aims to limit the number of newborns, delay pregnancy, and ensure having a suitable number of pregnancies for a mother's economic condition and health, by using one of several methods of contraception.

It has been known for some time that there is no problem greater than the critical increase in population, especially in developing countries, including Thailand. For a long time, birth rate and death rate were in close approximation, that is the numbers of births per year and deaths per year were approximately the same. Thus the total population increased only slightly. There has been important changes during the last 150 years, and especially in the last 30 years. The numbers of births have gradually increased while longevity has increased and the death rate has rapidly fallen. This probably results from economic and social development, from the advance of medical sciences, and from the effectiveness of health personnel in fighting human diseases. The population growth rate in Thailand rapidly increased to its highest rate 3.5% per year before 1972, when compared to the growth rate in earlier years (about - 3.0%). Thailand then had one of the highest population growth rates in the world.

This increased rate of population not only affected the health and economic situation of individual families, but also affected the whole community, because community development could not keep pace with this rapid rate. The community is already short of adequate social and health services. Problems of excess population cause many obstructions to the development of the country and to improvements in social services, education, and health. The old belief "More population, more development" has changed. The important factors in national development are the conditions of society and the culture, the natural resources and the quality of people, but not the size of the population as believed previously.

To solve the problem of increasing population in Thailand, we need to find a method of decreasing the birth rate. It is not practical to solve the population growth problem by increasing the death rate, hoping for a war or famine or to move people to other parts of the world. Thus, the only way to solve the problem is to reduce the number of births by using different methods of family planning in combination with improved education, social and economic development.

The peace and welfare of a population primarily depend on the fight against excess population. The aim of family planning is to improve human welfare. Family planning will give each individual a chance to improve his or her ability and quality of life which, in turn, will create happiness and prosperity for his/her own family, for society and, ultimately, for the nation as a whole.

3. GOVERNMENT POLICY AND PLANS CONCERNING POPULATION

3.1 Family Planning Policy

In March 1970, the Thai government decided to establish policies for effective population control. The policy stated that the government will support people in providing freedom in selection of family planning services to help solve problems due to the increase of population which was considered to be an important obstruction to national socioeconomic development.

3.2 Family Planning and The Fourth National Socioeconomic Plan (1970-1981)

To reduce the rate of population increase from 2.5 to 2.1 per cent by the end of the planning period, the areas of service were expanded to cover many more people, especially in distant rural areas, and more alternative methods of family planning were also provided. The strategy of family planning to achieve its objective, included:

- (1) Expanding and improving services in high birth rate areas.
- (2) Supporting and improving the efficiency of personnel in both urban and rural areas.
- (3) Supporting propaganda and public relations efforts by using different mass media to attract people, so that they will understand and come for family planning services.
- (4) Supporting research and evaluation concerning family planning, especially concerning the efficiency of services.
- (5) Supporting and coordinating with official units or private agencies in performing family planning.

3.3 Target of Family Planning

Since 1970, the government has accepted family planning as a high priority national policy and plan. In that year the Ministry of Public Health and private agencies established a target to decrease the growth rate from 3.5 per cent (1970) to 2.5 per cent in 5 years (1976), and to 2.1 per cent by 1981. The specific family planning practice targets for the 1977 - 1981 fourth national economic and social development plan are provided in Table 17.1.

Table 17.1 Family Planning Targets Set under the Fourth National Economic and Social Development Plan (1977 - 1981), by Type of Service

Year	IUD		Pill		Sterilization	Injection		Total		Grand Total
	New Acceptor	Old Acceptor	New Acceptor	Old Acceptor	New Acceptor	New Acceptor	Old Acceptor	New Acceptor	Old Acceptor	
1977	95,000	298,817	350,000	691,072	90,000	40,000	35,800	575,000	1,025,689	3,201,378
1978	100,000	333,120	350,000	795,631	95,000	42,000	61,300	587,000	1,190,051	3,554,102
1979	105,000	368,798	360,000	888,548	100,000	44,000	85,020	609,000	1,342,366	3,902,732
1980	106,500	405,541	370,000	977,244	100,000	45,000	107,340	621,500	1,490,125	4,223,250
1981	106,500	440,430	385,000	1,061,937	100,000	45,000	127,740	636,500	1,630,107	4,533,214
Total	513,000	1,846,706	1,815,000	4,414 432	485,000	216,000	417,200	3,029,000	6,678,338	19,414 676

3.4 Family Planning As A Basic Right

Family planning, a human right, means that women have freedom to decide whether to become pregnant or not. Family planning is concerned directly with health. The health and welfare of a couple can depend on the number of children and the intervals between pregnancies. Multiparous women usually run more risk of complications in delivery. A family with more children also has more chance to get sick and to receive less care. Fathers themselves, if they have too much responsibility for the care of the family, will stand more chance of becoming sick. An important factor is the attitude of the community toward family planning. A community that is crowded will progress slowly, or not at all. There will not be sufficient jobs available for the people in the community. Problems of robbery or crime will be increased, a further burden on the community. Finally, the national security may be shaken.

4. POPULATION AND HEALTH SERVICE STATISTICS FOR NATIONAL AND PROVINCIAL PLANNING OF FAMILY PLANNING PROGRAMS

Thailand (1973)

Total population	41,334,152
Total population in Bangkok	4,143,000
Married women aged 15-44 years	4,736,970
Total population below 15 years of age	16,377,000
Population density	70 per square kilometer
Birth rate	41 per 1000
Death rate	11 per 1000
Population growth rate per year	3%
Population increase in 1970	1,182,000
Stillbirth rate	22.5 per 1000 live births
Maternal death rate	2.1 per 1000 live births
Population in rural areas	85%
Buddhists	94%
Total number of provinces	71
Total number of district	559
Total subdistricts	46
Total tambons	5,036
Total villages	59,934
Total health centers	252
Total subcenters	2,736
Midwife stations	1,577

Lampang Province

Total population	636,580
Total males	325,531
Total females	311,049

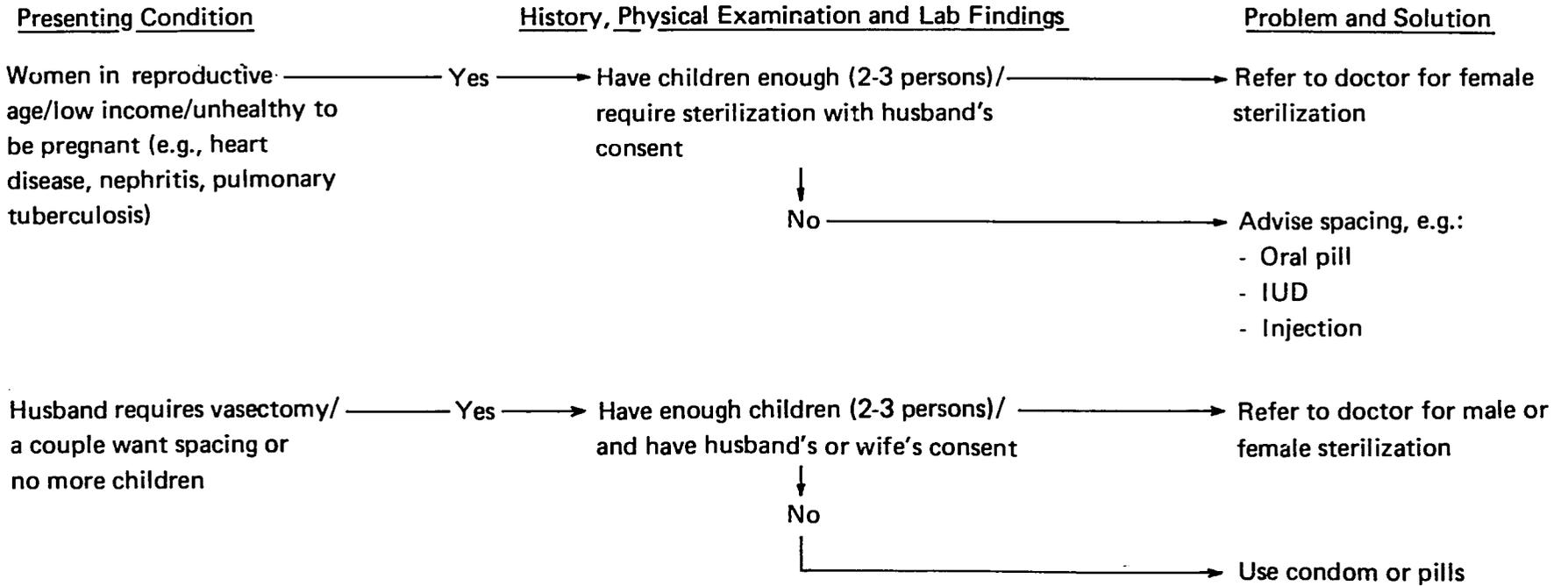
Note: Population Growth Rate = $\text{Births per 100} - \text{Deaths per 1000} \times \frac{100}{1000}$

Table 17.2 Population by Age in Hangchat District, Lampang Province 1975.

No.	Subdistrict	No. of Villages	No. of households	Male	Population Female	Children: under 6 years old				Women of reproductive age (15-49 years old)
						Total	Male	Female	Total	
1	Pong Yang Kok	13	1689	4308	4336	8644	425	394	819	2280
2	Maung Yao	10	1187	3176	3126	6302	430	439	869	1481
3	Hang Chat	9	1730	4545	4661	9206	486	472	958	2390
4	Vieng Tan	8	1206	3142	3062	6204	454	436	890	1437
5	Nong Lom	8	789	2153	2121	4274	221	207	428	1060
6	Mae Son	7	724	1915	1888	3803	263	281	544	934
7	Wo Kao	6	749	2128	1982	4110	273	228	501	950
Total		61	8074	21367	21176	42543	2552	2457	5009	10532

Children under 6 years constitute 11.8% and women in the reproductive period constitute 24.8%, of the total population.

Protocol 17.1 Family Planning



5. COMMON METHODS OF FAMILY PLANNING

5.1 Characteristics of Ideal Method for Family Planning

An ideal method for family planning should have the following characteristics:

- (1) Be low cost
- (2) Be effective
- (3) Be convenient
- (4) Be natural
- (5) Have few side effects and be safe for users
- (6) Be acceptable to both husband and wife

6.2 Methods for Gaining Acceptance of Family Planning Services

(1) Explain meaning and uses of family planning to people throughout the community.

(2) Explain the methods used in family planning, including the advantages and the effects of each method.

(3) Advise people to choose the method they like best, and the one that seems most effective for them.

(4) If people cannot decide on a method, then advise them to use condoms or IUDs or even sterilization, as appropriate.

5.3 Specific Family Planning Methods

The specific family planning methods and their respective advantages, rates of failure, disadvantages, and contraindications are presented in Table 17.3

Table 17.3 Family Planning Methods

Family Planning Methods	Advantages	Number of Pregnancies per 100 Women/year	Disadvantages	Contraindications
Temporary Methods				
1. Oral Pill	Effective; can be used for long periods.	0-2	Must be taken daily.	Liver disease; diabetes mellitus; hypertension; breast, uterine, or cervical cancer; and allergy.
2. IUD	One insertion can last 10 years	1-3	Uterine pain	Uterine infection, cancers of uterus or cervix.
3. Condom	Effective also in prevention of venereal diseases	-	Applied before each intercourse	None
4. Injection	Each injection lasts for 3 months	0-4	Irregularity of menstruation.	As for item 1.
5. Abstinence	Absolutely effective	0	Not practical	None
6. Withdrawal	Economical but less effective	30-38	Uncertain result and inconvenience	None
7. Cervical cap	Less effective	3-34	"	Cervicitis or cancer
8. Vaginal diaphragm	"	3-34	"	"
9. Douche	"	6-49	"	"
10. Spermicides (foam, tablet, aerosols, jelly or cream)	"	5-42	"	"
11. Safe period	Economical	14-35	Uncertain result especially in irregular period	None
12. Combined method	Better than single method	Lower than single method.	Depends on combination	Depends on combination.

Table 17.4 Family Planning Methods (Continued)

Family Planning Methods	Advantages	Number of Pregnancies per 100 Women/Year and Efficacy	Disadvantages	Contraindications
Permanent Methods				
1. Vasectomy	Permanent	0.003-0.004	May be irreversible	None
2. Female sterilization	Permanent	0.003-0.004	"	"
a. Abdominal tubal resection	"	0.003-0.004	"	"
b. Vaginal tubal resection	"	0.003-0.004	"	"
c. Laparoscopic tubal sterilization	"	99% efficacy	"	"
d. Culdoscopic tubal sterilization	"	98% efficacy	"	"
e. Hysteroscopic tubal sterilization	"	85-95% efficacy	"	"
No Family Planning Method Used	-	50-100	-	

Remarks: $\text{Pregnancy Rate} = \frac{\text{Number of Pregnancy}}{\text{Months with Family Planning Methods Used}} \times 1200 \text{ Months}$

6. ORAL CONTRACEPTIVE PILLS.

Oral Contraceptive pills are composed of two hormones, estrogen and progesterone. The pills were first used widely in Puerto Rico in 1956, and proved to be effective. Since that time the use of oral pills has spread rapidly over the world, and the ingredients have been gradually improved. In Thailand, the "pill" was first introduced in 1962.

There are 3 kinds of oral pills:

(1) Combined: every tablet contains both estrogen and progesterone. This was the first pill and is the most widely used at present.

(2) Sequential: the first 14 tablets of a series contain only estrogen, but the last 7 tablets contain both hormones. Some companies make a series of 28 tablets by filling another 7 tablets with placebo or vitamins; however, this kind of pill is out of date.

(3) Low-dose progesterone tablets.

Each package of pills may include 20, 21, 22, 28 or even 35 tablets.

6.1 How the Pill Prevents Pregnancy

It has been proven that the pill:

(1) Prevents ovulation.

(2) Can change the endometrium so it will not support pregnancy.

(3) May decrease the volume and increase the thickness of cervical mucus. This change usually begins on the 7th to 10th day of the menstrual cycle. At midcycle the cervical mucus will be so sticky that sperm cannot move into the vaginal canal.

6.2 How to Take the Pill

6.2.1 Original method. Users take first pill on day 5 of cycle and continue with 1 tablet orally every day at the same time for 20 to 22 days. Most users have withdrawal bleeding 2 to 4 days after the last pill, or not later than 7 days. This sequence is repeated for the next cycle, beginning again on day 6.

6.2.2 In the second method, the user begins with day 5 as in the first method, continuing each day for a total of 21 and then stopping for 7 days, or, if the series contains 22 pills, stopping for 6 days after taking the last pill. Then the cycle is repeated with a new package of pills.

6.2.3 Calendar day method. Beginning on the same date of every month of the calendar, the first pill in the package is taken on day 5 of the menstrual cycle, as in the first method. For user convenience, the series can commence on the first of every month, particularly during lactational amenorrhea.

6.2.4 In the fourth method, every package contains 28 tablets, but the last 7 tablets are only placebos or vitamins. The same method is used as for the 21 pills, 7 days no pills method.

6.2.5 With the fifth method, each package contains 35 tablets of the pill which is a microdose of progesterone. The user takes 1 tablet every day without stopping even during menstruation.

It should be remembered that the pill should be taken at the same time each day. If it is forgotten one day, two pills should be taken the next day. The series should not be stopped when the husband is not home for a period of time.

6.3 When to Take the Pill after Pregnancy Termination

6.3.1 Postdelivery. Ovulation may occur as early as 6 weeks post partum. Thai or Chinese women usually have no sexual relations during this period, taking the pill may begin 1 to 2 weeks before first intercourse. Pill will be effective only 6 days up from the first day.

6.3.2 Postabortion. Ovulation may occur earlier than in the case of term delivery. However, most women have no sexual relations for 3 to 4 weeks after an abortion. Taking the pill may commence 2 to 3 weeks after abortion or immediately after abortion.

6.4 Advice for Pill Users

(1) The best time to take the pill is after dinner, because of slow absorption and to lessen side effects, such as nausea; it should not cause much trouble during sleep.

(2) It should be taken at the same time every day, to regulate the hormone level in the blood.

(3) If one forgets to take the pill, it should be taken as soon as this fact is recalled, the next tablets should be continued on the same schedule. If forgotten for 1 or 2 days, 2 or 3 tablets should be taken immediately after recalling, and the same schedule should be continued. If forgotten longer than two days, the use of condoms or other methods is advised.

(4) Missing tablets frequently produces spotting, and the effectiveness of birth control is reduced, particularly when tablets are missed during the first ten days of menstrual cycles.

(5) Spotting when taking the pill will usually stop in 2 to 3 days. Any bleeding or spotting that continues longer than 5 days should be seen by a doctor.

(6) Amenorrhea may occur even when taking the pill correctly. It is advisable to continue the same schedule unless amenorrhea continues for 2 to 3 months, then a doctor should be consulted.

(7) If pill taking commences later than day 10 of the menstrual cycle it will not be effective during that cycle.

6.5 Contraindications for Using Oral Contraceptive Pills

6.5.1 Liver diseases or jaundice. It should not be used by women with a history of jaundice. In suspicious cases, liver function tests may be useful.

6.5.2 Diabetes mellitus. The oral pill will increase the requirement for insulin to control blood sugar, as for pregnant women. If the pill must be used this use must be closely controlled by the doctor.

6.5.3 Heart diseases, hypertensive diseases, kidney diseases. The oral pills cause sodium retention which worsens these diseases.

6.5.4 Allergic diseases such as asthma. In some cases the pill may aggravate or relieve allergic diseases, so women with such problems should be closely observed by the doctor in the first month of using the pill.

6.5.5 Thrombophlebitis or phlebothrombosis. Use of the pill will worsen these diseases, so women with varicose veins should not take the pill. Although this problem is not common among Asian women, use of the pill should be closely observed.

6.5.6 Breast cancer. Use of the pill will worsen the disease. Any known cancer must be treated.

6.5.7 Thyrotoxicosis or Hyperthyroidism.

6.6 Cautions to be Observed in Prescribing the Pill

Before giving a woman the first package of pills, one must be sure that she has none of the contraindicated diseases. If pills were given to her, symptoms would get worse. This could cause people to distrust oral contraceptive pills, because they would be afraid of having the same bad effects. Such fears could mean not achieving the goals of family planning. So, before prescribing the pill, some investigations must be done:

(1) A history must be taken to find out if she has any disease which contraindicate the use of contraceptive pills.

(2) A general physical examination, particularly blood pressure and breast examination, should be done.

(3) A vaginal examination and a Pap smear should be done every year. Urine analysis, especially for sugar and protein, should be conducted.

6.7 Side Effects of Oral Contraceptive Pills.

6.7.1 Nausea and vomiting, the most common side effects, occur in about 10% to 30% of pill users. This effect will appear with the first few tablets and will gradually decrease, until it disappears about the third month. This side effect may be corrected by decreasing the amount of estrogen in the pills.

6.7.2 Facial chloasma occurs in about 7% of users. This chloasma is the same as that observed in pregnant women. It may be a light "mask" on cheeks or lips, or it may be very dark. Exposure to sunlight may worsen the symptom. It may appear in 3 to 4 months, or in 10 to 12 months. After the woman stops taking the pill, the chloasma will gradually decrease, or at least not increase.

6.7.3 Increase in body weight. This is possible because of the effect of water and sodium retention caused by estrogen. It may also be an anabolic effect of progesterone.

6.7.4 Sore breasts have been reported in Europe and America in the first month of use, but this complication seldom occurs in Thai women.

6.7.5 Headache. There may be migraine headaches which occur during the use of oral pills.

6.7.6 Change in libido. Libido is increased in some and decreased in other persons. Thus, it is very difficult to differentiate the effect of the pill from psychogenic effects. There is no clear evidence that a change in libido is the effect of oral pills.

6.7.7 Mental change: Some women will feel depressed during use of the pill, and some feel nervous. However, few Thai women complain of this.

6.7.8 Leukorrhea. This is more common in users of sequential than of combined pills. This is probably because the first 14 pills of a sequence produce more cervical mucus.

6.7.9 Lactation. Use of the pill may reduce the amount, but not the quality, of lactation. There is no clear evidence of abnormal conditions in breast fed children whose mothers take the pill.

7. INTRAUTERINE DEVICES

Humans have known for centuries about inserting foreign bodies into the uterine cavity for birth control. For example, the ancient Egyptians placed stones in the uterine cavities of camels to prevent pregnancy during long desert journeys. Intrauterine devices widely used today include the Lippes loop, Copper-T, Copper-7, and the Dalcon shields. They are very commonly found in Thailand and neighboring countries because they can be easily inserted and removed, and are very effective.

7.1 How the IUD Works

The IUD may provide contraceptive protection in one or more of the following ways:

(1) It shortens the time of transportation of the fertilized ovum, renders it unsuitable for implantation.

(2) It changes the characteristics of the endometrium so that the ovum is not suitable for implantation.

(3) It may change the uterine fluid content – for example, increase protein or decrease histamine and carbohydrate.

(4) It may cause more contraction of the uterus, so that the fertilized ovum cannot implant.

7.2 Advantages of IUD

(1) It can prevent pregnancy immediately after insertion.

(2) It is about 98% effective.

(3) Fertility reoccurs when it is removed.

(4) It does not cause any disease, so it is safe for use.

(5) It is a low cost device.

7.3 Disadvantages of IUD

(1) Insertion can cause abdominal pain which will, however, subside in a short time.

- (2) There may be occasional spotting.
- (3) There may be menorrhagia in the first few cycles of use.
- (4) There may be leukorrhea.

Most of these symptoms will disappear in a few cycles. Only about 8% of IUD users will need to change to other methods.

7.4 Contraindications for IUD Use

- (1) Severe genital tract infection, pelvic inflammatory disease
- (2) Pregnancy or suspected pregnancy
- (3) Carcinoma of cervix or uterine corpus
- (4) Leiomyoma
- (5) History of abnormal uterine bleeding
- (6) Uterine anomalies such as bicornuate uterus

8. STERILIZATION

Sterilization is permanent contraception and is generally irreversible. Therefore, it is done only when the family is complete. Both females and males can be sterilized.

8.1 Female Sterilization (e.g., Tubal Resection)

It must be explained clearly to the candidate that it is very difficult and generally impossible to reverse female sterilization later. The couple must accept this fact and sign consent papers. The couple should already have their children. It takes only 10 to 15 minutes to perform a tubal resection, but it can prevent pregnancy forever. It has no hazards, and its cost is very low, considering it is effective for a lifetime. Its disadvantages are that it must be done only in a hospital or a well equipped health center, and that it is very difficult to reverse if someone wants more children later.

8.1.1 Timing. The appropriate times for female sterilization are post-partum, post abortion, or intervals between pregnancies.

8.1.2 Methods for female sterilization. The procedure for "tubal resection" female sterilization is, first, to reach the fallopian tubes via the abdominal cavity. A part of each tube is cut off or cauterized to prevent sperm from reaching and fertilizing the ovum. There are many ways to approach the abdominal cavity, e.g. via suprapubic, subumbilical or vaginal routes. There are also many conventional methods of tubal resection, including cauterization, cutting off portions, and/or ligation.

Main types of female sterilization

(1) Conventional tubal resection. The procedure is as mentioned above.

(2) Special methods using endoscopes (e.g. laparoscope, culdescope).

The latter are usually not done post partum, but only in intervals between pregnancies.

8.2 Male Sterilization (e.g., Vasectomy)

This method is permanent, so the candidate must have completed his family. The procedure is very simple. Local anesthesia is applied at the scrotal sac beneath the penis. A small wound is opened and it is then easy to approach each vas deferens, to pick each vas up and cut out a part of it to prevent sperm from passing. There may be some sperm left in the distal end of the vas. Some people believe that it takes about 12 ejaculations, or 1 to 2 months after the operation, before the remaining sperm is all gone. In the meantime, the candidate should use condoms for birth control until there is no viable sperm in the semen analysis. Most candidates can resume sexual relations in a few days.

9. INJECTABLE CONTRACEPTIVES

At present, the most popular hormone used is medoxyprogesterone acetate, or Depo-provera. The usual dosage is only 150 mg. for 3 months' pregnancy prevention. Less commonly, 400 mg. is given for 6 months' prevention.

9.1 How to Use Injectables

- (1) Physical examination and history taking
- (2) Supply either 150 mg for 90 days, or 400 mg for 6 months or 180 days (6 months)
- (3) Give first dose on day 5 of menstrual cycle and then every 90 or 180 days according to size of dose.
- (4) Estrogen may be given for 5 - 7 days to stimulate menstruation each month.
- (5) Condoms should be used for the first 10 days after the first injection, because it takes 10 days for the injection to take effect.
- (6) Injections may be used post partum or post abortion the same as oral pills.

9.2 Disadvantages of Injections

- (1) Irregular menstrual periods
- (2) Amenorrhea
- (3) Irregular spotting, some have this problem for many months and some have spotting everyday for months.
- (4) Atrophic edometrium, This effect should be reversed, however, when injections are stopped. Ovulation may occur 3 to 12 months after the injection program is stopped, but it may take longer than that before pregnancy will occur.

9.3 Side Effects of Steroids

There may be some headache, chloasma, acne, or breast tenderness. If accepters have severe headaches or blurred vision, the injections should be stopped. Any accepter who has these symptoms should see a doctor. When injections are stopped temporarily, condoms can be used for birth control.

9.4 Contraindications

- (1) Varicose veins or thrombophlebitis
- (2) History of fainting and unconsciousness, which may be due to brain disease
- (3) Liver disease
- (4) Breast cancer
- (5) Abnormal uterine bleeding
- (6) Missed menstrual period

10. CONDOMS

There are 2 types of condoms. One has a round bottom, and the other type has another small sac attached to its bottom to collect semen. If they are carefully preserved and kept away from heat and sunlight, most condoms should be safe to use for a period of 2 years or more from their date of manufacture. Most condoms have a chemical agent to prevent oxidation, which would destroy their quality. Some companies produce 7 colors of condom to use each day of the week, as an aid to memory. Most condoms now contain a lubricating substance.

10.1 Directions for Use

(1) Apply during erection of the penis. Put the rolled condom on the tip of the penis and then unroll it to cover the whole length of the erected penis.

(2) When using the round-bottomed condom, leave about 1 cm of space for semen collection at the tip of the penis.

(3) The penis must be withdrawn immediately after the male orgasm; otherwise the penis will become smaller, which may cause the condom to slip. Users should be advised to hold the opening of the condom during withdrawal of the penis, to keep the semen inside. Some condoms have a tight opening in order to prevent slippage.

10.2 Advantages of Condoms

- (1) The condom is a very effective method if used correctly.
- (2) The condom is very simple to use.
- (3) It is harmless (no side effects).
- (4) It may prevent the spread of venereal disease from infected males.
- (5) Its use may delay the time of male orgasm, which makes the female happier.

10.3 Disadvantages of Condoms

- (1) If the vagina is not well lubricated, it may cause irritation to the penis.
- (2) One caution about using the condom is that old condoms may tear easily.
- (3) Some people may be allergic to the chemical agent in the condom.
- (4) It is not natural, which some people may dislike.

11. FOLLOW-UP OF FAMILY PLANNING PROGRAMS

In any family planning program, it is very important to follow up on cases. Following up cases will help in:

- (1) Increasing the continuation rate of participation in family planning, because the nurse or midwife can encourage some "lost" cases to return.
- (2) Assisting contraceptive users if side effects occur.
- (3) Correcting any wrong concepts which users may have concerning family planning and birth control.
- (4) Evaluating the program accurately.
- (5) Persuading friends of users to become interested in family planning.
- (6) Getting acquainted with users' relatives or husbands and answering questions they may have.
- (7) Supporting the mental health of users.

12. FAMILY PLANNING SERVICE PROGRAMS

In hospitals every kind of family planning service may be found, but in outside health centers there may be only a few services. However, every center should try its best to set appointment schedules for users to ensure correct use suitable to the conditions of users. A suggested schedule is shown in the following timetable:

<u>Birth Control Method</u>	<u>Appointment Frequency</u>	<u>Topics to Discuss and Give Advice on</u>
Oral pills	1 month, and then every 3 or 4 months	1. General feeling 2. Side effects
IUD	1 month, and then every 3 or 6 months or 1 year	3. Any related problems, including sex. 4. Feelings of neighbors, friends, etc.
Sterilization	5 to 7 days, to remove stitches	5. Menstruation
Injectable Contraceptive	every 3 months	

13. BREAST EXAMINATION FOR EARLY DETECTION OF BREAST CANCER

Oral contraceptive pills may exacerbate breast cancer, if present. Breast cancer may occur in nulliparous and multiparous women, and even in single women. So every acceptor should be advised to have a breast examination frequently, and particularly before commencement of a plan involving any

steroid hormone, either injectable or oral pill.

Breasts should be examined at least once a month. The best time is after menstruation, because before menstruation most women will have some breast engorgement, which might interfere with feeling any masses present at the time of the examination.

13.1 Examination Process

Accepters will be taught to do breast examinations by themselves, using the following steps in sequence:

(1) Any blouse or underwear is taken off. The acceptor sits on the rim of a bed, with legs dropping down over the edge of the bed, both arms parallel to the body. Examiner looks at the general shape of the breasts to observe any abnormalities such as retracted skin or nipples. In a self-examination, the acceptor sits in front of a mirror.

(2) The acceptor raises her arms fully above her head. The examiner looks again at the breasts to see if there is abnormal shape, or retractions.

(3) The acceptor is asked to press her hands firmly into the sides of her body. This makes the pectoral muscles contract fully. The examiner looks at the breasts again.

(4) The acceptor lies down on the bed, raising her left arm above her head, with a small pillow under her shoulder on the same side.

(5) The examiner palpates all 4 quadrants of the left breast systematically between of all fingers, commencing with the inner and upper quadrants. Palpation is then commenced with the outer and then inner areas and finally the nipple. Palpation is repeated for the right breast in the same maner.

(6) The examiner palpates directly behind the nipple with the fingers, then gently squeezes and looks for any discharge from the nipple. The same procedure is used on the other breast.

(7) The acceptor drops her arm down and places it laterally to the trunk. Breast palpation is continued into the axilla and beneath the pectoris major. This is also done for the other side.

(8) The examiner palpates the supraclavicular areas to see if there are enlarged lymph nodes or any tumor masses.

If a lump is found during palpation or examination the following things should be determined and recorded as follows:

(a) Size and consistency – a cancer mass is usually hard or firm, but its size varies.

(b) Smoothness – a cancer mass is usually irregular.

(c) Solid or cystic – a cystic mass is usually benign.

(d) Mobility – a cancer mass is usually fixed.

For any palpable mass, the woman should be seen by a doctor, immediately for a suspicious mass. Breast cancer is one of the leading causes of death of women. It is common in women aged 30 to 35 years.

13.2 Symptoms and Signs of Breast Cancer usually are:

- (1) Breast tenderness,
- (2) Breast discharges,
- (3) Abnormal shape of breast, and
- (4) Abnormal mass, mostly in the upper and outer quadrants.

13.2.1 Breast Tenderness. This symptom is common in young age group, 16 to 20 years. It normally occurs before a menstrual period. If breast pain or tenderness is localized or is not related to a period this indicates a breast tumor.

13.2.2 Discharge. Any discharge, clear or bloody, which is not milk may indicate a breast cancer.

13.2.3 Retracted Nipples. Breast cancer is often associated with retracted nipples.

13.2.4 Size. Cancer may increase breast size.

13.2.5 Color. Cancer may change the breast skin color to a reddish tint. However, this must be differentiated from color change caused by infection. Sometimes such a color indicates both infection and cancer combined.

14. VAGINAL EXAMINATION

The aim of a vaginal examination is to know the shape, size, and mobility of pelvic reproductive organs and the adnexal structures. It is to be done before insertion of an IUD and when accepters have problems.

14.1 Materials

- (1) One vaginal speculum
- (2) One sponge forceps
- (3) One kidney tray
- (4) Two cotton balls
- (5) One stirrups table, or plain table, for examination
- (6) One electric lamp or flashlight (torch)

14.2 Process

(1) The examiner arranges the patient in the lithotomy position, with the legs and stirrups covered by two pieces of cloth.

(2) The examiner washes hands and puts on gloves.

(3) The external genital organs are examined.

(4) A speculum is placed in the vaginal canal, while using the left hand to separate the labia major. The speculum should be lubricated with petrolatum jelly or prepared in the kidney tray. The patient is asked to push down a little during insertion, so that it will be easier.

(5) The speculum is passed in a 45 degree angle and is then turned clockwise until its blades are in a horizontal position. Its tip points posteriorly to the posterior fornix. The blades are opened to find the cervix. If the cervix is not found, the speculum is drawn back slightly until the cervix is clearly seen

between the blades. The examiner looks at the cervix and vaginal wall to detect any abnormality. In the case of an IUD user, the tail of the IUD should be at the cervical os (For a Lippes loop, blue = size A, black = size B, yellow = size C, and white = size D).

(6) If no nylon thread is seen, a cotton ball dipped in saline solution is used to wash out the area and improve visual exposure. If it is still not seen, the patient should be referred to a doctor.

(7) The examiner looks at the culdesac to find any bulging condition.

(8) The blades of the speculum must be closed up before drawing it out from the vagina.

(9) The manual vaginal examination is done by putting the 2nd and 3rd fingers of the right hand in and palpating the pelvic organs. The left hand is placed above the pubic symphysis so that the pelvic organs will be between both hands. First palpate the cervix, to determine its size and consistency, then the uterus, to determine its surface and mobility. Move the fingers toward the adnexal structures on both sides. The ovaries and tubes can also be palpated. Any abnormality should be recorded.

(10) Clean up the vulva after vaginal examination.

(11) Ask the patient to get up and dress.

(12) Advise the patient and make the next appointment.

Notes:

The bladder should be emptied before every vaginal examination, otherwise the structures cannot be clearly palpated. If necessary, catheterization may be done and the urine should be analyzed.

15. PROVIDING ORAL CONTRACEPTIVE PILLS SERVICES

15.1 Materials

(1) Check list which indicates what should be done, and lists cautions to observe.

(2) Sphygmomanometer

(3) Materials for urine analysis

(4) Materials for vaginal examination

(5) Materials for breast examination

15.2 Process

(1) History-taking (including past and present history)

(2) Physical examination, including breast and vaginal examination.

(3) Blood pressure taking, if blood pressure is more than 140/90 mmHg no birth control pill is given.

(4) Urine analysis.

(5) If there are no contraindications, 1 package of oral pills is given, with advice on how to use the pills.

(6) Appointment for next follow-up, as planned.

16. PROVIDING INTRAUTERINE DEVICE SERVICES

16.1 Materials

- (1) A container to boil water for instrument sterilization.
- (2) 2 kidney trays.
- (3) A pair of forceps to pick up instruments needed.
- (4) 3 tenaculums.
- (5) 2 uterine sounds.
- (6) 3 sets of 4-inch speculums.
- (7) 1 set of 5-inch speculums.
- (8) 2 uterine packing forceps.
- (9) 3 sponge forceps.
- (10) 2 sets of 7½-inch scissors.
- (11) 2 uterine hooks for IUD removal.
- (12) 2 log trays with covers, one for sterile instruments and the other for loops in zephiran solution.
- (13) A container for sterile cotton balls.
- (14) A container for sterile cotton swabs.
- (15) 6 pairs of hand gloves (sterilized by boiling for 5 minutes in water)
- (16) Antiseptic solution, Merthiolate for cervical cleansing and Zephiran for loop sterilization
- (17) 2 basins for used instruments and used hand gloves.
- (18) A rubbish container.
- (19) Examination table, with a rubber sheet covering at the end and a spare cotton sheet for covering the patient.
- (20) A small table for instruments and other materials.
- (21) A small table with a bowl containing water.
- (22) A small towel for hand drying.
- (23) Soap or any detergent for cleansing.
- (24) Electric lamp or flashlight (torch)

16.2 Process of IUD Insertion

- (1) History taking, to detect history of any contraindicated conditions.
- (2) Vaginal examination, to detect size and position of the uterus.
- (3) Choosing suitable size of IUD. Size C (medium) is used for a normal uterus, Size B for a smaller size uterus, and Size D for a bigger size uterus.
- (4) Place the Lippes loop in the inserter and follow this with the plunger until the tip of the Lippes loop is at the end of the inserter.
- (5) Apply the vaginal speculum until the cervix is clearly seen.
- (6) Grasp the cervix with a tenaculum.
- (7) Place the inserter with loaded loop into the cervical canal until a bar of the inserter contacts the cervix by pulling down the tenaculum.

(8) Hold the inserter with the left hand and push the plunger up to make the Lippes loop slip into the cavity.

(9) Draw the plunger back about 10 cm to prevent compression of the nylon thread. Draw out the inserter.

(10) Clean up the genital organs.

(11) Let the patient get up and dress.

(12) Advise patient and arrange the next appointment.

16.3 IUD Checkup

17.3.1 Material. The same materials are used in an IUD checkup as in a vaginal examination.

17.3.2 Process.

(1) Apply vaginal speculum using the same process as in a routine vaginal examination.

(2) Look for the IUD tail and observe its color.

(3) Remove the speculum.

(4) Make a vaginal examination after removal of the speculum.

(5) If the IUD tail is too long (beyond the hymenal level), it should be shortened.

(6) Let the acceptor know about her present condition, and give the next appointment.

(7) Any abnormal condition should be referred to a doctor.

(8) Perform a Pap smear for women aged more than 20 years.

17. "PAP SMEAR"

17.1 Materials

Same as for a vaginal examination, plus:

(1) Ayre wooden spatula for cervical scraping.

(2) Slides for smearing.

(3) Fixative solution (alcohol 95%)

(4) Pencil to write subject's name on one end of the slide.

(5) A jar containing fixative.

17.2 Process

(1) Proceed as in a vaginal examination, until the speculum is in place.

(2) Use the spatula to scrape the cervix with a clockwise rotation.

(3) Smear the material obtained thinly on the slide on which the name has already been written.

(4) Apply a cotton swab to the endocervical canal. Remove the swab and smear the material obtained on another slide and fix it in solution.

(5) After fixation for at least 30 minutes, pick up the slides and let them dry; they are then ready for mailing to the pathologist.

(6) Write the necessary history and findings on the request form and send it with the slides.

MODULE 18

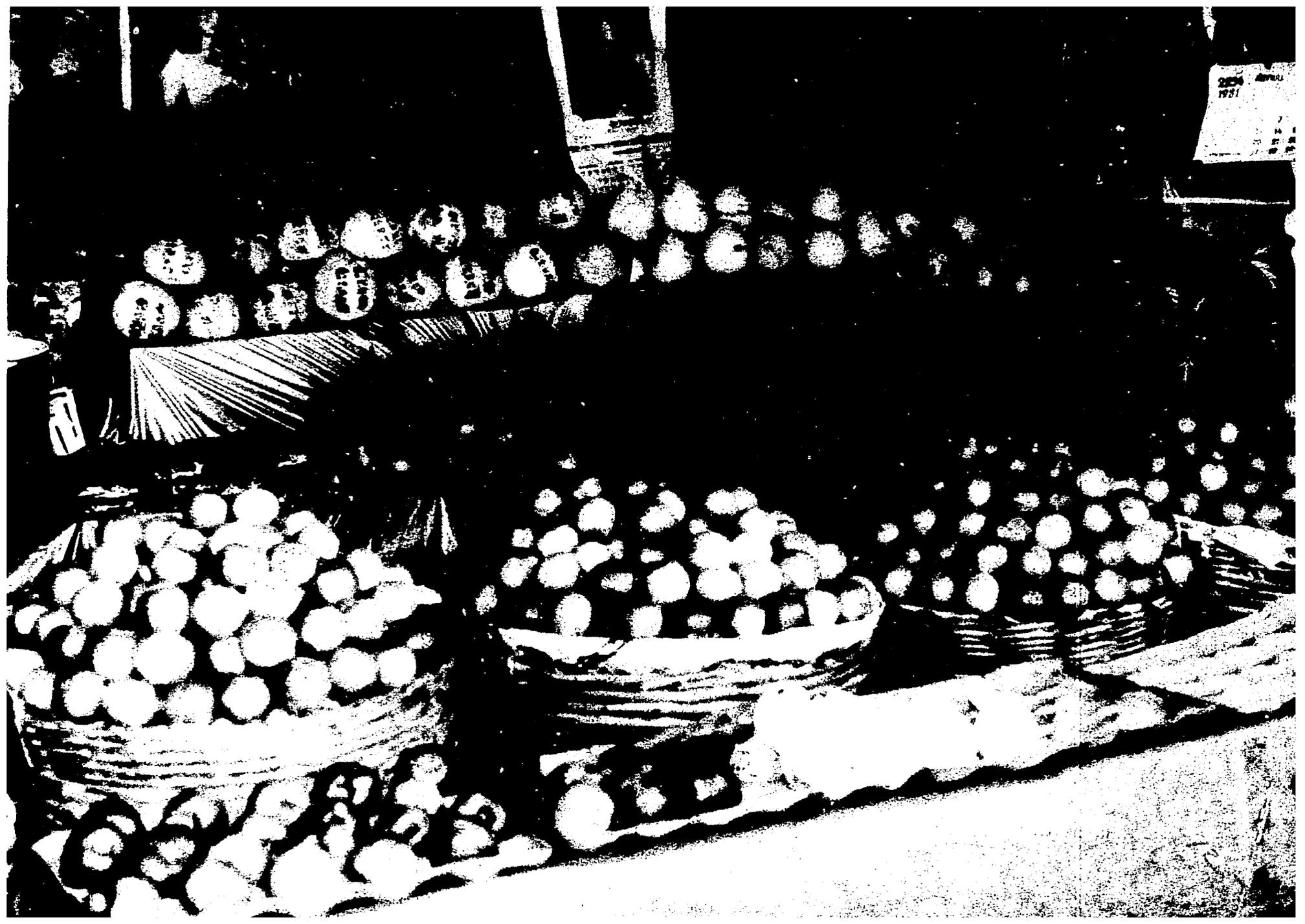
NUTRITION

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MODULE 18

NUTRITION

1. INSTRUCTIONAL OBJECTIVES

At the end of the course the wechakorn will be able to:

- (1) Explain the meaning of nutrition, food, nutrient, and their usefulness,
- (2) Aware of nutritional requirement of villagers and explain nutritional problems,
- (3) Give treatment for beri-beri, angular stomatitis, and simple goiter cases,
- (4) Give necessary care for toxic goiter, cardiac beri-beri, and protein-calorie malnutrition cases, and refer them to hospital or physician as indicated,
- (5) Give health education on malnutrition to patients and villagers,
- (6) Conduct a nutritional survey for a community, and
- (7) Plan an applied nutrition program for a community.

2. BASIC NUTRITION

2.1 Definitions

Nutrition is the applied science that deals with the relationship between nutrients and the health of humans or animals. It also includes the digestion, absorption and utilization of foods.

Foods are solid or liquid substances which can produce energy and heat and provide body growth and repair.

2.2 Usefulness of Foods

Foods provide the following:

- (1) Physical growth and repair,
- (2) Energy and warmth,
- (3) Resistance to infection,
- (4) Regulation of normal body functions, and
- (5) A healthy mind and body, as well as intelligence.

2.3 Nutrients

Nutrients are found in foods. Essential nutrients are protein, carbohydrates, fats, minerals, vitamins and water. Each nutrient has its own function, but the functions interrelate. Therefore, a combination of nutrients is required by a body for its normal function and growth. The amount of nutrients must be adequate and the composition of nutrients must be balanced to be called a balanced diet.

Generally food can be categorized into 5 groups:

- (1) Animal proteins, eggs, beans, and milk,
- (2) Rice, sugar, taros,
- (3) Green leafy vegetables,
- (4) Fruits; and
- (5) Animal fats and vegetable oils .

2.3.1 Animal Proteins, Eggs, Beans, and Milk. Foods of this group provide mainly protein with a variable amount of fat, minerals, and vitamins. They are the main source of daily protein. Animal meat, eggs, and milk are high quality protein which are essential for body growth and repair. Usually this kind of food is rather expensive, so Thai people receive an inadequate amount of protein. However, vegetable protein or beans and their products are largely consumed by the poor. A proper combination of vegetable proteins gives as high a quality protein as animal protein. Examples of vegetable proteins and their products are soy beans, ground nuts, red beans, soy bean milk, and bean curd. They can be mixed and cooked with animal protein or other foods.

2.3.2 Rice, Sugar, Potato, and Taro. This group provides mainly carbohydrates for energy. Usually Thai food contains a large amount of carbohydrate or rice because it is bulky. Foods of this group are, for example, rice, sticky rice, corn, potato, taro, and tapioca. But Thai people consume rice as a staple diet and use potato, taro starch, or flour with sugar and coconut milk as dessert. They are quite cheap and filling. Laborers consume a large amount of rice to suit their economic and body needs.

2.3.3 Green Vegetables and Produce. Foods of this group give varying amounts of carbohydrates, vitamins C and A, and minerals. Vegetables also provide roughage which can prevent constipation. Thailand has various kinds of green vegetables and produces them in adequate amounts all year round. Either leaves, fruits, stalks or flowers can be consumed or are edible. The common vegetables are lettuce, cabbage, broccoli, spinach, watercress, and cauliflower, for example.

2.3.4 Fruits. The nutritional value of fruits is similar to that of vegetables. They contain minerals, vitamins, and carbohydrates. Fruits contain relatively more carbohydrates than vegetables do. All kinds of tropical fruits are found in Thailand all year round. Sour fruits contain more vitamin C, while papayas and ripe mangoes contain more carotene or vitamin A. Taste, appearance and smell are very attractive. Fruits are popular among the rich as well as the poor.

2.3.5 Animal and Vegetable Fats. Fats are energy food but they give more calories than carbohydrates do. Meat, pork, eggs and beans also contain some amount of fat. Fats are classified into animal fats and vegetable fats.

The most common animal fat is lard, while butter is the least consumed. Animal fat also can be obtained from pork, beef, and chicken. The common vegetable oils or fats are coconut milk, beans, and sesame. Vegetable oil is popular among the Thai Moslem people while ethnic Thai people prefer coconut milk. At present vegetable fat or oil is becoming more popular because it has been proved that it does not cause cardiovascular disease.

2.3.6 Carbohydrates. Carbohydrates provide the main source of energy in rural Thai diets. Carbohydrates consist of carbon, hydrogen, and oxygen

atoms with the basic formula $C_6H_{12}O_6$. Plants can synthesize carbohydrates by using carbon-dioxide in the air, water, and sunlight, while humans have to receive carbohydrates from plants. Carbohydrates are burned during metabolism in humans to produce energy while liberating carbon dioxide and water. Carbohydrates are divided into 3 forms as follows:

(1) Monosaccharides. Monosaccharides are the simplest form of carbohydrates. Monosaccharides or simple sugar can pass through the wall of the alimentary tract without being changed by the digestive enzymes. The three common monosaccharides are glucose, fructose, and galactose. Glucose, sometimes called dextrose, is present in fruits, sweet potatoes, onions, and other plant substances. Glucose is oxidized in the production of energy and heat with the liberation of carbon dioxide which is exhaled in breathing. Because glucose is the sugar in blood, it is the obvious choice for an energy-producing substance for persons being fed intravenously. Glucose dissolved in sterile water is frequently used for this purpose, usually in concentrations of 5 or 10 percent. Fructose is present in honey and some fruit juices. Galactose is the monosaccharide which is formed together with glucose when digestive enzymes act on milk.

(2) Disaccharides. Disaccharides are fairly simple sugars and have to be changed into monosaccharides before they can be absorbed from the alimentary tract. Disaccharides are, for example, sucrose, lactose, and maltose. The common name of sucrose is table sugar which is produced from sugarcane. It is also present in beets, carrots, and pineapple. Lactose is present in human and animal milk. It is less sweet than sucrose. Maltose is found in germinating seeds.

(3) Polysaccharides. The polysaccharides are chemically more complicated carbohydrates. They tend to be insoluble in water, and only some are able to be used by humans to produce energy. Examples of polysaccharides are starch, glycogen, and cellulose. Starch is found in cereal grains and root foods such as potatoes and cassava which are an important source of calories for man. Glycogen is the polysaccharide made in the human body. It is sometimes known as animal starch. The process of glycogen formation is the reverse of the digestive action on some other polysaccharides. Thus starch from potato is broken down in the intestines to form monosaccharide molecules. This saccharide passes to the bloodstream to form a new polysaccharide or glycogen. Therefore, starch can be converted into either energy or glycogen as regulated by the need of a body. Glycogen is usually present in muscles and the liver, but not in large amounts. Any of the digestible carbohydrates when consumed in excess of body needs can be converted by the body into fat and laid down as adipose tissue. Cellulose forms the fiber of green plants and is also present in wood. The human alimentary tract cannot break down cellulose and utilize it to produce energy. Some animals such as cattle have microorganisms in their intestines which break down cellulose and make it available as an energy-pro-

ducing food. Cellulose forms much of the bulk and roughage which passes out in human feces.

2.3.7 Fats. In the rural Thai diet fats account for less than 10% of the total calories. Fats are important as sources of calories or energy, as transporters of fat-soluble vitamins, as insulators to keep the body warm, as a source of essential fatty acids and food adjuvants for improving palatability.

Fats, like carbohydrates, contain carbon, hydrogen, and oxygen. They are insoluble in water, but soluble in such chemical solvents as ether, chloroform and benzene. Here the term fat is used to include all fats and oils which are edible and appear in human diets. The fats are compounds which can be split to form glycerol and fatty acids. This action is achieved in the human body by enzymes, known as lipases. These are present primarily in the pancreatic and intestinal secretions. Bile salts from the liver emulsify the fatty acids, making them more soluble in water. Excess calories from carbohydrate sources such as rice can be converted into fat in the human body and deposited beneath the skin.

Fatty acids are divided into two main groups, the saturated and unsaturated fatty acids. All fats and oils eaten by man have mixtures of fatty acids, but generally animal fats have more saturated fatty acids than do those of vegetable origin. Fats from plant products and fish have more unsaturated fats. The excess intake of saturated fats has been considered to be one of the factors involved in the causation of atherosclerosis. This association is mostly found in developed countries and the rich.

2.3.8 Proteins. Proteins are vitally important in human nutrition. Protein-calorie malnutrition in young children is the most important nutritional problem in Thailand and developing countries.

Proteins contain carbon, hydrogen, oxygen, nitrogen and sulfur. They are particularly important as nitrogenous substances which are necessary for the growth of the body and for tissue repairs. The main structural constituents of the cells and tissues of the body are proteins also are constituents of enzymes, hormones, and immunological substances. During digestion proteins are broken down to form amino acids. Human and animals do not have the ability to make amino acids, and so all the amino acids necessary for building their protein come from consumption of mixture of plant or animal protein.

There are many amino acids. Of these, eight have been found to be essential for adults. They have thus been termed "Essential amino acids." Each protein in a particular food contains several amino acids, sometimes all eight essential amino acids, plus some others.

When proteins are consumed they undergo a series of changes in the gastrointestinal tract. They are changed by enzymes from the stomach, pancreas, and intestines into the component amino acids. Proteins of animal origin are more easily utilizable than those derived from plants. Amino acids are absorbed into the blood in the small intestine and travel to the liver, and thence

all over the body. There is no true store of protein in the body as there is a store of fat and to a small extent glycogen.

With regard to protein in any particular food, it is important to know how much protein it contains; what amino acids are present in the protein, and what quantities and proportions of essential amino acids are included. Protein from milk or eggs is better than the protein from rice or beans. It is possible to make up deficient amino acids by providing some other food which contains the missing ones. Therefore, two foods with poor protein might together form a diet with good protein. The body can convert protein into carbohydrates and fats if necessary, but fats and carbohydrates cannot be converted into protein.

Our daily balanced diet for an adult should contain 300 - 400 grams carbohydrates (60%) 70 grams fat (25%), and 60 grams protein (15%).

2.3.9 Minerals. The principal minerals present in the human body are calcium, phosphorus, potassium, sodium, chlorine, sulfur, copper, magnesium, manganese, iron, iodine, and fluorine. Minerals in the body have a number of functions. They are present as salts in body fluids where sodium, potassium, and chlorine play a physiological role, maintaining osmotic pressure; they form part of the constitution of many tissues (e.g., bone); they are present in body acids and alkali; and they are an essential constituent of certain hormones (e.g., iodine in thyroxine of the thyroid gland). Minerals which are important in nutrition relating to Thai people will be discussed.

(1) **Calcium.** The body of an average-sized adult contains about 1250 grams of calcium, most of which is present in the bones and teeth, where it is combined with phosphorus as calcium phosphate, forming a hard substance which gives the body rigidity. The bones are a cellular matrix, and the calcium is taken up by the bones and given back to the body continuously.

Calcium is present in the serum of the blood in small but important quantities, usually about 10 mg%. A reduction in this amount causes the condition tetany. All the calcium in the body except that inherited from the individual's mother comes normally from food consumed. It is especially necessary to have adequate quantities of calcium during growth, for it is at this stage that the bones are being developed. The mother, if her diet is poor in calcium, draws extra supplies of this mineral from her bones for the growth of her fetus. An entire breastfed infant, provided that the volume of milk is sufficient, will get adequate calcium. Small fish, vegetables and pulses provide some calcium. The absorption of calcium, phosphorus and other main mineral constituents of the bones is variable. Vitamin D is essential for the proper absorption of calcium. In Thailand, disease or malformation due primarily to a dietary deficiency of calcium is rare.

(2) **Iron.** The average iron content of a healthy adult is only about 3 to 5 grams, yet this relatively small quantity is vitally important. Iron deficiency is a leading cause of ill health in Thailand and many parts of the world. Iron deficiency is usually found in pregnant and lactating women.

The major portion (55 to 60%) of this iron is present in the blood linked to a protein in the form of a pigment called hemoglobin. Hemoglobin is in the red blood cells where it serves to carry oxygen from the lungs to the cells of the body and returns carbon dioxide to the lungs to be exhaled. If the body, for some reason, has insufficient iron, then the amount of hemoglobin will be reduced and anemia will result. A small quantity of iron is also present in the chromatin of the cells, in certain respiratory catalysts, and in a compound present in muscles called myoglobin. This iron is not released even in an anemic patient. The healthy body has a small store of iron (0.5 gm) which is present as the compound ferritin in the liver, spleen and bone marrow. This iron can be utilized in a person who becomes deficient in iron. Iron which is released when the red blood cells are old and broken down is taken up again and used for the synthesis of new red cells. In normal conditions, less than 1 mg of iron is lost to the body each day. Women lose more iron during puerperium, childbirth and lactation.

Human milk contains only about 0.2 mg of iron per 100 ml, and cow's milk half this amount. Because of this small content, the infant is supplied with a store of iron from the pregnant mother. This store, together with the small quantity of iron contained in breast milk, should be sufficient to last the infant until he is 6 months of age. Infants who are breast fed for over a year are likely to develop iron deficiency anemia unless iron-containing foods are introduced at about the age of 6 months.

Iron is present in most foodstuffs, but in plants it tends to vary in quantity, according to the soil. The richest plant sources are green leaves, followed by vegetables and fruits. Man's main supply usually comes from his staple food (e.g., rice), the cereals containing almost twice as much as the starchy roots. In the animal group, fish and meat contain good quantities: the internal organs such as liver, heart and kidney are specially rich. Like calcium, only a portion of iron in the diet is absorbed and there are many factors which determine how much iron in a food is capable of utilization by the human body.

In unhygienic conditions the Thai population harbors many kinds of parasites. Among them hookworm infestation and ascariasis are common. Parasitic infestations and diets low in iron are the important factors in the development of iron deficiency anemia in men.

(3) Iodine. The body of an average adult contains about 40 mg of iodine, of which about half is present in the thyroid gland. Iodine is essential for the formation of thyroxine, the hormone of this gland.

Iodine is present in rocks and soils, and the quantity in different plants varies according to the earth in which they are grown. Iodine tends to get washed out of the soil, and through the ages a good quantity has flowed into the sea.

A lack of iodine in the diet causes an enlargement of the thyroid gland or goitre. There are other causes of goitre than iodine deficiency, though undoub-

tedly this is by far the commonest cause of endemic goitre. A high incidence of goitre has been reported usually from plateau areas far from the sea. In Thailand goitre is endemic in north and north-east regions; it is very rare in the southern part. Iodized salt has been used for the prevention of goitre with excellent result.

(4) Fluoride. Fluoride is found mainly in the teeth and skeleton. Traces of fluoride in the teeth help to protect them from decay. The main source of fluoride is water. If the drinking water contains about 1 part per million of fluoride, then it will supply adequate fluoride for the teeth. If the fluoride content of drinking water in any locality is below 0.5 part per million, then it can be expected that dental caries will be more prevalent than if it were higher. An excessively high intake of fluoride during childhood causes a condition known as dental fluorosis, the teeth become mottled as a result of too much fluoride in the water supplies.

2.3.10 Vitamins. Vitamins are organic substances which are present in minute amounts in foodstuffs and are necessary for metabolism. Vitamins are classified as fat soluble (e.g., Vitamins A,D,E and K) and water soluble (e.g., Vitamins B1 B2 and C). Vitamins which are of importance in malnutrition of Thai people will be described.

(1) Vitamin A. Vitamin A is soluble in fat but insoluble in water. It is an almost colorless substance and is found only in animal products. Carotenes, which can be converted into vitamin A, are yellow substances which occur widely in plant substances.

The liver is the main storage organ for vitamin A in humans and vertebrates, hence the high content of this vitamin is fish liver oils. Vitamin A is an important component of the visual purple of the retina of the eye. If vitamin A is deficient, the ability of the eye to see in dim light is reduced. Vitamin A appears to be necessary for the protection of surface tissue. A deficiency in man results in various conditions including follicular hyperkeratosis of the skin and pathological drying of the eye leading to xerophthalmia and sometimes keratomalacia.

Thai dietary sources of vitamin A are eggs, milk, liver, fish, dark green leaf plants (e.g., sweet potato, cabbage and lettuce), pigmented fruits and vegetables (e.g., mangoes, papaya, tomatoes, carrots). Both vitamin A and carotene withstand ordinary cooking temperatures quite well. A considerable loss of carotene takes place when green leaves or other foods are dried in the sun.

(2) Vitamin D. This vitamin is associated with rickets in children and osteomalacia in adults, but its deficiency is not common in Thailand and tropical countries since vitamin D is made from the action of the sun on the skin. The function of vitamin D in the body is to allow the proper absorption of calcium. The Thai dietary sources of vitamin D are eggs, meat, and milk. Cereals, vegetables, and fruits contain no vitamin D.

(3) Vitamin B₁ (Thiamine). Thiamine is highly soluble in water and it will resist temperatures of up to 100°C, but tends to be destroyed if heated above this. Thiamine plays a very important role in carbohydrate metabolism in man. The energy used by the nervous system is derived entirely from carbohydrates, so it can be seen that a deficiency of thiamine leads to a deprivation of fuel, resulting in lesions of the nervous tissues, including the brain. It is because thiamine is concerned with carbohydrate metabolism that a person is more likely to develop signs of deficiency of this vitamin when his main supply of energy comes from carbohydrates.

Thiamine is easily absorbed from the intestinal tract, but the body is not capable of storing much of it. The liver, heart, and brain have a higher concentration than the muscles and other organs. The Thai dietary sources of thiamine are rice, other cereal grains and the seeds of pulses, green vegetables, fish, meat, and fruit. Unfortunately, thiamine is heavily lost during grain milling and cooking. Thiamine deficiency is mostly found among pregnant and lactating women.

(4) Vitamin B₂ (Riboflavin). Riboflavin is a yellow crystalline substance. It is much less soluble in water than is thiamine, and is more heat resistant. It acts as a coenzyme concerned with tissue oxidation. The richest sources are milk and nonfat products, green vegetables, meat, fish, and eggs. Its common deficiency signs are angular stomatitis and cheilosis which are commonly found in Thai People.

(5) Niacin (Nicotinic acid). Niacin is soluble in water and is extremely stable. It is widely distributed in foods of both animal and vegetable origins, particularly meat, groundnuts, and cereal bran or germ. Its deficiency is usually found in chronic alcoholics and is rarely found in the general Thai population.

(6) Vitamin B₁₂ (Cyanocobalamin). Vitamin B₁₂ is a red crystalline substance containing the metal cobalt. It is necessary for the production of healthy red blood cells. It is mainly found in foods of animal origin. Its deficiency causes macrocytic or megaloblastic anemia.

(7) Folic Acid. Folic acid deficiency causes macrocytic anemia commonly found in pregnant woman. Folic acid is also helpful in thalassemia cases. Sources of folic acid include green leaves, liver, and kidney.

(8) Vitamin C (Ascorbic Acid). Vitamin C is soluble in water and is destroyed by excessive heat. It is necessary for the proper formation and the maintenance of intercellular material. It also helps the absorption of iron and calcium. Its deficiency causes hemorrhages in the tissue (e.g., bleeding gums). The main supply of vitamin C comes from fruits, vegetables, and various leaves.

2.3.11 Water. Water is also necessary for the body. It is a constituent of cells and tissues. It helps chemical reaction and food metabolism, carries nutrients to the cells and excretes the wastes. Usually an adult should have 6 to 7 glasses (2 to 3 liters) of water daily, but the required amount also de-

depends on physical exercise, climate or temperature and diet. The body can lose more water through a high temperature, perspiration, or diarrhea.

3. NUTRITIONAL REQUIREMENTS

3.1 Energy Requirements

The body requires a certain amount of energy for daily life activities and regulating the body temperature at 36°C. This required energy comes from the diet or, in other words, carbohydrates, fats, and proteins. The unit used to measure energy is called calories. The daily requirement of energy for an adult Thai is 2500 calories. This means that the adult Thai should receive 2500 calories daily for routine activities or normal life. This energy is used for basal metabolism (normal functioning of internal organs to maintain life), for routine activities, and for specific dynamic action in the metabolism of ingested food. Body growth also requires a certain amount of energy. Body weight is a good indicator to show whether the energy requirements of a body are being met or not. Body weight will increase if energy received is excessive. Body weight will decrease if energy intake is inadequate. Body weight will be constant if the energy received is optimal. Changes in body weight are easily observed and vital to monitor in infants and young children.

3.2 Infant Feeding

3.2.1 Breast Milk. Breast milk is necessary for infant feeding especially in developing countries. Colostrum which comes during first few days of feeding is also useful as a laxative for a newborn. Breast feeding provides a close relationship or “love” between mother and infant. Breast feeding or breast milk is costless and always available when needed; it takes no time for preparation, but nipples must be cleaned before the infant sucks. In addition, breast milk is safe and provides some immunities.

3.2.2 Breast Milk vs. Cow’s Milk. Though breast feeding is generally practiced – especially in rural areas – infant feeding with cow’s milk or humanized milk is accepted by those who can afford it or for whom breast feeding is inconvenient. Whole cow’s milk has more protein, vitamin B2 and calcium, but less lactose or carbohydrates as shown in the following table. It is suggested to dilute cow’s milk with water.

Table 18 - 1 Nutrients in Human Breast Milk and Cow's Milk

Nutrient Content in 100 ml.	Human Breast Milk	Cow's Milk
Water	87.6 gm	87.2 gm
Protein	1.1 gm	3.3 gm
Carbohydrate	7.0 gm	4.8 gm
Fat	3.8 gm	3.8 gm
Calcium	34.0 mg	126.0 mg
Iron	0.21 mg	0.15 mg
Vitamin A	80.0 microgram	72.0 microgram
Vitamin B ₁	16.0 microgram	42.0 microgram
Vitamin B ₂	43.0 microgram	157.0 microgram
Vitamin C	4.3 mg	1.8 mg
Vitamin D	0.4 - 10.0 I.U.	0.3 - 4.2 I.U.

3.2.3 Selection of Milk For Bottle Feeding. Proper selection of milk for bottle feeding and its preparation can be suggested by a doctor. Each brand requires specific preparation.

(1) Powdered Whole Milk and Evaporated Milk. It is made from cow's milk. Protein and fat are easily digested. Sugar should be added for infant under 6 months of age. Evaporated milk is concentrated and requires dilution with water.

(2) Humanized Milk. It is the same as powdered whole milk except that sugar is also added so that it is similar to human milk. It is used for feeding infants under 6 months of age. Powdered whole milk and evaporated milk are used if an infant who is over 6 months of age.

(3) Sweetened Condensed Milk. This kind of milk is very sweet because some sugar is added. It is not suggested for infant feeding since it may cause infantile diarrhea.

3.2.4 Preparation of Bottle Milk. Commercial artificial milk or bottle milk available in a market provides information and directions for preparation. This information may be shown on the container or in a leaflet. A measuring spoon is also provided. It should be remembered that a preparation must be hygienic with proper proportion of milk and water as directed. Milk left-over from each feeding or meal should be kept on ice, in a thermos, or in a refrigerator. This left-over milk must be warmed before feeding and a mother should taste it to discover whether it is spoiled or not. If it is spoiled it should not be given to a child since it will cause diarrhea. Therefore, it is safe and more convenient if the amount of bottled milk prepared is just enough for each feeding. Warm, clean water must be given after bottle feeding to prevent hygienic problems and fungal infections of the mouth.

3.2.5 Supplementary Diet for Infants. Though breast milk or cow's milk is the best food for infants, supplementary foods are necessary for normal growth and development of infants over 3 months of age. Infant feeding should be as follows:

- 2 months : orange juice (if possible), 1 teaspoon with boiled water. The amount can be gradually increased up to $\frac{1}{2}$ - 1 orange daily.
- 3 months : ground banana, outer portion of fully ripe banana is used.
- 4 months : ground cooked rice with bone or vegetable soup. Start with 1 - 2 teaspoons for each feeding and then gradually increase up to 2 tablespoons followed by bottle or breast feeding; boiled egg yolk can also be gradually added.
- 5 months : ground boiled vegetables with ground cooked rice can be started, in an amount enough to replace one milk feeding.
- 7 months : chopped or ground cooked pork or liver can be given.
- 8 - 9 months : supplementary diet can be given for 2 feedings and milk feeding should be decreased to 3 or 4 feedings per day; sweets can be given after meals.
- 10-12 months : three feedings of supplementary diet can be given and milk feeding is decreased to 2 or 3 feedings per day.

3.2.6 Vitamin Supplements. Cod liver oil and vitamins in syrup or droplet form can be given. Breast milk of a well-nourished mother contains enough vitamin B1 and vitamin B2.

3.2.7 Infant Feeding Schedule. Infant feeding schedules can be tailored to fit individual necessity. Rural and poorly educated mothers need reasons and practical suggestions. An example of an infant feeding schedule is provided in Table 18.2.

Table 18 - 2 Infant Feeding

Time	Infant Diet According to Age		
	6 months	7 - 9 months	10 - 12 months
6 am	breast milk	breast milk	breast milk or orange juice, ground cooked rice and vegetables with soup and egg yolk
8 - 9 am	-	-	-
10 am	orange juice, ground cooked rice and vegetables with soup and egg yolk	orange juice, ground cooked rice and vegetables with soup and egg yolk	-
12 am - 1 pm	-	-	ground cooked rice, vegetable, and pork, and sweet
2 pm	breast milk	ground cooked rice, vegetables, pork and sweets	-
5 - 6 pm	ground ripe banana and breast milk	ground ripe banana and breast milk	ground cooked rice, fish, banana
10 pm	breast milk	breast milk	bottle milk

Remarks.

Breast feeding can be continued until a mother is pregnant or a child is 1½ years old, but supplementary foods must be given when a child is 3 months old and older.

3.3 Dietary Recommendation for Preschool Aged Children

The physical and mental development of preschool aged children is rapid. The children of this age require a relatively large amount of protein. If protein and calories are not adequately taken, protein energy malnutrition is easily developed. Thai culture allows the working adults, particularly men to take the first share of the family meal which is already low in protein and calories, therefore the share remaining for the young children is inadequate and they are prone to develop protein-calorie malnutrition. An example of an adequate diet for a young child is shown in Table 18.3.

Table 18 - 3 Example of Daily Diet for Preschool Aged Children

Item	Age and Amount		
	1 - 2 years	2 - 3 years	3 - 5 years
Cooked rice	1½ cups	2 - 2¼ cups	2½ - 3 cups
Animal protein (beans can also be used alternately)	2 table- spoons	2½ - 3 table- spoons	3½ - 4 table- spoons
Eggs	1 egg	1 egg	1 egg
Milk (e.g. soy bean milk)	2 cups	2 cups	2 cups
Green vegetables and others	4 tablespoons	6 tablespoons	8 tablespoons
Orange juice	½ cups	½ cup	¾ cups
Fruits (banana, papaya)	¼ cup	½ cup	½ cup
Fats	enough for palatable taste		

3.4 Dietary Recommendation for Adults

Adults require foods for maintaining growth and repair, and for physical exercises or activities. Dietary allowance for adults therefore vary. A practical dietary recommendation for adults is shown in Table 18.4 and recommended dietary allowances for the Thai people are shown in Tables 18.5 and 18.6.

Table 18-4 Example of Daily Diet for Adults

Items	Amount			Remarks
	Adult	Pregnant Women	Lactating Women	
Milk (e.g. soy bean milk)	2 cups	3 cups	3 - 4 cups	Fresh or canned.
Egg	3/week	1/day	1 or more/day	Chicken or duck.
Animal meat	180 gm	280 - 360 gm	360 - 400 gm	Seafood should be eaten.
Vegetables	1 cup	2½ - 3 cups	2 or more cups	Green vegetable for each meal.
Fruits	1/meal	1/meal	1/meal	
Rice	4 - 5 cups	5 - 6 cups	6 or more cups	Do not use over polished rice
Fat	2½ - 3 table- spoons	2½ - 3 table- spoons	3 or more tablespoons	

Table 18.5 Recommended Dietary Allowance for Thai People

Person	Age (yr-)	Weight (kg)	Calories	Protein (gm)	Calories (gm)	Iron (mg)	Vit. A (unit)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic Acid (mg)	Vit. D (unit)
Men	20 - 29	54	2550	54	0.5	6	2500	1.0	1.4	17	30	400
	30 - 39		2450	54	0.5	6	2500	1.0	1.4	16	30	400
	40 - 49		2350	54	0.5	6	2500	0.9	1.3	16	30	400
	50 - 59		2200	54	0.5	6	2500	0.9	1.2	14	30	400
	60 - 69		2000	54	0.5	6	2500	0.8	1.1	13	30	400
	70 +		1750	54	0.5	6	2500	0.7	1.0	12	30	400
Women	20 - 29	47	1800	47	0.4	16	2500	0.7	1.0	12	30	400
	30 - 39		1700	47	0.4	16	2500	0.7	0.9	11	30	400
	40 - 49		1650	47	0.4	16	2500	0.7	0.9	11	30	400
	50 - 59		1550	47	0.4	6	2500	0.6	0.8	10	30	400
	60 - 69		1450	47	0.4	6	2500	0.6	0.8	10	30	400
	70 +		1250	47	0.4	6	2500	0.5	0.7	8	30	400
Pregnant Women												
- First 6 months			+ 200									
- Last 3 months			+ 200	+ 20	1.0	26	2500	0.8	1.1	13	50	400
Lactating Women			+ 1000	+ 40	1.2	26	4000	1.1	1.5	18	50	400
Infants	0 - 1	6	Kg. x 110	14	0.5	Kg. x 1.0	1000	0.3	0.4	4	20	400
Children	1 - 3	10	1200	17	0.4	4	850	0.5	0.7	8	20	400
	4 - 6	16	1200	17	0.4	4	1000	0.6	0.8	10	20	400
	7 - 9	20	1900	24	0.5	4	1350	0.8	1.0	12	20	400
	10 - 12	25	2300	32	0.6	8	1900	0.9	1.3	15	30	400
Boys	13 - 15	36	2800	40	0.7	11	2400	1.1	1.5	18	30	400
	16 - 19	50	3300	45	0.6	11	2500	1.3	1.8	22	30	400
Girls	13 - 15	38	2355	38	0.6	16	2400	0.9	1.3	16	30	400
	16 - 19	46	2200	37	0.5	16	2500	0.9	1.2	14	30	400

Table 18.6 Practical Daily Dietary Recommendation for Thai in General

	Weight (gm)	Calories	Fat (gm)	Carbohydrate (gm)	Protein		Calcium (mg)	Phosphorus (mg)	Iron (mg)	Vit. A (unit)	Vit. B ₁ (mg)	Vit. B ₂ (mg)	Niacin (mg)	Vit. C (mg)	Remarks	
					Animal (gm)	Vegetable (gm)										
Rice	340	1251	1.7	274.7	-	25.1	27	367	4.2	-	0.34	0.17	8.2	-	each can be substituted by 15 gm. of dried bean	
Animal protein																
fish	18	26	1.2	-	3.6	-	31	11	2.1	25	0.01	0.11	1.7	-		
chicken	17	51	4.3	-	3.1	-	2	34	0.3	138	0.01	0.03	1.4	-		
beef	16	44	3.5	-	2.8	-	-	24	0.4	6	0.01	0.03	0.7	-		
pork	23	86	8.1	-	3.2	-	2	35	0.5	-	0.16	0.04	0.9	-		
duck egg	27	49	3.4	1.0	3.2	-	19	47	0.8	768	0.07	0.15	-	-		
Vegetables																
green vegetable	100	48	0.7	5.0	-	5.0	250	-	4.0	3000	0.10	0.30	1.5	100		
other	200	48	0.4	10.8	-	2.6	98	58	0.8	260	0.10	0.10	0.6	94		
Fruits																
papaya	150	32	0.3	18.3	-	0.9	35	15	1.1	638	0.05	0.05	0.6	134		
oranges	50	12	0.1	4.0	-	0.2	16	9	0.1	25	0.06	0.01	0.1	10		
Fats																
lard	15	135	15.0	-	-	-	-	-	-	-	-	-	-	-		
vegetable oil	15	133	15.0	-	-	-	-	-	-	-	-	-	-	-		
Total	-	1954	53.7	313.9	15.9	33.8	480	600	13.9	4860	0.91	0.99	15.7	338		
Allowances	-	1913	-	-	37.57		484	-	8.54	1988	0.76	1.05	12.57	27		

4. CHILD GROWTH AND DEVELOPMENT

The progress of a child's growth is a good indicator to measure his development. Child health is one of the major concerns of public health professionals in developing countries. Practical points concerning child health are therefore presented:

- (1) Growth means the increase in the amount and size of cells in a body.
- (2) A child's growth rate indicates the child's health.
- (3) The child's weight at a particular age indicates the child's growth.
- (4) A growth chart developed for an individual child (especially a child under 5 years old) is a reliable indicator to show whether the child is healthy or malnourished.
- (5) The standard growth chart is derived from average weights of normal, well nourished children of the same locality. The development of a local growth chart for a community is encouraged. However, this kind of growth chart may not be available in a community. Modification of a standard growth chart is acceptable. For example, a modified Gomez chart can be used to detect malnutrition in Thai children. If a child's weight is 80% or above standard weight he is healthy or normal. But, if his weight is between 70 and 79%, he is first degree or slightly undernourished; if his weight is between 60 and 69% he is second degree or moderately undernourished. If his weight is below 60% of standard weight, he is third degree or markedly undernourished. The relationship between the body weight and mortality rate is shown in Table 18.7.

Table 18.7 Mortality Rate of Underweight Children

Children Weight	Death Rate in First Five Years of Age	Death Rate As Compared with Normal Children
Above 80% of standard	8/1000	Normal death rate
Between 70 - 79% standard	16/1000	2 times normal death rate
Between 60 - 69% standard	40/1000	5 times normal death rate
Below 60% standard	80/1000	10 times normal death rate

- (6) The growth chart can indicate the following:
 - Whether or not the child's weight is normal according to his age.
 - Whether or not the child's growth and development is normal.
 - Whether or not the mother understands what she is advised about child feeding.
 - Whether or not the child is healthy.
 - The number of malnourished children in a community and the severity of malnourishment.
- (7) Consequences of undernutrition include:
 - Under weight children have a higher mortality rate.
 - Markedly or severely undernourished children have poor mental

development or intelligence.

Under weight children have a higher morbidity rate.

Malnourished children causes national problems and consume national resources.

Table 18.8 Weight and Height As Compared With Newborn
(Newborn weights 3 kg and is 50 cm tall)

Age	Body Weight As Compares With Newborn	Age	Height As Compared With Newborn
5 - 6 months	2 times	3 months	20% increase
1 year	3 times	1 year	50% increase
2 years	4 times	2 years	75% increase
6 years	6 times	4 years	100% increase
7 years	7 times	13 years	300% increase
20 years	20 times		

Table 18.9 Normal Height and Weight of Thai Students

Age (yr)	Height (cm)		Weight (kg)		Average	
	Male	Female	Male	Female	Height	Weight
3	95.00	95.00	14.90	14.10	95	14.50
4	98.85	98.58	15.30	14.70	98.72	15.00
5	103.00	103.00	16.05	15.50	103	15.77
6	107.40	107.40	17.00	16.60	107.4	16.80
7	111.80	111.80	18.30	17.95	111.8	18.12
8	116.60	116.60	19.90	19.67	116.6	19.79
9	121.20	121.20	21.70	21.60	121.2	21.75
10	125.60	126.20	23.65	24.00	125.9	23.82
11	129.90	131.50	25.85	26.75	130.7	26.30
12	134.30	137.00	28.40	30.20	135.7	29.30
13	139.20	142.40	31.40	34.45	140.8	32.92
14	145.00	142.90	36.00	39.50	143.95	38.75
15	151.60	150.50	41.10	42.80	151.05	41.95
16	157.00	151.60	45.58	44.75	154.3	45.16
17	160.20	152.00	49.20	45.85	156.1	47.50
18	161.80	152.20	51.10	46.60	157.0	48.85
19	162.30	152.20	52.35	47.00	157.3	49.67
20	162.30	152.20	52.80	47.30	157.3	50.10
21	162.30	152.20	53.10	47.60	157.3	50.35
22	162.30	152.20	53.30	47.95	157.3	50.62
23	162.30	152.20	53.60	48.20	157.3	50.90
24	162.30	152.20	53.80	48.50	157.3	51.15

(8) Factors Affecting Child Growth and Nutrition:

The growth rate of Thai children aged under 6 months of age is similar to children in developed countries, but the relative growth rate is gradually decreased afterward. Many factors are involved in this phenomenon. For example;

- (a) Predominant child malnutrition problem
- (b) Predominant intestinal parasitic infestations
- (c) Increasing malaria problem
- (d) Problems due to unsanitary conditions e.g., diarrhea
- (e) Problems of infectious diseases in children
- (f) Childhood pulmonary tuberculosis
- (g) Socioeconomic problems
- (h) Psychological problems
- (i) Problems of proper infant feeding and food taboos.

5. NUTRITIONAL ASSESSMENT OF A COMMUNITY

Problems of malnutrition are commonly found, especially in children. Nutritional problems usually are related to other health problems such as diarrhea and respiratory tract infections. Frank cases (e.g., third or second degree) of malnutrition are mostly found in hospitals while subclinical cases are found in villages. The magnitude of a community's nutritional problems must be measured before the implementation of a nutritional intervention program. Health personnel should be able to assess the general nutritional problems of a community based on their own clinical acumen and the weighing program for children measured and recorded on a standardized growth chart.

As a health team leader of a health center, a wechakorn should be able to assess the nutritional status of his village and implement a nutritional intervention program to solve nutritional problems.

Personnel and facilities at health centers are limited. Practical and feasible methods of nutritional assessment will be mentioned.

5.1 Direct Nutrition Assessment

5.1.1 Clinical Signs of Malnutrition. Specific deficiency of a nutrient shows specific clinical signs but some clinical signs may result from the deficiency of many nutrients. In practice, a complete physical examination is performed and carefully evaluated. Clinical signs relating to malnutrition are lack of lustre of hair, dyspigmentation of hair, naso-labial dyssebacea, moon-face, pale conjunctivae, Bitot's spot, keratomalacia, angular stomatitis, cheilosis, atrophic papillae tongue, mottled enamel of teeth, spongy and bleeding gums, thyroid enlargement, exerosis of skin, follicular hyperkeratosis, pellagrous dermatosis, "flaky-paint" dermatosis, koilonychia, edema, muscle wasting, epiphyseal enlargement, bow-legs, hepatomegaly, loss of ankle and knee jerks, calf tenderness, and cardiac enlargement.

(a) Protein-calorie malnutrition signs include edema, dyspigmentation of the hair, muscle wasting, diffuse depigmentation of the skin, psychomotor change, moon-face, hepatomegaly, and flaky-paint dermatosis.

(b) Vitamin A deficiency signs include Bitot's spots, corneal xerosis, keratomalacia, xerosis of skin, and follicular hyperkeratosis (type 1).

(c) Riboflavin deficiency signs include angular stomatitis, cheilosis, and dyssebacea.

(d) Thiamine deficiency signs are edema, loss of ankle or knee jerks, motor weakness, and calf muscle tenderness.

(e) Niacin deficiency signs are pellagrous dermatosis, scarlet and raw tongue, and atrophic lingual papillae.

(f) Vitamin C deficiency signs are spongy and bleeding gums, and petechiae.

(g) Vitamin D deficiency signs are beading of ribs, and bowlegs.

(h) Iron deficiency signs are pale conjunctiva, koilonychia, and atrophic lingual papillae.

(i) Iodine deficiency signs is the enlargement of thyroid gland.

(j) Excess of fluorine sign is mottled dental enamel.

5.1.2 Nutritional Anthropometric Measurement. The most important measurement is body weight. The body weight should be measured by using a beam balance scale or a modified butcher's steelyard. Other measurements are height, head circumference, arm circumference, chest circumference, and skin-fold thickness.

5.1.3 Biochemical Tests. Biochemical tests are not widely used in rural field practice. But, samples of urine and blood may be taken for detailed study.

5.1.4 Biophysical Methods. These methods are sophisticated and are used for research study rather than routine nutritional assessment.

5.2 Indirect Nutritional Assessment

Direct nutritional measurement, when possible, should be supplemented by indirect nutritional assessment to assure correct interpretation. One indirect nutritional assessment method is vital statistics. Statistical indicators used are age-specific mortality rates of 2 to 5 months and 1 to 4 years which indicate the nutritional problems of thiamine deficiency and protein-calorie malnutrition in a community respectively. In addition, data concerning the commonness and mortality rates of certain "nutritional relevant" diseases should be collected e.g., beri-beri, goiter, protein-calorie malnutrition, diarrhea, measles, broncho-pneumonia, and blindness. Other methods include assessment of ecological factors which can be complicated for health center personnel. In practice, health personnel can perform a review of ecological factors by obtaining information about family size, occupations, education, household water supply and sanitation, and family food preparation and feeding patterns. Information about food production, marketing, and availability of health

greater proportion of this immense problem lies “under the surface” as sub-clinical or inapparent cases of malnutrition.

6.1 Important Nutritional Problems

6.1.1 Protein-Calorie Malnutrition. This problem may be present in a form of kwashiorkor or marasmus. It is mostly found in children under 6 years of age – especially, those between 2 and 4 years of age. It is a social disease that is associated with low socioeconomic groups.

6.1.2 Beri-beri. It is more common in pregnant and lactating women, the aged and infants. Consumption of highly polished rice and rice cooking methods are the main factors contributing to this problem.

6.1.3 Goiter. Endemic or simple goiter is very common in the northern and northeastern parts of the country. Iodine deficiency is the main cause of this disease.

6.1.4 Anemia. Nutritional anemia or iron deficiency anemia is very common among pregnant and lactating women and the aged. It is usually associated with intestinal parasitic infestation or a thalassemic condition.

6.1.5 Vitamin A Deficiency. Cases of vitamin A deficiency are commonly seen in hospitals and may or may not be associated with protein-calorie malnutrition. Vitamin A deficiency is found less in field surveys.

6.1.6 Urinary Bladder Stones. Cases of urinary bladder stones are very common in the north and northeast regions. They are mostly found in children below 5 years of age. They are associated with protein malnutrition and phosphorus deficiency.

6.1.7 Angular Stomatitis. This is a deficiency of riboflavin. It is especially common among school-aged children.

6.1.8 Other Problems. Problems of vitamin C, niacin, or calcium deficiency are uncommon. Problems of food additives and food adulteration are rapidly emerging. Obesity is found primarily in the higher socioeconomic groups.

6.2 Groups that are Vulnerable for Developing Malnutrition.

Mild undernourishment is a problem that is widely found in the general population. The vulnerable groups include pregnant woman, lactating women, infants, preschool-aged children and school-aged children.

6.2.1 Infant and Preschool-Aged Children. Children of this age group require a high protein intake for rapid growth. It is evident that 52 to 76% of infant and preschool age (1 day - 6 years) are undernourished, especially of the protein calorie malnutrition type.

6.2.2 School-Aged Children. Children of this group are growing and require more nutrients. Their mental development or intelligence can be sub-normal due to previous and/or current protein malnutrition.

6.2.3 Pregnant and Lactating Women. Puerperal complications relating to nutritional problems are very common. Beri-beri and anemia are also frequent. Food taboos play a major role in causing these problems.

6.2.4 Working Population. They are farmers, laborers, and fishermen. They work hard and their bodies require adequate energy, protein, thiamine, riboflavin, iron and iodine. But their daily diets usually do not provide such nutrients and energy adequately. The average birth weight of a newborn is 2.5 to 3.0 kg which is lower than the average for newborns in developed countries (3.5 kg). The life expectancy of Thai people is also lower than the life expectancy of people in developed countries (55 years for male and 62 years for female).

7. PREVENTION OF MALNUTRITION

Malnutrition is a social problem resulting from problems of socioeconomics, social values, food production, food technology, sanitation, health service facilities, and even of the form of government. However, malnutrition in a community can be prevented to some extent. Health personnel or the wecha-korn at the health center level has the facilities and the capacity to plan, operate and follow-up a nutrition program geared to nutritional improvement for the community as well as for individual cases. Nutrition programs vary according to local situations, specific nutritional problems and target populations.

7.1 Health Activities for the Prevention of Malnutrition in Young Children

7.1.1 Treatment, Prevention and Rehabilitation

- (a) Treat malnutrition cases in hospital and clinic.
- (b) Provide supplementary diets for undernourished children.
- (c) Produce weaning diets using local foods that are nutritious.
- (d) Give health education on infant feeding and child rearing to mothers and children.
- (e) Provide services and health education on immunization.
- (f) Conduct dietary surveys and clinical nutritional assessments of vulnerable groups.
- (g) Provide group nutritional rehabilitation services at child nutrition center, day care center, and kindergarten.
- (h) Control diarrheal and parasitic diseases.

7.1.2 Promotion of Healthy Family Food Habits

- (a) Health education on nutrition and in general.
- (b) Nutritional activities and school lunch program in school.
- (c) Applied nutrition program such as backyard garden and poultry raising.
- (d) Balanced diet or menu for a family.

7.1.3 Preventive Activities in a Community

Community nutrition education program should be based on the analysis of local information on agriculture, education, communication, industry, culture, belief, and health resources. Health personnel or health educators should practice what they teach other people to practice.

Objectives of Nutrition Education. The objectives should be clearly defined and relevant to community problems and resources. Health education should be scientifically based, and aimed to improve community nutritional knowledge, attitudes and practice. The acquired knowledge must be practical, achievable, and relevant to community need and available technology. The changed behavior of practice must be recognized by both community members and health personnel. Finally, the objectives should be measurable.

Characteristics of Health Education Programs. Effective health education programs that would be acceptable to a community should have the following characteristics:

- (1) Proposed behavior changes should be relevant to the concerned community situation.
- (2) Proposed behavior changes should not conflict with existing social values or beliefs.
- (3) Proposed behavior changes should be compatible with local attitudes and behavior.
- (4) Proposed behavior changes should fit with the objectives of existing organizations and social institutions.
- (5) Proposed behavior changes should be acceptable to the community and be practical.
- (6) Proposed behavior changes should be closely related to expected results.
- (7) Proposed behavior changes should not be beyond the community's resources including money, time, and technology.

7.1.4 Health Education Analysis. General characteristics of a community should be studied by a health educator first. Then specific studies on nutritional aspects of the community including knowledge, attitudes and practices should follow. After the completion of careful analysis of obtained data, measurable and common objectives should be set. The detail of strategies and community approach should be spelled out as to what should be taught; how it should be; when it should be taught; where it should be taught; who should teach it; whom should be taught; and why it should be taught. These simple questions must be always kept in mind before health education activities are planned and implemented. The community should be consulted and its resources fully utilized. In short, the present community situation should be analyzed, proposed behavioral changes should be stated, and how the changes can be implanted should be planned.

7.1.5 Health Education Team Approach

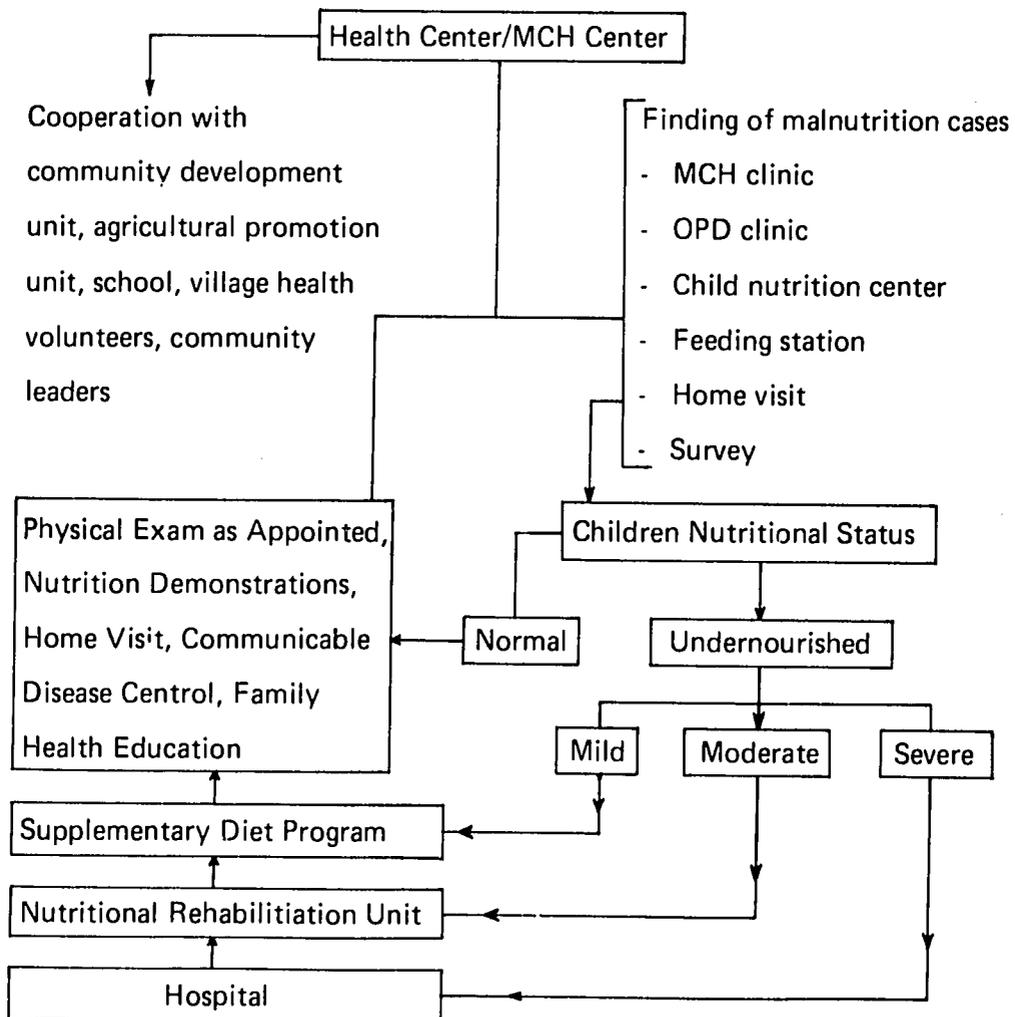
A health team leader and team member should be able to provide health education service. Health personnel at peripheral health centers or auxiliaries usually have no problem of social gap between themselves and villagers, and they have more time available for nutrition education. They fluently speak the same dialect as the local villagers. The community as a whole and

community leaders should be convinced to actively participate in health education programs and should be supported in their efforts.

Health education can be given at a child nutrition center, a day care center, a school, a Sunday market, a "nutrition day", a MCH clinic, a "nutri-hut", a hospital ward, an OPD, or a temple. If possible, nutrition education should be given by a health team with every member participating in the teaching. Nutritional education media should be properly selected for each occasion. Demonstration seems to be very acceptable to villagers. Each step in nutritional education planning should be carried out in detail, including problem analysis, operation of the program and the follow-up of results.

At the health center level the most important nutrition education targets are mothers and children and the most important topics are child rearing and infant feeding. The health education methods used are individual discussion, group discussion, demonstration, and posters. Other important target groups are school children and community leaders. They are influential groups. Youth clubs, young farmers clubs, village health workers and village committees can also be very helpful in applied nutrition programs.

A community nutrition program to prevent malnutrition in children can be carried out as follows :



This kind of nutrition surveillance program can be more effective if village health volunteers fully cooperate and are fully utilized. They can help in registration of children, checking or weighing children's weight, making appointments, following up the results, and advising mothers and children. However, health personnel should also try to receive more cooperation from other governmental and private sectors such as the community development unit, formal and non-formal education units, the agricultural unit, and voluntary organizations or clubs.

A long term nutrition program should be planned to include a child nutrition center, a school lunch program and school health; program mobile and static nutritional demonstrations for mother, children and community leaders or influential groups; agricultural promotion programs such as poultry raising, fishing, and food diversification, nutrition education on infant feeding and preparing a balanced diet with emphasis on the utilization of local animal and vegetable proteins; the control of infectious diseases, malaria, and intestinal parasitic infestations; expansion of existing immunizations programs; nutritional training for health personnel and volunteer, and other relevant programs. It must be kept in mind that the long-range effects of nutrition programs depend on many factors and often they are not easily evaluated. But the success is very much appreciated.

MODULE 19

DENTAL HEALTH CARE

BOONTHOM CHOTIRATTANA, D.D.S.

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MODULE 19

DENTAL HEALTH

1. INSTRUCTIONAL OBJECTIVES

After completing this module, the wechakorn will be able to:

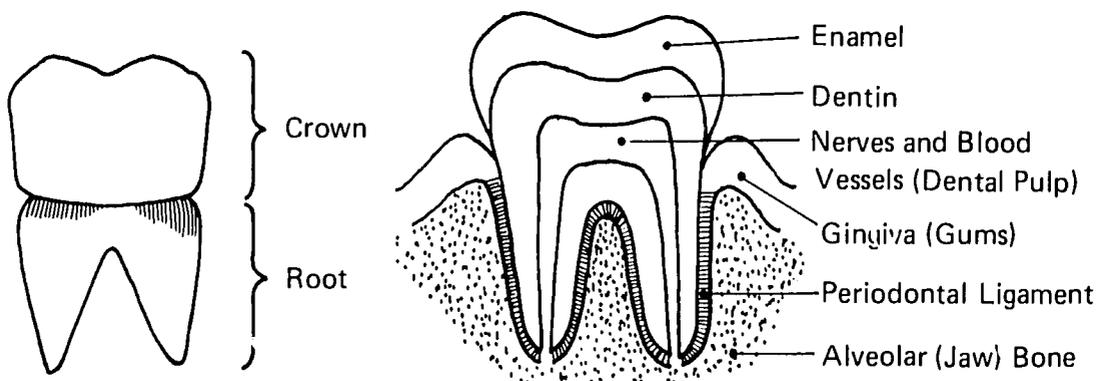
- (1) Give advice to individuals and the public concerning dental care and the prevention of dental diseases, and
- (2) Treat patients for simple cases of gingival and dental disease.

2. DENTAL ANATOMY AND MORPHOLOGY

2.1 Structure of the Tooth

The gross structure of the tooth is divided into two areas as follows:

- (1) **Crown:** That portion of the tooth which is seen above the gumline (clinical crown). The clinical crown is further subdivided into the anatomical crown which is that portion of the crown covered by a very hard substance called enamel. Beneath the enamel is a softer substance (like bone) called dentin. At the center of the tooth is a small cavity carrying all the nerves and blood vessels that keeps the tooth alive, called the nerve or dental pulp.
- (2) **Root:** That portion of the tooth which is below the gumline and holds the tooth in the bone. The root is covered by a substance called cementum which is softer than dentin. The root is embedded firmly in the jaw by a ligament (periodontal ligament) which connects the root to the surrounding bony socket (alveolus).



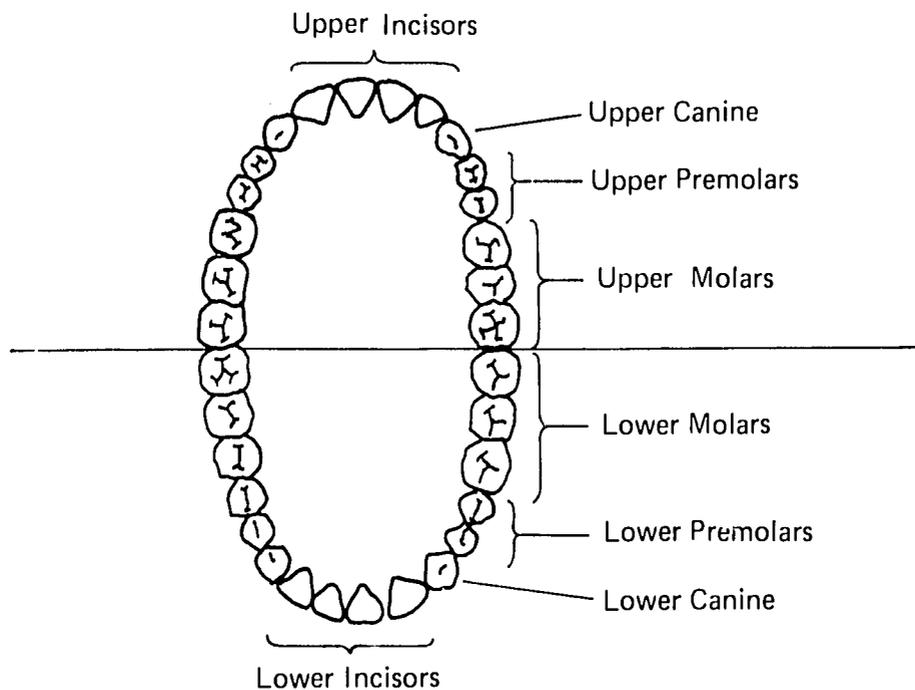
2.2 General Nomenclature

The adult has 32 teeth called the permanent dentition. These permanent teeth replace the primary or deciduous or milk teeth which are fully erupted by two years of age.

There are four types of permanent teeth:

- (1) Incisors for cutting and tearing food
- (2) Canines or cuspids
- (3) Premolars or bicuspid
- (4) Molars for grinding food

These teeth are arranged in the maxilla (upper jaw) and mandible (lower jaw) as follows:



Each tooth has five surfaces:

1. buccal surface - surface closest to the cheek
2. lingual surface - surface closest to the tongue
3. mesial surface - surface facing the midline
4. distal surface - surface facing the back of the mouth
5. occlusal (for molars and premolars) or incisal (for incisors and canines) surface - biting surface of teeth.

3. DECIDUOUS TEETH

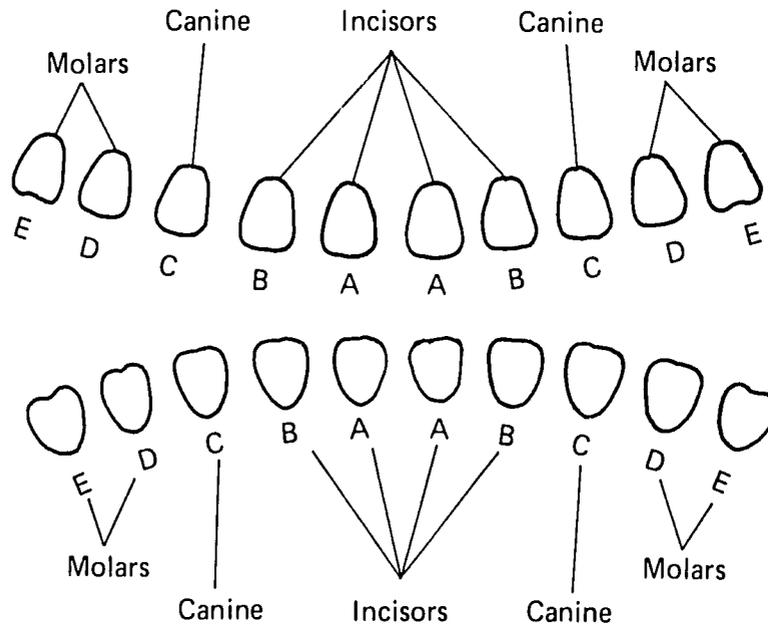
Deciduous teeth are so called because they are shed or exfoliated from the mouth. The deciduous teeth begin to develop in the 6 week old embryo during intrauterine life. When the embryo is 4-5 months old, the tooth buds are being

calcified in the jaw. The emergence of the tooth through the soft tissue of the jaw is referred to as eruption. The deciduous teeth begin to erupt at approximately 6 months after the birth of the child and continues to about age 24 months.

3.1 Nomenclature

There are ten teeth in each upper and lower jaw as follows:

- (1) Four incisors for cutting food,
- (2) Two canines for tearing food, and
- (3) Four deciduous molars for grinding food.



For convenience in naming the deciduous teeth, English letters have been selected as symbols as follows:

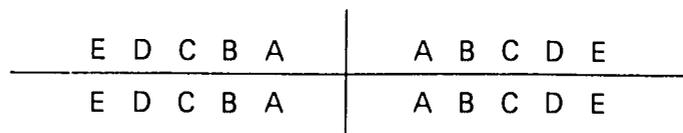
- A represents the deciduous central incisor
- B represents the deciduous lateral incisor
- C represents the deciduous canine
- D represents the deciduous first molar
- E represents the deciduous second molar.

Note: There are no deciduous premolars.

If we divide the mouth into four parts or quadrants, then the five English letters represent the names of the teeth in each quadrant as shown diagrammatically below:

Upper Right Quadrant

Upper Left Quadrant



Lower Right Quadrant

Lower Left Quadrant

3.2 Eruption Schedule

The usual sequence and time of eruption for deciduous teeth are as follows:

Lower deciduous central incisor	6 - 8 months
Upper " " "	7 - 8 "
Lower " lateral incisor	7 - 9 "
Upper " " "	9 - 11 "
Lower " first molar	12 - 14 "
Upper " " "	14 - 16 "
Lower " canine	16 - 18 "
Upper " " "	18 - 20 "
Lower " second molar	20 - 22 "
Upper " " "	24 - 26 "

During the time of tooth eruption, the child may feel some pain and discomfort. This is normal. The gums may be red, swollen and painful in the area of the tooth eruption. There may be an increase of saliva and the child may have a fever. The child needs strong attention and love from his parents during this time. The parents may help to sooth the pain by rubbing a piece of ice wrapped in a clean cloth along the sore gums. Or the parents may find some clean, hard object for the child to bite (teether). Care should be taken in selecting teethers, because some teethers contain harmful chemical solutions. A hard biscuit "crispy rice", or piece of toast may be used as a teether for the older child.

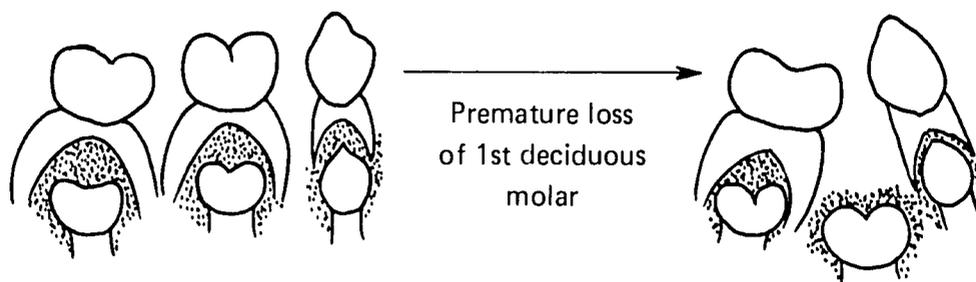
It is the responsibility of the parents to be understanding and patient during this difficult time of tooth eruption. Sometimes the child will stop crying if he is offered the breast to suckle. Mothers should continue to breast-feed their children while they are erupting the deciduous teeth. Breast milk will help the child to develop strong teeth. Breastfeeding helps to develop a beautiful, round mouth. Babies who are bottle-fed and who are thumbsuckers often develop front teeth which stick out(buck teeth) from sucking on a bottle or their thumbs too much. If possible, every mother should breastfeed her baby. Remember: Breast milk is the best food for your baby and breastfeeding helps to develop strong, beautiful teeth and a pleasant-looking mouth.

3.3 Importance of Deciduous Teeth

Deciduous teeth are very important to the proper health and development of the child. Some parents do not understand the importance of the primary or deciduous teeth and do not take proper care of the child's teeth. Even though the deciduous teeth will eventually fall out, it is important to take good care of them for the following reasons:

(1) A child needs to have deciduous teeth until they are shed naturally because the deciduous teeth maintain the space for the permanent teeth to fit into the normal tooth alignment. The permanent tooth buds form between the

roots of the deciduous teeth and the deciduous teeth help to guide the permanent teeth into their proper position in the jaw. If a deciduous tooth is decayed or attached by dental caries and extracted (pulled out by a dentist), there will be a space which will become smaller because the teeth near the space will move into that space. There will not be enough space for the permanent tooth to erupt normally. This will cause an abnormal eruption of the permanent teeth and an abnormal occlusion (bite).



Deciduous teeth with permanent tooth buds developing between their roots. Note: The roots of the deciduous teeth maintain the proper space for the developing tooth buds.

Loss of the deciduous first molar results in the movement of the adjacent teeth into the space. The developing tooth bud has no place to erupt and will erupt crooked.

(2) An early or premature loss of the deciduous teeth, especially the incisors, may cause difficulty in proper speech training. If the child does not learn to form his words properly early in life, then he may develop a speech defect which may be carried over into his adult life causing misunderstanding and embarrassment.

(3) A child needs to have a full set of teeth (dentition) for proper chewing, swallowing and digestion of food. If one deciduous tooth is lost before its time, then food will collect in the space. It is very difficult to clean between the space and the adjacent teeth may become decayed from improper cleansing of the space.

(4) If a child loses a deciduous tooth prematurely, then the permanent teeth may erupt in a crooked pattern causing an unpleasant appearance. Crooked teeth may embarrass the child and lead to some psychological problems.

3.4 Proper Care of Deciduous Teeth

When the first deciduous tooth erupts in the child's mouth, the parents should begin to clean this tooth every day with a small, soft wet cloth. The cloth may be wet with warm salt water and gently rubbed on the tooth surface to remove food and the sticky film (plaque) which will collect on the teeth. A small, soft toothbrush may also be used on the child's teeth. The brush must be soft to prevent injuring the gums of the child. It is a good idea to let the

child play with the brush and chew on it as it will encourage him to clean his own teeth. However, the parents will have to continue to brush the child's teeth everyday until the child is old enough and has gained enough muscle coordination to perform the task himself (usually around 4 - 5 years old).

Parents can also help to prevent the child from getting tooth decay by supervising what the child eats. Children should not be permitted to eat candy, especially hard candies, because candy causes the teeth to decay. Soft drinks such as Coca Cola, Green Spot and other sweet drinks also may cause tooth decay. If the child wants a snack or something sweet to eat, it is better to give him/her some fruit which has natural sweeteners that do not directly cause tooth decay.

Parents should not allow the child to use a baby's bottle for more than two years. Children who are always sucking a bottle will develop cavities more quickly than babies who are breastfed. Breast milk is the best milk for a young child and, if possible, babies should be breastfed until two years of age or longer.

If it is not possible to breastfeed a baby, a bottle containing infant formula may be given to the young child. However, the child should never be given a bottle when he/she is laying down and ready to go to sleep. The milk will accumulate in the infants mouth while he/she is sleeping and cause caries of the deciduous teeth (baby bottle syndrome).

Many children lose their deciduous teeth prematurely because of accidents. Parents should not allow their children to walk around with a soft drink bottle in their mouth because someone may bump into them or they may walk into someone and knock their front teeth out.

REMEMBER: Prevention will save the child a lot of suffering from tooth decay and will save the parents money in the long run.

4. MIXED DENTITION

During the period from approximately 6 - 12 years of age, the eruption of the permanent teeth occurs. At the same time, the deciduous teeth exfoliate (shed) one by one, naturally. Children may become anxious when deciduous teeth are being shed. It should be explained to them that the deciduous teeth are being shed to make room for the permanent teeth.

4.1 Exfoliation Sequence and Timetable

The sequence and timetable for exfoliation of deciduous teeth are as follows:

<u>Deciduous Teeth</u>	<u>Child's Age Range</u>
A,B	6 - 8 years
C	9 - 11 years
D	10 - 11 years
E	10 - 11 years

The period of exfoliation of the deciduous teeth and eruption of permanent teeth is referred to as mixed dentition. At the same time, the jaws are growing and increasing in size so that there is enough space for the permanent teeth to erupt. The first permanent tooth to erupt is usually the first permanent molar. Because this tooth erupts at the age of 6 years and posteriorly to (behind) the second deciduous molar, some people think that this tooth is a deciduous tooth.

4.2 Proper Care of the Mixed Dentition

During the time of mixed dentition, there will be deciduous teeth, permanent teeth and spaces where permanent teeth are erupting all at the same time. This condition makes it more difficult to clean the teeth properly. Special care must be taken to clean all surfaces of the teeth and to clean the tips of the erupting permanent teeth. If possible, teeth should be brushed after every meal to remove food particles from the spaces in between. There may also be some problems with gum infections (gingivitis). Proper cleansing of the teeth and frequent rinsing of the mouth with water will prevent dental decay and gingivitis.

Bad habits such as thumb sucking, rubber nipple sucking and finger sucking should be discouraged at all times. These habits may interfere with the eruption of the permanent teeth and cause malocclusion (improper bite). Any decay in either permanent or deciduous teeth should be treated immediately. Infections caused by decay in deciduous teeth (periapical abscess) may interfere with the development of the permanent teeth, causing malformation or incomplete development.

5. PERMANENT DENTITION

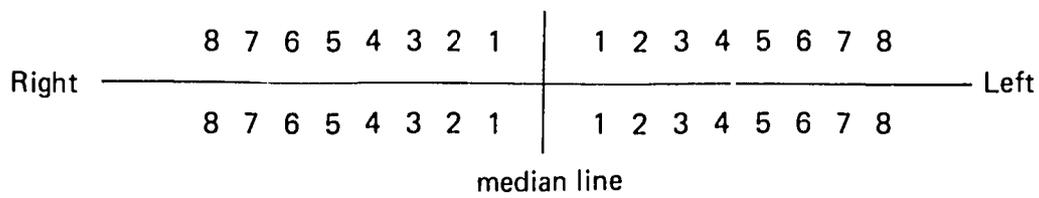
There are 32 permanent teeth - so called because they should remain in the mouth throughout life after the loss of the deciduous teeth.

5.1 Nomenclature

For convenience in recording, permanent teeth are symbolized by Arabic numbers as follows,

Central Incisor	=	1
Lateral Incisor	=	2
Canine (cuspid)	=	3
1st Premolar (bicuspid)	=	4
2nd Premolar (bicuspid)	=	5
1st Molar	=	6
2nd Molar	=	7
3rd Molar	=	8

If we divide the mouth into four quadrants, then, the eight Arabic numbers represent the names of the teeth in each quadrant as shown diagrammatically below:



5.2 Eruption Schedule

Eruption times for individual permanent teeth and the usual sequence of eruption are as follows:

<u>Permanent Tooth</u>	<u>Child's Age (years)</u>
Lower first molar	6 - 7
Upper first molar	6 - 7
Lower central incisor	6 - 7
Upper central incisor	7 - 8
Lower lateral incisor	7 - 8
Upper lateral incisor	8 - 9
Lower cuspid (canine)	9 - 10
Upper cuspid	11 - 12
Lower first bicuspid (premolar)	10 - 12
Upper first bicuspid	10 - 11
Lower second bicuspid	11 - 12
Upper second bicuspid	10 - 12
Lower second molar	11 - 13
Upper second molar	12 - 13
Lower third molar	17 - 21
Upper third molar	17 - 21

5.3 Importance of Permanent Teeth

Permanent teeth are important for good health. Without good teeth, we are unable to masticate (chew) our food properly which can lead to poor nutrition and indigestion. The premature loss of permanent teeth to tooth decay or gum disease can lead to a number of other problems. If a permanent tooth is lost and not replaced with a prosthetic (false) tooth, then adjacent teeth will drift into the space and cause malocclusion (incorrect bite). Malocclusions can lead to speech problems, improper swallowing habits, pain or discomfort of the jaw muscles and drifting and loosening of other teeth.

5.4 Proper Care of Permanent Teeth

Daily cleaning of the teeth is important to prevent tooth decay and gum infections (gingivitis). Periodic visits to the dentist are also necessary to detect caries in the teeth and gum diseases.

Adults should brush their teeth as often as possible or at least once a day. It is more important to clean the teeth thoroughly once, than to brush quickly and incompletely a number of times. A toothpaste with fluoride will help to prevent caries. However, if toothpaste is not available, table salt may be sub-

stituted. Frequent rinsing of the mouth with water will also help to keep the teeth and mouth clean of food particles.

A soft toothbrush with many bristles is recommended because one can clean close to the gum-line without injuring the gums. If possible, it is also recommended that one use dental floss (waxed string) to clean between the teeth.

6. ETIOLOGY OF DENTAL DISEASE

There are two major diseases which cause loss of teeth:

- (1) Dental caries, and
- (2) Periodontal (around the tooth) disease.

Most people know that dental caries (decay) causes loss of teeth, but there is another disease, periodontal disease which also causes loss of teeth. Periodontal disease is the disease of the tissues, ligaments and bone which surround the teeth. Both dental caries and periodontal disease are caused by the formation of a substance called dental plaque on the teeth.

6.1 Plaque

Dental plaque is the product of bacterial (germ) growth on the tooth surface and adjacent gingiva (gum). When we examine dental plaque under the microscope, we find that it has a very specific structure. Within 30 minutes of brushing the teeth, a thin wall or pellicle of saliva will form on the tooth surface. After 1 - 2 hours, bacteria (germs) will attach themselves to this pellicle and begin to multiply and grow within the pellicle. The pellicle will become thick and the bacteria will organize themselves into colonies or groups.

There are many types of bacteria (microorganisms) in plaque. Some types produce substances called enzymes which can break sugar down to acid (lactic, acetic or propionic acid). It is the production of acid on the tooth surface which causes tooth decay.

CARBOHYDRATE or SUGAR + BACTERIAL PLAQUE = ACID → TOOTH DECAY

The growth rate and site of dental plaque differs from person to person. In general, there are four requirements for plaque to form. These requirements or prerequisites are as follows:

- (1) Environment: This refers to the teeth and surrounding tissues. If there are no teeth present, then there will be no place for the plaque to form. The environment also refers to the shape (morphology) and site of the tooth, gingiva and other oral tissues.
- (2) Time: Time is an important factor in plaque formation. The greater the time between brushing, the more plaque that accumulates on the teeth.

- (3) **Food or Substrate:** In order for the bacteria in the plaque to grow, some food or substrate must be available. Certain foods, such as carbohydrate and sugar, are easily digested (broken down) by the bacteria in plaque. Foods that are sticky also promote plaque formation as they remain on the teeth longer.
- (4) **Micro-organisms:** Microorganisms such as bacteria, vibrios and fusobacteria are commonly found in the mouth of man. However, when the mouth and teeth are not properly cleaned, these microorganisms may grow too rapidly and cause diseases such as decay and gingivitis.

6.2 Calculus

The amount of dental plaque will increase in proportion to the length of time it remains on the teeth. Plaque which remains on the teeth for many days may become hard or calcified. Salts normally found in the saliva will begin to form on top of the dental plaque. This formation is referred to as dental calculus.

Dental plaque and dental calculus are classified as follows:

- Supragingival: Found on the exposed tooth surface, and
- Subgingival: Found in the crevice (space) between the tooth and the gum (periodontal pocket). Subgingival plaque contains more vibrios and fusobacteria than supragingival plaque.

6.3 Factors Which Influence the Formation of Plaque/Calculus

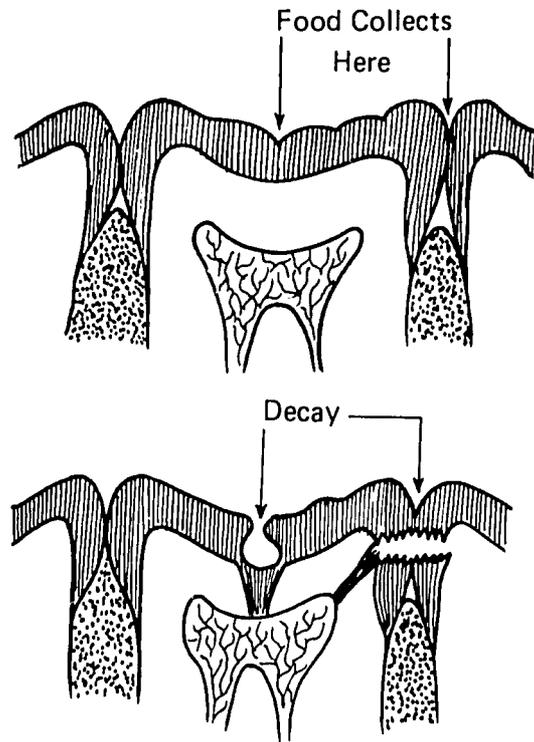
Certain conditions may influence the formation of dental plaque and calculus. These include:

- (1) Malposed teeth: Teeth which are crowded and crooked are difficult to brush. Therefore, dental plaque and calculus often form on these teeth.
- (2) Irregular gingiva: Gingiva which does not hug the teeth closely due to disease or malposed teeth will collect plaque more readily than normal gingiva.
- (3) Rough tooth surface: Teeth which have pits in the enamel or exposed roots will collect plaque and calculus more easily than smooth tooth surfaces.
- (4) Thick saliva: A person with very thick saliva tends to form more calculus and plaque than a person with normal saliva.
- (5) Oral hygiene: Poor oral hygiene will directly lead to heavy plaque and calculus formation.

7. DISEASES OF THE TEETH AND SURROUNDING TISSUES

7.1 Diseases of the Teeth

Dental decay is the major disease of the teeth. Dental caries or dental decay, begins on the occlusal or proximal surfaces as follows :



Food left on or between the teeth is the first step in the formation of dental decay. Bacteria in the mouth digest this food and produce an acid which dissolves the enamel of the tooth. At first only a small hole is created, and if all the decay is removed at this point, and the hole is filled with silver, the tooth can be saved. However, if left untreated, the small hole will get larger and larger as the bacteria produce more acid, and the decay will eventually reach the nerve or dental pulp.

Sequellae of decay if left untreated

If decay is left untreated and reaches the nerve or dental pulp, the bacteria will begin to kill the nerve. At first the tooth will be only slightly sensitive to hot, cold, or sweet foods. Once the bacteria have killed the whole nerve, the tooth will become infected, begin to hurt very badly, and an abscess will form.

Symptoms of a dental abscess are

- (1) tooth hurts when it is tapped gently,
- (2) swelling in the mouth next to the infected tooth, and
- (3) swelling of the whole side of the face.

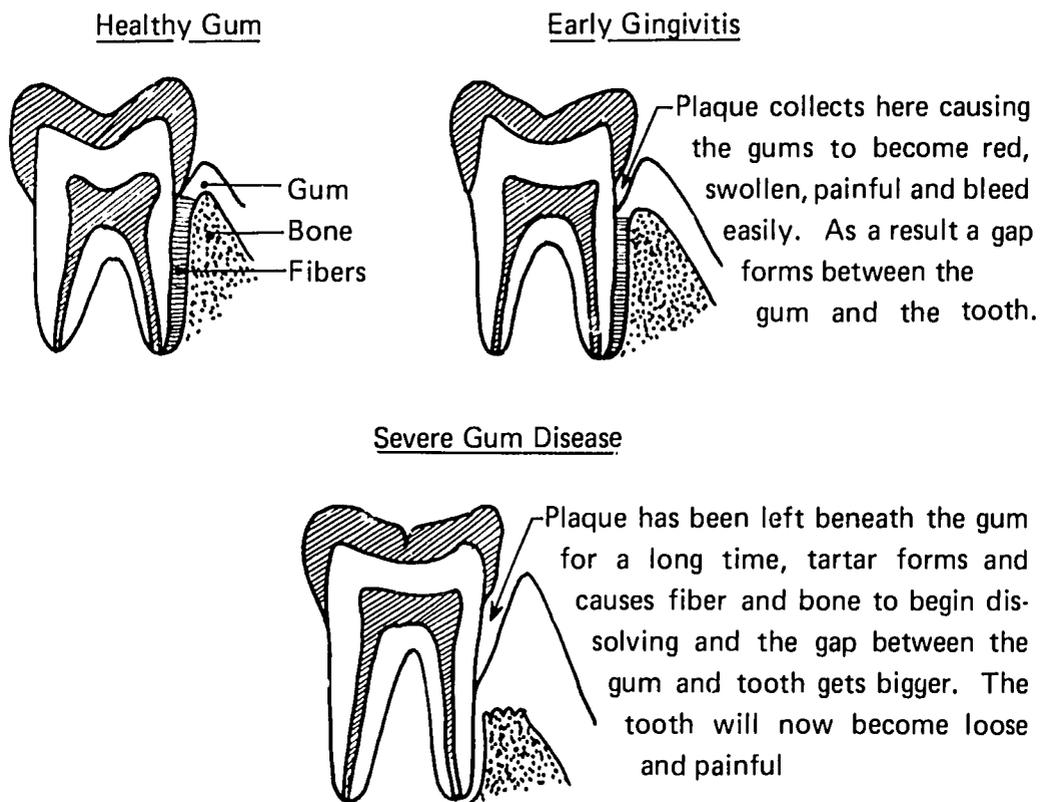
Treatment:

Dental decay is best treated before the decay has reached the nerve or dental pulp by removing as much of the decay as possible and placing a tempo-

rary filling if no dentist is available. If the decay reaches the nerve and the tooth becomes painful, extraction is the only treatment suitable for an area with no dentist. If the patient has swelling, pain, and fever from a dental abscess, it is best to reduce the swelling and fever with antibiotics before extracting the tooth. Refer the case to hospital.

7.2 Diseases of the Surrounding Tissues

7.2.1 Gingivitis and Periodontal Disease. This is seen first when the gums become very red and swollen, and bleed easily when touched or brushed. Gingivitis and periodontal disease are usually caused by plaque being left around the gum and underneath it. If the plaque is left there long enough, it will become hard and form a substance called tartar or calculus. Calculus will make the gums more red and swollen and painful, and if not removed will cause the fibers and bone which hold the tooth in the jaw to dissolve. The tooth will then loosen, become painful, and will have to be extracted



Clinical symptoms of gingivitis include:

1. Redness and swelling of the gingiva,
2. Swelling of the gingival papilla,
3. Indefinite edges of the gingival margin,
4. Gingiva bleed easily during chewing or brushing.

Clinical symptoms of periodontitis include:

1. Chronic inflammation of the gingiva,

2. Pocket formation, usually (but not always) with pus formation,
3. Usually painless, but may be accompanied by such symptoms as:
 - sensitivity to thermal (heat) changes,
 - sensitivity to food or touch (associated with exposure of the roots),
 - dull, radiating pain during and after chewing (caused by the wedging of food into the periodontal pockets), or
4. Acute symptoms such as throbbing pain and sensitivity to percussion usually indicates the presence of a periodontal abscess.

Treatment: If there is calculus present, it should be removed with a special instrument (scaling instrument). Removing the calculus will allow the gums to heal. Then the patient should be taught how to brush their teeth correctly. If there is no calculus present, the patient should be taught proper brushing to prevent plaque from accumulating around the teeth. Once the plaque has been removed, the pain and swelling will decrease.

It is also helpful to rinse the mouth out with warm salt water. This will help to reduce the swelling and soreness in the gums and surrounding tissues.

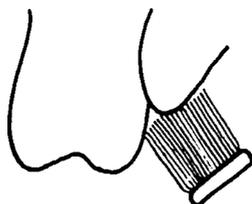
Prevention: Both dental decay and gum disease are caused by plaque resting on or near the teeth and gums. If this accumulation of plaque can be prevented, then both of these diseases can be prevented. The best way to remove plaque from around the teeth and gums is through proper and frequent toothbrushing.

Toothbrush: A toothbrush with soft, even bristles is the most effective in cleaning the teeth. However, substitutions can be made in rural areas where toothbrushes are either too expensive or not available. Toothpaste is not essential but adds a pleasant flavor to the mouth after brushing.



When to brush the teeth: Ideally, teeth should be brushed after each meal. As this is difficult in most areas, a thorough brushing once a day should be enough.

How to brush: The bristles of the brush should be inserted at a soft angle where the gum meets the tooth. This will allow the bristles to slip beneath the gum where most of the food will become lodged.



The brush should then be gently vibrated so that it will dislodge the sticky food and clean around and beneath the gum. After vibrating, the brush should be swept toward the occlusal surface of the teeth. This technique should be used along the gum margins of all the teeth both inner and outer. Then the occlusal surfaces of all the teeth should be brushed briskly to dislodge the food particles caught in the grooves.

8. OTHER DISEASES OF THE ORAL CAVITY

8.1 Acute Abscess. Sometimes infections of dental origin will cause facial swelling, fever and pain. This is called an acute dental abscess. The swelling will be fluctuant and very painful when pressed. When looking in the mouth the abscess will usually be seen in the sulcus next to the involved tooth.

Treatment:

Children;

(1) Give Penicillin G sodium 500,000 units/day intramuscularly for 3-5 days.

(2) Give Penicillin V 200,000 - 400,000 units orally four times a day before meals and at bedtime for 5 days.

(3) Give A.P.C every 4 hours for pain.

(4) Give mouthwash for oral rinsing.

Adults;

(1) P.G.S 100,000 units IM daily for 3-5 days.

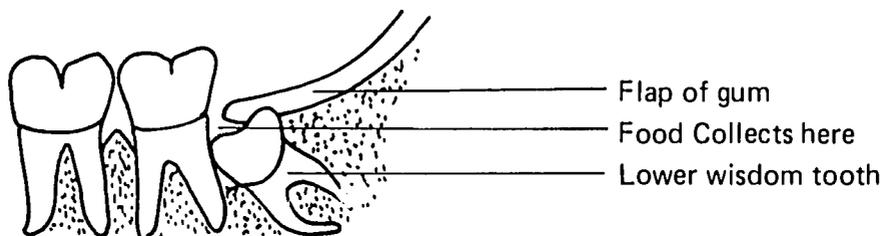
(2) Give Pen V 400,000 units orally before meals and at bedtime for 5 days.

(3) Give A.P.C or Deparon 2 tablets every 4 hours for pain.

(4) Give mouthwash for oral rinsing.

Note: When the patient's condition is improved, refer him to the dentist.

8.2 Pericoronitis This is an inflammation of the gum around the tooth, usually associated with a lower wisdom tooth which is only partly erupted. It is most often seen around a wisdom tooth which has just erupted or around a wisdom tooth which is only partly erupted because there is not enough room for it to completely erupt. Food debris collects beneath the gum flap and causes swelling, pain and possibly infection.



Treatment:

(1) Irrigate the area around the tooth and underneath the gum flap with saline.

- (2) Gently curette the area around the tooth to remove any debris
- (3) Have the patient rinse with warm salt water four times a day after meals.

If this condition does not improve or if it recurs, the patient should be referred to a dentist for removal of the third molar, as this will sometimes be the only way of permanently curing the inflammation.

8.3 Ulcerative Diseases

There are a number of ulcerative diseases of the mouth of which the following are the most common:

8.3.1 Acute Necrotizing Ulcerative Gingivitis (ANUG). Patients with this disease will usually come to the clinic complaining of severe pain in the gums either in one small area or throughout the mouth. The gums will be very red and swollen, with ulcerations or white patches scattered around the gums. These ulcers will bleed easily and the breath will have a characteristic odor. ANUG usually occurs in young adults, and is the result of very poor oral hygiene.

Treatment:

- (1) Gently scale the involved areas removing as much debris as possible. Care must be taken as the gums will be very sensitive.
- (2) Instruct the patient to rinse their mouth with a disinfectant, such as hydrogen peroxide 1.5% qid.
- (3) Instruct the patient in proper oral hygiene.

8.3.2 Acute Herpetic Gingivostomatitis. This disease will usually be seen in young children 6 years old or younger. It is a disease of viral origin which affects the mucous membranes of the mouth, appearing as ulcerations on the mucous membranes of the lips, cheek, tongue and gums inside the mouth, along with a generalized gingivitis. The patient can be very ill, suffering from severe oral pain, fever, and malaise. Acute herpetic gingivostomatitis is one of the viral diseases of early childhood like measles, chickenpox, and mumps and will usually disappear after 7 to 10 days.

Treatment:

Treatment should be mainly supportive in the form of an astringent mouthwash, aspirin for fever and pain, vitamin supplementation since the child will usually have trouble eating, and reassurance to the parent that the disease is self-limiting.

There are many other diseases which have oral manifestations such as the leukemia, anemia, neutropenia, diabetes, and viral diseases. These conditions appear infrequently and so should not be confused with the diseases which have been described above which are much more common. The emergency procedures described will usually be very effective for the particular diseases. If the condition persists after treatment, it must be emphasized that the patient should be referred to either a dentist or a physician.

Dental diseases and infections of dental origin can spread to other areas of the body and cause severe illness and even death if left untreated. The ren-

dering of emergency dental services is an important component of primary health care and provides a valuable service to the community.

8.3.3 Apthous stomatitis (fever sores). This condition presents itself as small vesicles (blisters) which appear on the lips, cheek, tongue, floor of the mouth and palate. The blisters rupture and become ulcers. Apthous stomatitis is caused by the virus herpes simplex and is seen in adults and adolescents. It usually accompanies a fever, or a period of low resistance, or will most likely appear during periods when the person is under pressure, physical or emotional stress, or prolonged exposure to the sun. The ulcers are yellow-white with a red margin, usually lasting from 7 - 10 days, after which time they heal normally, and are recurrent.

Treatment: As this disease is viral in origin and self-limiting, there is no specific cure. Usually the ulcers will heal after 7 - 10 days. Treatment should be ameliorative and symptomatic as follows:

- (1) Analgesics such as aspirin or acetaminophen for pain,
- (2) Astringent mouthwash, and
- (3) Supportive vitamin therapy.

8.3.4 Oral Cancer: Any ulcer in the mouth which does not heal after two weeks should be suspected of oral cancer. Such patients should be referred to a dentist or physician.

Oral cancer may appear as a small painless lesion similar to others described above. If the ulcer persists, the lesion will increase in size, the borders will be hard, and the interior portion will become necrotic. The patients will eventually develop painful, hard, swollen cervical or submandibular lymph nodes in the more advanced stages of the disease.

The exact cause of oral cancers are unknown, but the following conditions can predispose people to developing oral cancers:

- (1) Chronic irritation from jagged or sharp-edged filling or carious teeth, and malfitting dentures,
- (2) Heavy, chronic use of tobacco or alcohol,
- (3) Betel nut chewing, and
- (4) Chronic chemical or thermal irritation.

Treatment: If a person is suspected to have an oral cancer, he/she should be referred immediately to a dentist or physician.

9. CONDITIONS OF ORAL TISSUES DURING PREGNANCY

Due to the increased levels of estrogen and progesterone during pregnancy, gingival (gum) tissues can become easily inflamed in the presence of poor dental hygiene. The following conditions are seen frequently during pregnancy:

9.1 Pregnancy gingivitis: This condition will appear as swollen inflamed, painful gums which bleed easily in a pregnant women. The cause is plaque for-

mation due to poor oral hygiene. Good oral hygiene habits should be encouraged amongst pregnant women to prevent this condition.

Treatment: The patient should be instructed to clean their teeth and gums and to maintain good oral hygiene, especially during the pregnancy.

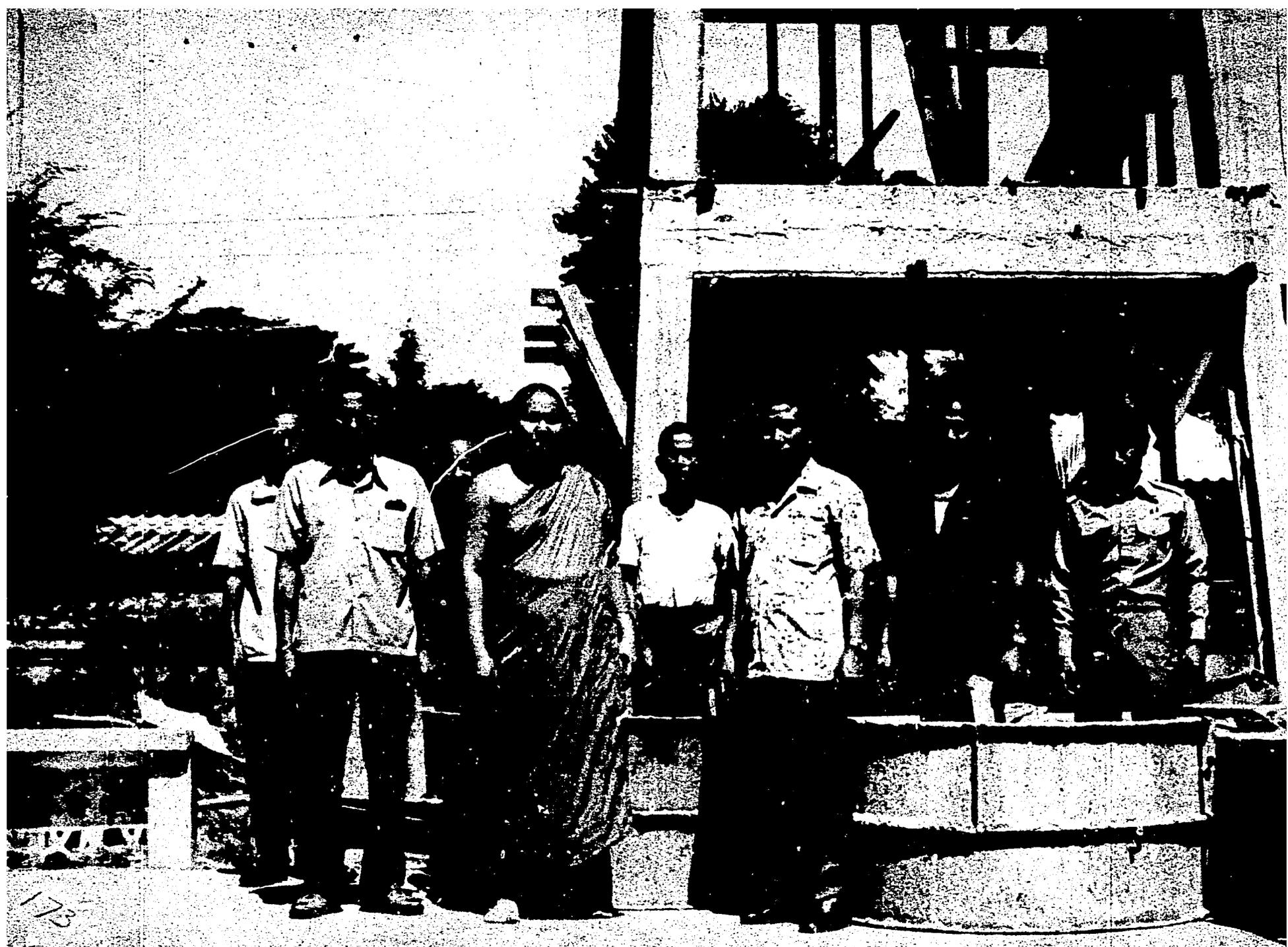
9.2 Pregnancy tumor: A pregnancy tumor is an inflammatory response to local irritants such as plaque or calculus during pregnancy. The tumor appears as a mushroom like mass adjacent to the gums, is red, painless, bleeds easily and usually appears after the third month of pregnancy. It will usually disappear after delivery.

Women who are pregnant should not be given tetracycline during their pregnancy as its use will result in brown stain on the deciduous teeth and some permanent teeth of the child.

MODULE 20
ENVIRONMENTAL SANITATION

NART CHAROENCHAI, M.S.

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173



MODULE 20

ENVIRONMENTAL SANITATION

1. INSTRUCTIONAL OBJECTIVES

At the end of the course, the wechakorn will be able to:

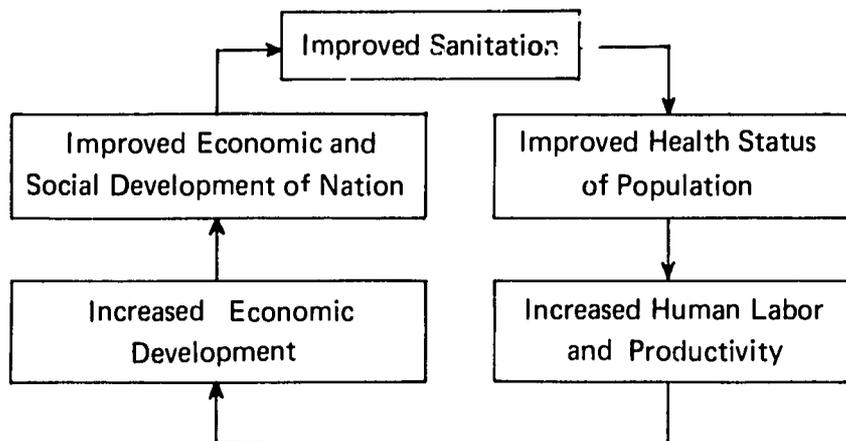
- (1) Explain the principles of water treatment and waste disposal in a rural community.
- (2) Explain the principles of food sanitation in a rural community.
- (3) Explain the principles of mosquito, fly, and rat control in a rural community.

2. THE IMPACT OF ENVIRONMENTAL SANITATION

Many communicable diseases are the consequences of filth or unhygienic environmental sanitation. Emerging hazards are air and water pollution caused by factories or industrialization. Flies, mosquitos, and other vectors play a great role in transmitting communicable diseases.

Sanitation is the prevention of diseases or unpleasant conditions through the proper disposal of wastes, and the control or improvement of the environment which can transmit diseases to humans. Therefore, environmental sanitation is a community affair and requires full public cooperation and sometimes the reinforcement of laws.

Good environmental sanitation will decrease the mortality and morbidity rates of some important infectious diseases related to waste disposal, water supplies, and vector control. It will also promote the health of the general population through, for example, housing sanitation, food sanitation, and personal hygiene. It can help increase national income and improve progress through human labor. This cycle can be shown diagrammatically as follows:



3. WATER TREATMENT AND PURIFICATION

Water is vital to body functions. Natural water is a good solvent for minerals and compounds. However, it also carries organisms or diseases. Therefore, water should be properly treated and safe for drinking or domestic use.

The rural Thai population uses water obtained from wells, ponds, or rivers. Water from such sources is often unclean and not safe for drinking. Fortunately some villages have sanitary wells or piped water. Some households use boiled or filtrated water.

Methods used in water treatment include:

3.1 Boiling.

Boiling kills many kinds of bacteria and parasites. Physical characteristics of water are not much changed, but temporary hardness is a little bit changed. For purification, water should be boiled for about 15 - 30 minutes.

3.2 Water Filtration.

Water filtration is a very common treatment for household and small community water supplies. A filter system consists of layers of graded gravel. Water is introduced into the top of the filter and flows down through the sand and gravel into a collecting or underdrain system. The removal of bacteria, turbidity, and other impurities is accomplished by the filtering action of a gelatinous layer that forms at the surface of the sand.

The equipment used for water filtration includes a casing 80 cm or 1 meter in diameter, gravels, and sand, and a water pipe 2 inches in diameter. A sand filtration system diagram is shown in figure 20.1.

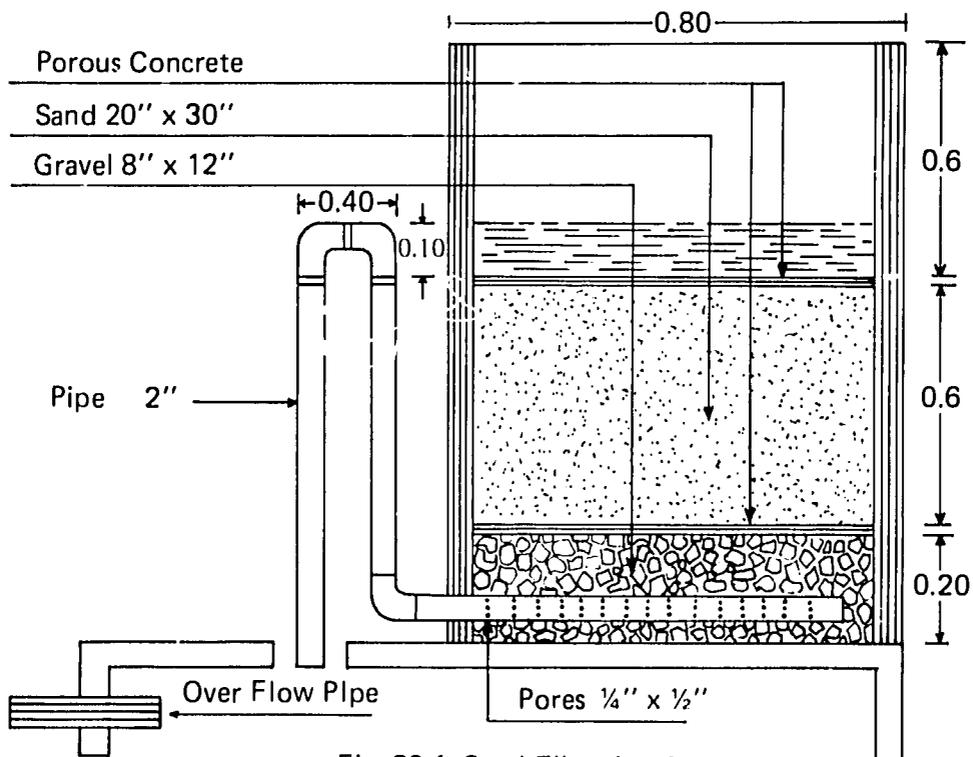


Fig. 20.1 Sand Filtration System

3.3 Chemical Method

Two chemical substances used for water treatment are iodine and chlorine. Two drops of 2% tincture of iodine are used to purify 2 liters of water; the treated water should stand for at least half an hour before use. Chlorine gas or powder, such as calcium or sodium hypochlorites, or chlorinated lime may be used; this chemical is also available in a pellet form called "stero-tabs". Chlorine is popular because it is cheap and kills a higher number of organisms. It is suggested that the residual chlorine in drinking water should be about 0.4 - 0.6 ppm after 30 minutes of chlorination. The turbidity of water before chlorination should be less than 50 ppm. Table 20.1 is a practical guide for water chlorination.

Table 20.1 Water Chlorination Table

Filtered Water		Chlorine Powder 25%*		Chlorine Powder 70%*	
Liters	Equivalent No. Gasoline (20 Liter Size) Containers	Weight (gm)	Teaspoons	Weight (gm)	Teaspoons
200	10	4	1	$1\frac{1}{3}$	$\frac{1}{3}$
400	20	8	2	$2\frac{2}{3}$	$\frac{2}{3}$
600	30	12	3	4	1
800	40	16	4	$5\frac{1}{3}$	$1\frac{1}{3}$
1000	50	20	5	$5\frac{2}{3}$	$1\frac{2}{3}$
1200	60	24	6	8	2
1400	70	28	7	$9\frac{1}{3}$	$2\frac{1}{3}$
1600	80	32	8	$10\frac{2}{3}$	$2\frac{2}{3}$
1800	90	36	9	12	3
2000	100	40	10	$13\frac{1}{3}$	$3\frac{1}{3}$

* Value of available chlorine by weight.

The residual chlorine content of a water supply is determined by means of the orthotolidine test. The test consists of adding 1 ml of standard orthotolidine solution to 100 ml of the water to be tested. The reagent should be mixed thoroughly with the water and allowed to stand for 10 minutes. The appearance of a yellow color indicates the presence of residual chlorine in the supply. The amount of chlorine present will vary with the intensity of the

coloring, a light straw coloring indicating a safe water supply.

3.4 Well Construction and Chlorination

The major portion of the drinking water serving a rural community is obtained from wells. Usually these are shallow wells used by one or a group of households. If wells are properly constructed and located they generally produce a safe water supply which is free from disease-producing bacteria. The groundwater supply must have a sufficient degree of filtration from the time it enters the soil in its downward direction of flow to the time it reaches the well inlet pipe. The degree of removal of bacteria and other suspended particles will depend on the character of the soil and length of travel. A sandy water bearing stratum usually provides adequate filtration to ensure a safe supply. On the other hand, water-bearing formations consisting of limestone, broken rock, or gravel may not provide sufficient filtration and may permit the passage of water containing bacteria to the well supply. Shallow wells are sometimes subjected to bacterial contamination by material being carried downward from the ground surface in the near vicinity of the supply.

For the greatest protection against surface contamination it is essential that the side wall of the well be of adequate construction and that the water-bearing stratum be separated from the ground surface by a clay or some other impermeable formation. The groundwater supply should be located at higher elevations and at a safe distance from installations such as sewers, cesspools, or privies. Sewage disposal facilities should be located at least 50 feet and preferably 100 feet from wells. In addition, the ground around the water supply installation should be properly drained and the earth should be mounded around the unit to remove surface water from the area.

The minimum depth of the well should be 10 feet. The side walls of the well should have an impervious casing such as concrete which should also extend down at least 10 feet. Wells are usually 3 to 6 feet in diameter. Watertight casings or side walls should be provided for well supplies, to extend from the ground surface to the water-bearing stratum. Casings should be also installed to prevent water at the ground surface from entering the supply, and to act as a barrier along its length to prevent any flow into the well. The wall should be at least 6 inches in thickness, reinforced properly, and free from voids. When piping is used for the well wall, it should be of standard wrought iron, steel, or a similar metal that is durable and watertight.

The well platform or cover should be designed to support the pumping unit properly and to prevent surface water or leakage from the pump from dripping down into the well. The cover is usually constructed of concrete and should have a minimum thickness of 4 inches. It should extend at least 3 feet in all directions from the well casing and should extend downward with an overlap of not less than 2 inches. The slope of the slab should be 1 inch per foot in a direction away from the well casing.

When the well is completely constructed it should be pumped out thoroughly. Water will permeate into the well up to its normal level. Chlorine

178

(calcium hypochlorite containing 70% available chlorine or high test hypochlorite) of 50 - 100 ppm is poured into the well as far down as possible and thoroughly mixed (see Table 20.2). The chlorinated water should be left to stand for a period of at least 24 hours. Then the well should be pumped out again and new water should be allowed to permeate.

Table 20.2 Amounts of Chlorine Needed Per 1 Meter Depth of Water to Chlorinate Well Water at Levels of 50 - 100 ppm.

Well Diameter	70% Available Chlorine		25% Available Chlorine	
	Grams	Tablespoons	Grams	Tablespoons
80 cm	35.7	2.5	100	7
90 cm	45.4	3	127	9
1 m	56	4	157	11
1 m 10 cm	67.8	5	190	13.5
1 m 20 cm	80.7	5.5	226	16
1 m 25 cm	87.5	6	245	17.5
1 m 50 cm	124	9	352	25
1 m 75 cm	171.24	12	480	34
2 m	224	16	628	45
2 m 50 cm	350	24.5	980	70
3 m	478	34	1360	99

Table 20.3 Drinking Water Quality Standards Recommended By The World Heath Organization.

<u>Chemical Quality:</u>	<u>Maximum Level</u>	
Lead	0.1	mgm/l.
Selenium	0.05	"
Arsenic	0.20	"
Chromium	0.50	"
Cyanide	0.01	"
Iron	1.00	"
Manganese	0.50	"
Copper	1.50	"
Zinc	15.00	"
Calcium	200.00	"
Magnesium	150.00	"
Fluoride	1.50	"
Sulfate	400.00	"
Nitrate	50.00	"
Chloride	600.00	"
Phenol	0.002	"

pH	6.5 - 8.5
Hardness	100

Physical Quality:

Color (by platinum cobalt scale)	20	Units
Turbidity	10	Units

3.5 Cisterns

Cisterns are commonly used in rural communities. The water collected in cisterns is soft and very desirable for washing purposes, but usually it is used for drinking. If the collection and storage procedures are not controlled properly the supply is likely to contain bacterial contaminants, and perhaps chemical contaminants in the form of agricultural insecticides or herbicides. After dry periods the atmosphere and the surfaces or roofs used for collecting cistern water may contain considerable quantities of dust and pollutional material. Fecal droppings from birds and dust borne contamination may be washed into a cistern during the first few minutes of rainfall. A "cutoff" may be used to divert the first washings from the roof or collecting surface from the cistern. The flap valve should be turned to the position to discharge the water to the ground for the first ten minutes of rainfall. After this period for cleansing the roof, the valve is then changed to divert the water to the cistern.

Cisterns should be constructed above the ground surface. The construction used should provide protection of the supply from contamination during storage. Cisterns may be constructed of wood, metal, or masonry. The roofing should be of watertight construction, and any opening between the roof and the top of the side walls should be screened or properly protected to prevent insects from entering the cistern. A diagram of a cistern is presented in Figure 20.2.

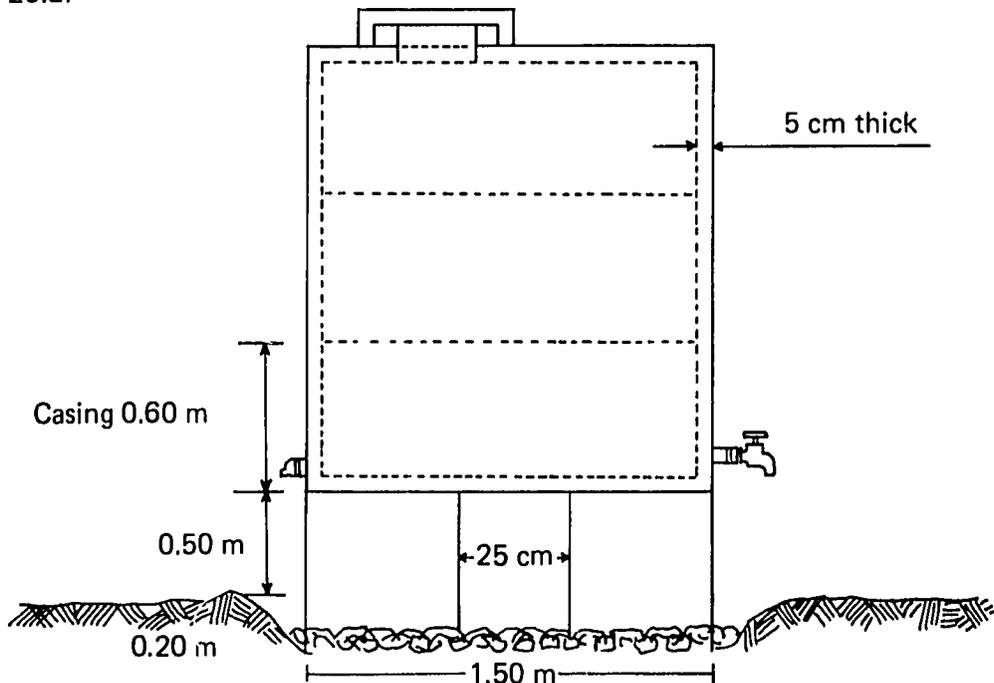


Figure 20.2 Construction of Cistern

4. HUMAN EXCRETA DISPOSAL

Safe disposal of human wastes is essential for the protection of health. Typhoid, cholera, dysentery, hepatitis, and parasitic infestations are diseases that may be transmitted by inadequate sewage and human excreta disposal. The treatment of waste is also important from an aesthetic standpoint. Sewage and excreta cause obnoxious odors and are offensive in appearance. Sewage and excreta discharged to surface streams may also be a menace to water supplies, bathing beaches, shellfish growing areas, and fish life. Insects may also spread diseases by carrying to food supplies the pathogenic organisms contained in excreta.

Common human excreta disposal methods in a rural community are as follows:

4.1 Earth Pit Privy

The earth pit privy provides a satisfactory means of excreta disposal. The fecal material deposited in the pit is broken down into liquids, gases, and inert material by the action of bacteria on the organic matter. For satisfactory operation, it is essential that the soil be sufficiently porous to permit seepage of liquids into the ground, and that the ground-water table be at an elevation below the bottom of the pit. The pit should also be sufficiently distant from the privy structure. The privy should be a unit separate from the residence but conveniently located. The structure should be properly designed and constructed and it should be insect and rodent-proof.

The pit should have a minimum capacity of 50 cubic feet and it should be properly sheathed to hold up the earth side walls. The earth around the pit should be rounded for a distance of about 18 inches, to prevent surface water from flowing down into the compartment and causing erosion or collapse of the side walls. Concrete floor slabs, risers, and curbing provide sound construction and great durability and are recommended in preference to wood. Bricks or similar hard substances should be used for lining the pit. Factors to be considered in building a house or superstructure are size, ventilation, lighting, and cleanliness.

The proper maintenance of a privy includes cleaning the inside of the structure, closing the seat lid when it is not in use, repairing the roof, pouring of a cupful of kerosene into the pit each week (if possible), banking up the earth mound to the floor level around the building at all times, using toilet paper (if possible) to prevent the pit from filling up too rapidly, and painting the building (if possible) to preserve the life of the building.

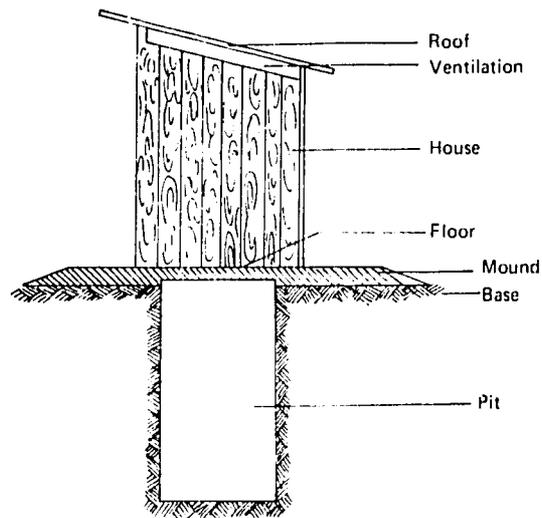


Figure 20.3 The Overall Structure of the Earth Pit Privy.

4.2 Water-Seal Latrine

In a water-seal latrine, the floor slab or squatting plate is connect with a bowl and a seal. The pit may be a cesspool, septic tank, or earth p. The pit is connected to a seepage pit by a drain pipe. This type of "cesspool latrine" is very popular in rural communities. A diagram of the structure o hand-flushed cesspool is shown in figure 20.4.

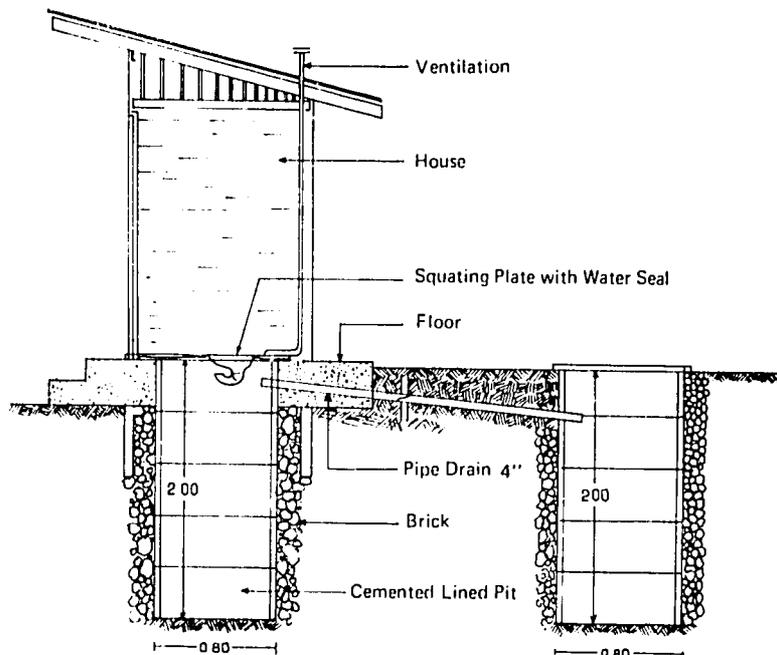


Figure 20.4 Construction of Water Seal Privy with Cesspool

182

5. REFUSE COLLECTION AND DISPOSAL

Refuse is the waste materia (garbage, rubbish, and ashes) from homes, restaurants, and other establishments in a community. The nature of refuse varies with many factors, such as location of community, season, villagers' habits, socioeconomic status, population density, and services.

Refuse disposal is of major importance in maintaining healthful living conditions. When refuse is stowed in unprotected containers and when improper disposal methods are used, the material thus exposed may attract insects and rodents. Disagreeable odors of the decomposing organic matter and unsightliness of the wastes are also esthetic problems that develop. Refuse also is a potential fire hazard. It has been shown that when wastes are allowed to accumulate in communities, insects and rodents population increase tremendously. When this occurs, the hazards of fly-borne and rodent-borne diseases in the community become more imminent.

5.1 Definitions

5.1.1 Garbage. Garbage is the waste food products from our homes and restaurants that are discarded or left over from meals. Garbage is usually easily decomposed. It can be used as a fertilizer or for animal feeding.

5.1.2 Rubbish. Rubbish is waste material such as paper, cans, boxes, glass, metal, etc., which is difficult to decompose.

5.1.3 Ashes. Ashes are the waste material formed through the burning of coal, wood, or bran.

5.2 Collection and Disposal of Refuse

5.2.1 Containers. Refuse containers should be of the proper size and shape (preferably round), watertight, and should have handles and tight-fitting lids.

5.2.2 Storage. Refuse can be stored in one container or can, or in two cans, one for garbage and one for rubbish and ashes, or in three cans, one for each type of refuse. One container is used when the refuse is used for landfill. Disposal is easier however, if different cans are used for each type of refuse.

5.3.2 Refuse. One economical and practical garbage disposal method used in rural areas is incineration. Garbage can be burnt in a pit with a diameter of 3 feet, or in an incinerator. A simple incinerator can be made using a casing or a barrel. The structure of a simple incinerator is shown an Figure 20.5.

193

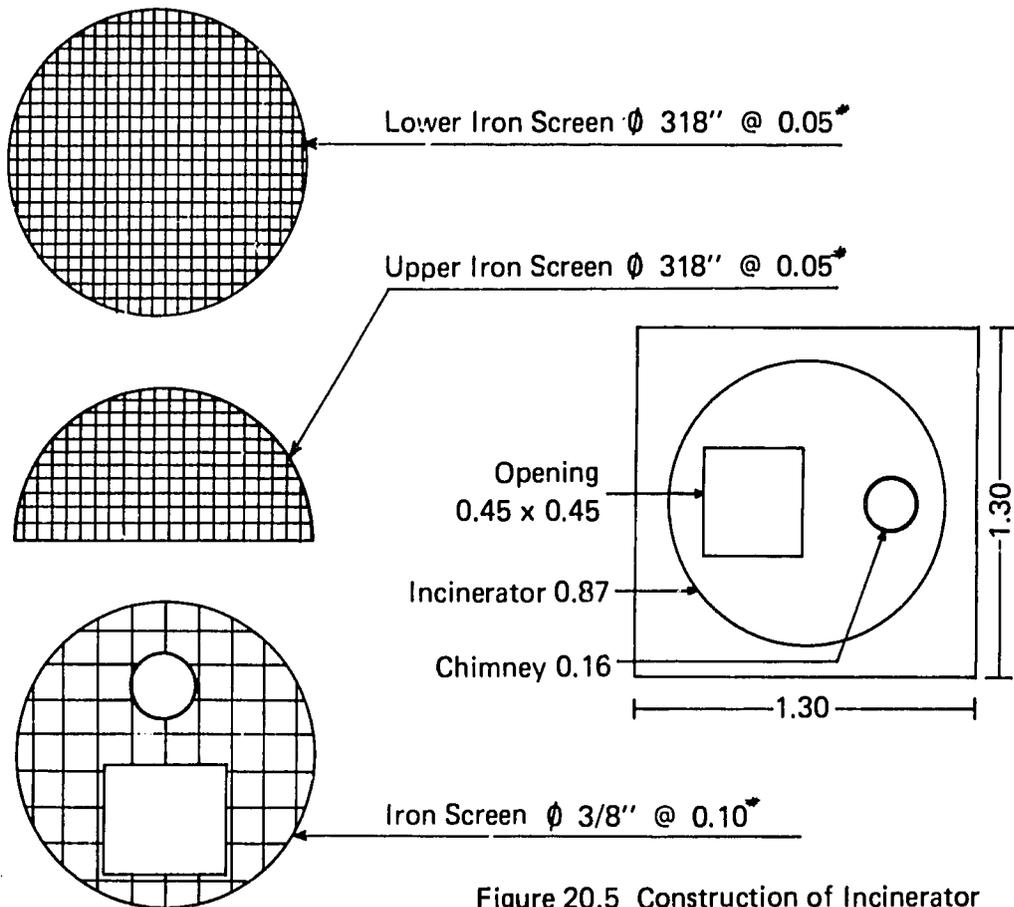
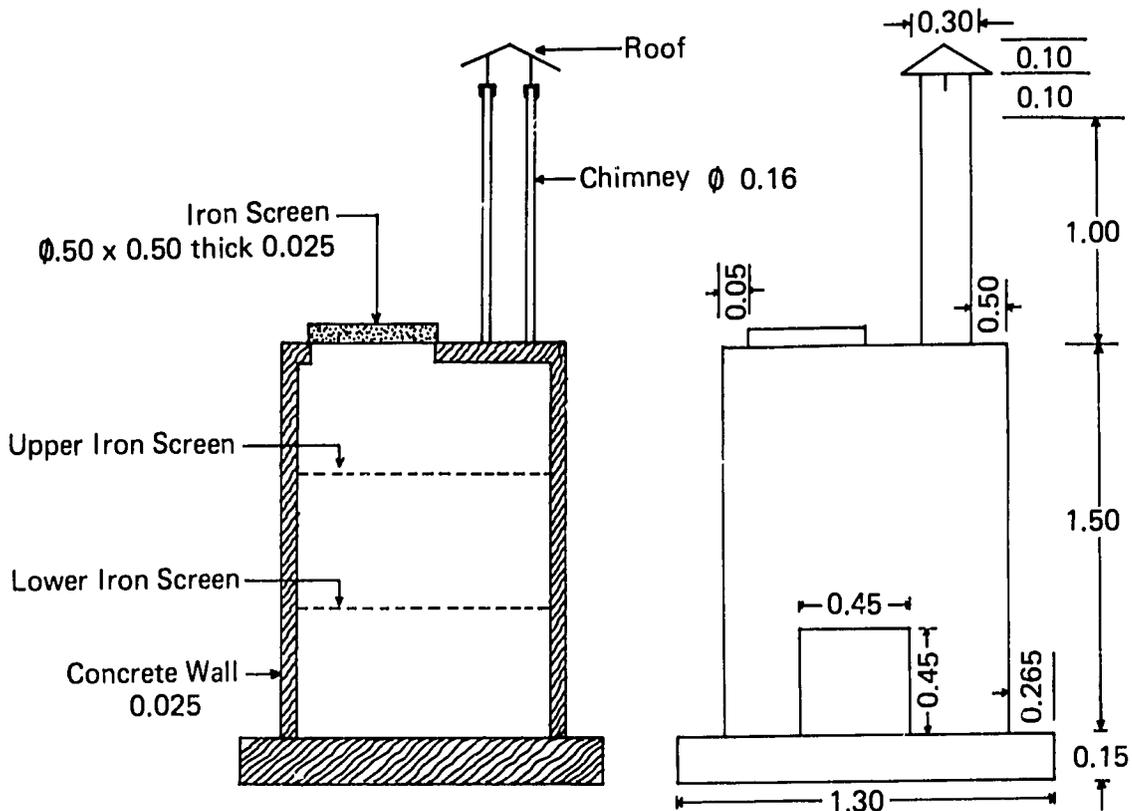


Figure 20.5 Construction of Incinerator

124

5.2.4 Sanitary Land Fill. A creation of a sanitary land fill is also an economical and satisfactory method of refuse disposal. Essentially, it consists of depositing refuse in a compacted form on dumps and promptly applying an earth cover to eliminate the objectionable conditions caused by exposed garbage. The land fill location should not be far away from the residences it serves, but it should be at least 30 meters away from drinking water sources. The land fill pit should be 1 - 2 meters wide and 2 meters deep. Refuse should be deposited every day. When the refuse deposit is about 1 meter thick, it should be covered with a layer of earth 30 cm thick. The last earth covering should be about 30 cm above ground level.

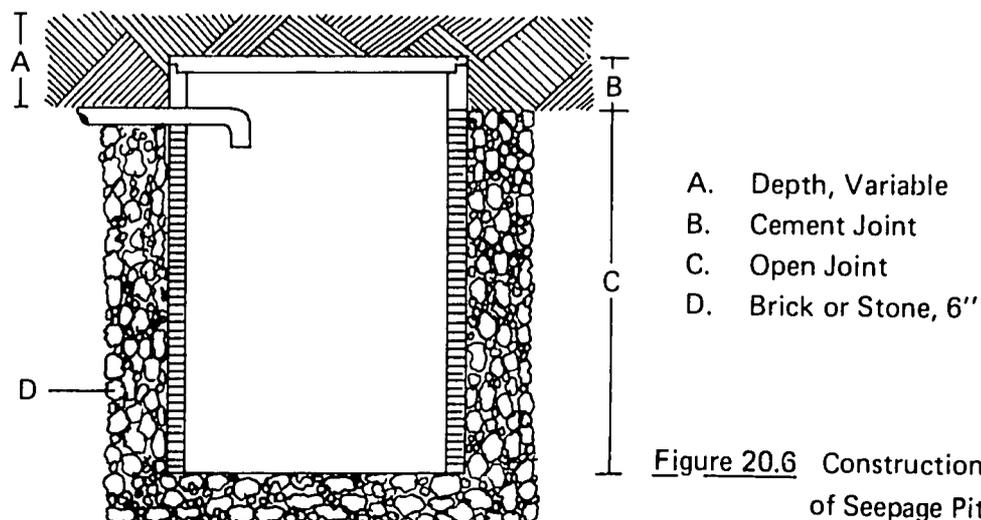
5.2.5 Feeding Garbage to Hogs. Feeding garbage to hogs is, of course, a very economical means of garbage disposal. For this, the garbage must be separated from the rubbish. The garbage container should be watertight and have a tight-fitting lid. It should be cleaned after every use.

5.2.6 Fermentation. Refuse can be fermented by an anaerobic process and later used as fertilizer. The refuse is deposited in a pit and when the pit is filled it is covered for 6 months, to permit the full anaerobic process required for fermentation. During that period, new refuse is deposited in another pit. When the second pit is filled and covered, the fermented material from the first pit can be used as fertilizer.

6. SEWAGE DISPOSAL

Sewage is the waste liquid from residences, buildings, and industries. In rural areas, sewage comes from houses. It causes obnoxious odors and is a source of disease transmission.

Sewage treatment and disposal should not contaminate surface and groundwater. Disposal methods should prevent fly and insect breeding and unpleasant odors or appearance. The methods used should not contaminate the ground, should be economical, and should employ appropriate technology.



A practical sewage disposal method recommended for rural areas is the use of a seepage pit. Such pit is 1 to 1.5 meters deep and 1 to 2.5 meters wide. The side walls are lined with bricks, and the bottom is covered with brick or gravel to a depth of 15 - 20 cm. A diagram of such a structure is given in figure 20.6.

7. FOOD STORAGE

Food should be kept in a proper storage container, otherwise it will spoil or decompose. Factors involved in food decay and decomposition are bacteria, fungi, parasites, rats, insects, temperature, moisture, dust, and improper food handling. Gastrointestinal disturbances are the most frequent illnesses in Thailand. These problems result from unhygienic food preparation and storage and poor personal hygiene. Diseases related to improper food handling commonly found in our country are dysentery, cholera, typhoid, tuberculosis, food poisoning, poliomyelitis, viral hepatitis, intestinal parasitic infestations, chemical poisoning from food additives, and insecticide poisoning.

7.1 Food Containers.

Different kinds of food require different storage methods. Some foods should be kept in open containers, while others must be stored in closed containers. Containers for insecticides should be labeled and kept away from foods. Dried food should be kept in glass containers, pots, wooden or zinc boxes, or bottles. Foods should not be stored in used insecticide containers. The food storage area should be well ventilated, dry, clean, and free from rats and flies or other insects. Proper ventilation prevents bad odors and keeps temperature and moisture normal. Such foods as fats, lard, pork, fish, and chicken easily decay or decompose in warm temperatures.

7.2 Vegetable Storage.

Vegetables and other produce should be stored in a clean, cool area or container with good ventilation. The container should be kept at least 75 cm above the floor. Vegetables and produce should be thoroughly cleaned before storage. If a refrigerator is available, they should be stored at a temperature of 1.7 - 7.2^o C. They should be washed before use. (Beans will last longer if they are not husked before use.)

7.3 Meat Storage.

Beef, pork, fish, duck, chicken, and seafoods should be stored in clean, dry, cool, and well ventilated storage or screened cabinet. If possible they should be wrapped. If a refrigerator is available they should be stored at temperatures below 4^oC. They should be washed before use.

7.4 Fats and Oils.

Fats and oils should be stored in a closed container that will not expose them to sunlight.

7.5 Canned Foods.

Canned foods should be stored in a dry, cool, well-ventilated, clean, screened cabinet. If a can bulges at the top or sides, it means that the food is rotten and should be thrown away. The cabinet must also be cleaned.

7.6 Eggs.

Eggs should be cleaned with cool water before being stored in a cool, dry, clean container. Cracked eggs should be cooked right away. Frequent washing can damage the shell, and this may lead to the penetration of organisms and evaporation.

7.7 Dried Foods.

Dried foods such as meat, vegetables, and fruits can be stored in a bag and hung in a well-ventilated place. Dried foods can also be stored in clean, dry containers or bottles. Food additives, preservatives, and insecticides should not be used in these storage areas.

7.8 Milk Products.

After a can of powdered milk has been opened the lid should be kept tightly closed; otherwise the powder will be rotten. Canned milk can be kept at normal temperatures, but when a can has been opened it should be stored in a cool container or refrigerator. Foods mixed with milk or milk products decay easily.

7.9 Leftover Foods.

Leftover foods, especially those prepared from milk, egg, meat, or fish, rot very readily. This leftover food should be kept in a refrigerator when possible, and should be heated before eating.

8. MOSQUITO CONTROL

Malaria, encephalitis, hemorrhagic fever, and filariasis are among the diseases transmitted by mosquitos. Some species of mosquitos do not transmit diseases, but they are annoyances. Insects transmit diseases by either biological or mechanical means. The biological carriers are usually bloodsuckers, as for instance is the case in malaria. The insect serves as an intermediate host for development of the parasite. In mechanical transmission, organisms causing the disease are carried on the legs or other parts of the body of the insect from contaminated material such as fecal matter to food and water supplies. Persons who eat or drinking this food or water then may contract the disease.

There are four stages of development of the mosquito – the egg, the larva, the pupa, and the adult. Mosquitos show marked variations in the selection of the site for laying their eggs. For example, the *Aedes sollicitans* mosquito is a salt water breeder; it lays its eggs usually in moist depressions in coastal marshes. In contrast, the *Anopheles* mosquitos are fresh water breeders, laying their eggs in lakes, ponds, borrow pits, and swamps. The eggs of the *Anopheles* species are laid singly on the water surface, usually floating in a horizontal position. *Aedes* eggs are shaped differently from those of the *Anopheles*. *Culex*

mosquitos lay their eggs in the form of rafts, with each egg in vertical position. Under favorable temperature conditions, the eggs will hatch in two or three days' time.

The larva stage lasts for approximately one week, depending on temperature and food supply. This stage is entirely aquatic. The oxygen required for respiration is obtained through the surface of the water from the atmosphere. An exception is the *Mansonia perturbans*, which lives on the bottom of ponds and obtains its oxygen by inserting a saw-like breathing tube into the roots or stalks of aquatic vegetation. The *Anopheles* larva rests parallel to the water surface and does not have a breathing tube. It obtains oxygen from the atmosphere by extending a flat plate through the water surface. The other species have long breathing tubes which are extended through the water surface to obtain oxygen, and rest at an angle to the water surface. Feeding is accomplished by a brushing action which sweeps algae, bacteria, and protozoa into the mouth of the larva.

The pupa stage is usually short, normally 2 to 3 days. In this state, which is also aquatic, feeding ceases and activity is greatly reduced. The pupa usually rests quietly at the water surface, taking in air through the surface film.

The adult mosquito emerges from the pupal skin at the water surface and the insect flies away. The *Anopheles* species rests at a 45° to 90° angle from the surface. Adults of other species usually rest and feed parallel to the surface. The *Anopheles* is principally a twilight and night biter and has a flight range of about one mile. Mosquitos of different species have different patterns of feeding, resting, flight range, and life span. Only the female mosquito bites, for the purpose of obtaining blood albumin to aid in egg production. The male mosquito lives on juices. The different characteristics of *Anopheles*, *Aedes*, and *Culex* mosquitos are indicated in figure 20.7.

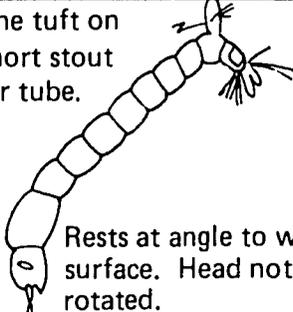
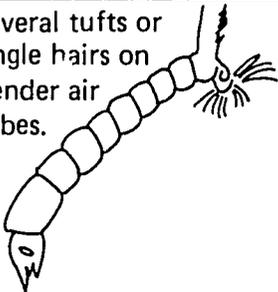
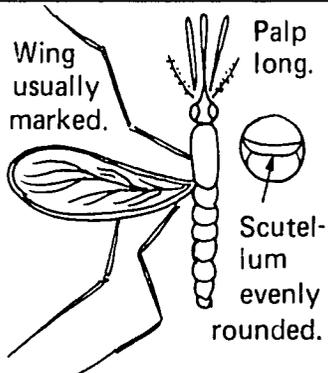
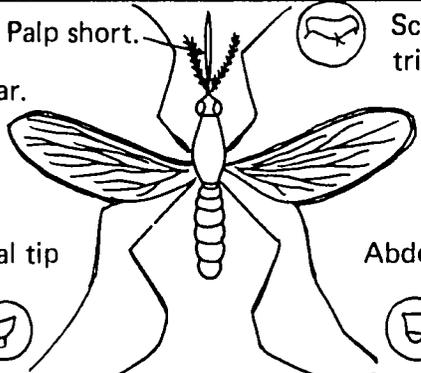
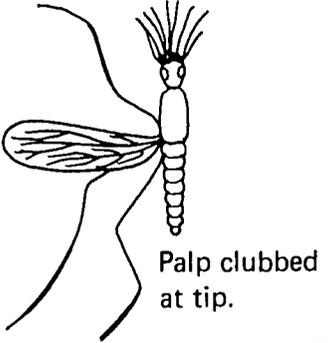
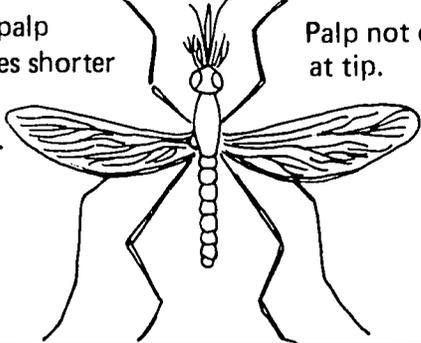
ANOPHELINES		CULICINES	
ANOPHELES		AEDES	CULEX
Eggs	<p>With Floats</p>   <p>Laid singly on water</p>	<p>No Floats</p>   <p>Laid singly on water</p>	<p>No Floats</p>   <p>Laid in rafts on water</p>
Larvae	 <p>Palmate hair no air tube</p> <p>Rests parallel to water surface. Head rotated 180° when feeding.</p>	 <p>One tuft on short stout air tube.</p> <p>Rests at angle to water surface. Head not rotated.</p>	 <p>Several tufts or single hairs on slender air tubes.</p>
Females	 <p>Wing usually marked.</p> <p>Palp long.</p>  <p>Scutellum evenly rounded.</p>	 <p>Palp short.</p> <p>Wing clear.</p> <p>Abdominal tip pointed.</p>  <p>Scutellum trilobed.</p> <p>Abdominal tip rounded.</p> 	
Adults	 <p>Palp clubbed at tip.</p>	 <p>Culicine palp sometimes shorter than proboscis.</p> <p>Palp not clubbed at tip.</p>	
Males		<p>Resting position except when engorged or hibernating.</p>  	

Figure 20.7 Characteristics of Mosquitos

Important malarial vectors in Thailand are *Anopheles minimus* and *Anopheles balabacensis*. *A. minimus* breeds in clean, slow streams in hilly areas. *Anopheles balabacensis* breeds in clean, shaded ponds.

8.1 Control Measures For Anopheles Species.

Control measures for the larval stage of *Anopheles* include using "Paris Green", petroleum oils, or "Abate" and drainage system, but it is very difficult to control *Anopheles* at this stage. In practice, DDT and benzene hexachloride are used to kill adult mosquitos. DDT can be mixed in the proportion of 0.1 pound per gallon of kerosene. For the treatment of breeding places it is applied in spray form, in the proportions of 0.05 pound per acre for *Anophelines* and 0.1 pound per acre for other species. For residual household spraying to control adult mosquitos it is recommended that the application be 200 mg of DDT per square foot of surface area DDT paralyzes and kills mosquitos in a short time. Every house should be sprayed once or twice yearly, at the beginning and ending of the rainy season. In addition, people who live in malarial zones should sleep under a mosquito net or in a screened room, or use a mosquito repellent.

8.2 Control Measures For Mansonia Species.

The control measures for the *Mansonia* species, which carries filariasis, are the DDT spraying, the use of chemical substances, and biological measures as mentioned earlier. Treatment of malaria and filariasis cases is also of utmost importance in control programs for malaria and filariasis.

8.3 Control Measures For Aedes Species.

Aedes aegypti breed in vases, cans, cups, or jars which are usually found in residences. Abate is a very effective control larvicide. The adults are susceptible to a 4% malathion smoke or a 57% malathion spray.

8.4 Control Measures For Culex Species.

The *Culex* species, which carries encephalitis, breeds in unclean or stagnant water. Control measures are the spraying of malathion 4%, or spraying of malathion 57% by the ultra-low-volume method.

9. FLY CONTROL

Flies play a very important role in the transmission of many diseases that may have devastating effects on public health. Flies serve as mechanical vectors of filth to infect our food supplies, resulting in diseases such as typhoid fever, dysentery, cholera, and intestinal parasitic infestation. The species *Musca domestica*, or common house fly, is the most important mechanical vector of disease. This fly, because of its filthy feeding habits and frequent contact with human feces, is a very dangerous carrier of diseases. It breeds in excreta, garbage, or any decomposing matter.

The life cycle of the fly consists of the egg, larva, pupa, and adult stages. The eggs are white and elongated, and are hatched in one-half to one day, depending on temperature. The larvae or maggots are also white and are about

one-half inch long. They develop in material such as garbage or excreta, and this stage lasts for 4 to 5 days, during which time the larvae feed continuously on the organic matter. The pupal stage, also lasting 4 to 5 days, is spent in dry locations, with very little movement or feeding. From the pupa, the adult fly emerges. The complete life cycle takes from 10 days to 2 weeks. The flight range of the fly is 20 miles, and it flies at speed of 4 miles per hour. The life span is 14 to 70 days.

9.1 Improvement of Sanitation.

Fly control is primarily a matter of good sanitation. Elimination of breeding places is the most satisfactory method of fly control. For example, animals should not be kept under houses, but if this cannot be avoided, animal excreta should be properly treated and disposed of to discourage fly breeding.

9.2 Destruction of Larva.

To destroy fly larvae, chemical substances such as 1% malathion emulsion are very effective. To destroy adult flies, popular chemical substances used are 2% chlordane, 5% DDT, or 2% malathion. Formaldehyde or sodium salicylate is put in a shallow vessel with rice, sugar, or bread as a baited poison. In addition, flypaper can be made by mixing one portion of castor oil with 2 portions of white kerosene, and applying this mucilage to a paper. The fly trap is also a practical mechanical means of destroying adult flies.

10. RAT CONTROL

The rat is one of the most expensive and dangerous pests known to man. Rats consume or destroy tremendous quantities of food, they ruin merchandise and many other articles, and they cause fires by shorting electric wires or accumulating material in their nests that may ignite through spontaneous combustion. Plague and murine typhus are transmitted to man by rat fleas. Hogs may acquire trichinosis either by eating garbage that contains the trichinella worms or by eating trichinella infected rats. Trichinosis is transmitted to humans who eat infected pork products that are not properly cooked.

There are two principal species of domestic rats, the Norway rat and the roof rat. The Norway rat is brownish in color and is the largest of the domestic rats. It is predominantly a burrowing species and its nests are usually concealed in the ground or beneath floors. It may be distinguished from the other species by its brownish coloring, large size, blunt head, thick body, and a tail shorter than the head and body. Roof or climbing rats are smaller than Norway rats. There are three varieties: the black rat, gray rat, and the fruit or tree rat. A roof rat has a smaller size, a blackish appearance, a long tail which exceeds the length of the head and body, and a more pointed head than the Norway rat. Another type is the house mouse, which is very small. Its back is usually colored gray and the stomach is an ashy gray.

The presence of rats can be observed by finding gnawings, burrows, droppings, footprints and tail marks, and by detecting rat excreta.

10.1 Rat "Proofing" (Prevention) Measures.

If rats can be excluded from houses, and if the premises are maintained in a sanitary condition, rat infestation of the area will be prevented. Ratproofing offers such protection by eliminating rat harborage and food supplies necessary for propagation of the rodents. The program should contain adequate provisions for storage, collection, and disposal of waste materials. Ratproofing an existing building is very difficult and expensive.

10.2 Destroying Rats.

Ratproofing of buildings should be followed immediately by a rat eradication or control campaign.

10.2.1 Trapping Rats. There are two types of rat traps; one is a snap type used with bait, and the other is a steel trap used with or without bait. Rats quickly become suspicious and become very difficult to catch. It is essential that the person in charge of a trapping program have a thorough knowledge of the habits of rats in nesting, feeding, and the use of runways. Care should be taken to place traps in the proper locations and to vary these locations from day to day. Frequent changing of bait is necessary.

10.2.2 Poisoning Rats. The most effective method of destroying rats may be poisoning. The disadvantage of this method is that rats dying from the effects of the poison die in walls, under flooring, and in other inaccessible places, giving rise to objectionable odors of decomposition. Also, many poisons now used are toxic to humans and other animals and must be used with extreme caution.

Poisoning may be accomplished using either bait or water. Warfarin and pival are excellent anticoagulant rodenticides. They are tasteless, odorless chemicals that have the advantage of not being harmful to humans or animals unless consumed in large quantities over a period of several days. One portion of warfarin with 17 portions of bran and 2 portions of vegetable oil is used to kill rodents. Zinc phosphide is recommended, but the bait must be attractive. One portion of zinc phosphide is mixed with 50 to 99 portions of bait by weight. Rats will die within 24 hours after consuming this poison. Hydrocyanic acid gas is used for ship fumigation and calcium cyanide powder for spraying into rat burrows. Some people may prefer to keep cats to catch rats.

STATISTICS

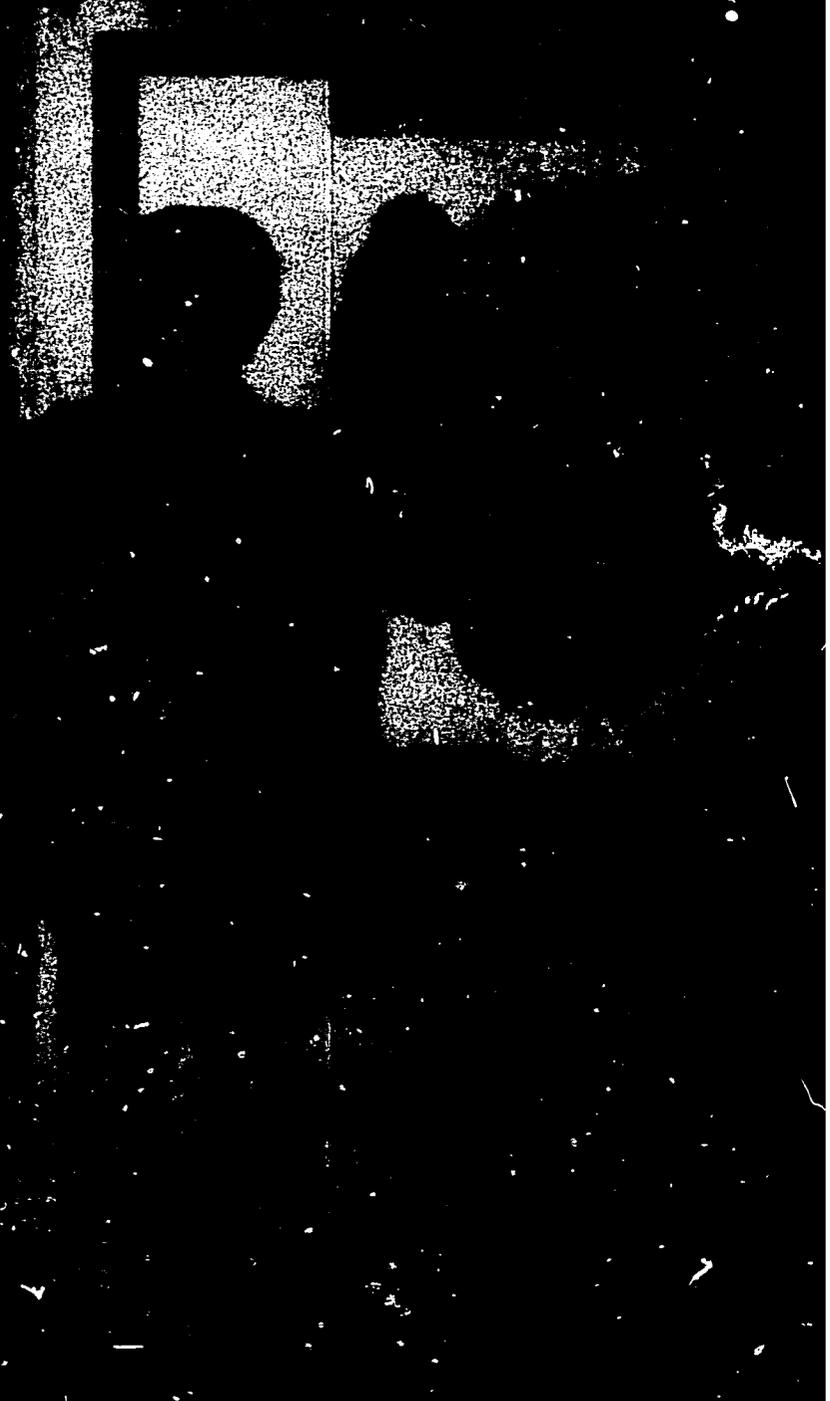
MODULE 21

VILAI KUSOLVISITKUL, M.S.



STANDARDS OF COSTS OF LABOR
FOR THE YEAR 1954

INDUSTRY	1953	1954
Manufacturing	100	100
Construction	100	100
Transportation	100	100
Wholesale Trade	100	100
Retail Trade	100	100
Services	100	100
Government	100	100
Education	100	100
Health	100	100
Other	100	100





สถิติคนไร้สัญชาติ
 นร. 2525
 คนไร้สัญชาติทั้งหมด 5195 ราย

■ คนไทย	77%
■ คนจีน	14%
■ คนอื่น	9%

MODULE 21

STATISTICS

1. INSTRUCTIONAL OBJECTIVES

On completion of this course the wechakorn will have a basic knowledge and understanding of general and simple health and vital statistics which are suitable for their work.

Specifically, the wechakorn will be able to

- (1) Calculate general statistics which are always used in health facilities,
- (2) Calculate, understand and interpret required vital statistics, and
- (3) Present statistical information correctly.

2. INTRODUCTION

2.1 Statistics

In general, the word "statistics" has two meanings. The first meaning refers to the number obtained from the collection of various data such as the number of births, the number of deaths, the number of people in a given population, or the amount of rainfall in different parts of the country. The second meaning refers to the methods used in the collection of data, the analysis of data, the interpretation of data and the presentation of data.

In contrast, the term "statistic" means different values derived from samples. For example, a "statistic" can be expressed as an arithmetic mean, a median, a standard deviation, and so on.

2.2 Biostatistics

Biostatistics is the art and science concerning different situations that happen to lives, especially personal and community health. It is considered to be an important subject for medical and public health personnel. Biostatistics concerns living things and is divided into 4 branches:

2.2.1 Vital statistics. Vital statistics is mainly used to measure human events such as birth, death, migration (moving in, moving out), marriage, and divorce.

2.2.2 Biometrics. Biometrics is used to measure and analyze data in biology.

2.2.3 Sociometrics. Sociometrics is used to measure and analyze the relationships of groups of people in sociology and anthropology.

2.2.4 Psychometrics. Psychometrics is used to measure human attitudes in behavioral sciences and psychology.

2.3 Vital Statistics

Vital statistics are the numbers that indicate the community situation, whether it is in a good or bad condition. These numbers are birth rate, death rate, infant mortality rate, maternal mortality rate, etc. For example, in

the community where the infant mortality rate is high, it indicates that the health condition of such community is not satisfactory.

Since a knowledge of basic statistics is needed in order to calculate vital statistics, basic statistics such as frequency distribution and arithmetic mean will be mentioned in the next section of this module.

3. BASIC STATISTICS

Important statistical methods and often used statistical values are presented in this chapter. They are the frequency distribution, the measures of central tendency, the measures of dispersion, ratio, proportion, percentage, and rate.

3.1 Frequency Distribution

The analysis of data is difficult if there is a large quantity of data and if it is of different values. Frequency distribution is a useful statistical method whereby data is analysed by dividing the data into different groups, then arranging data into groups which have values according to the determined values of each group. The number falling into any group is called the frequency for that particular group (or class).

The frequency table consists of classes of data arranged in a column to show frequency or number. Calculating frequency normally uses tally marks as seen in Table 21.1.

Example 1:

In practicing mother and child health, a wechakorn has recorded ages and weights of 25 children who have received services from the health facility in January 1977. The detail is as follows:

Child's Number	Age (months)	Weight (kg)
1	9	7.9
2	8	7.5
3	8	6.4
4	12	7.6
5	8	6.6
6	4	6.0
7	14	8.2
8	7	6.2
9	10	5.4
10	3	3.2
11	2	4.2
12	9	7.7
13	3	4.1
14	2	4.4
15	28	9.7
16	3	5.0

17	24	8.2
18	4	3.9
19	7	5.8
20	9	8.0
21	21	10.5
22	5	4.4
23	24	8.9
24	7	6.5
25	24	11.4

From these data, the frequency distribution according to children age can be shown as follows:

Table 21.1 Frequency Table

Age in months (class)	Tally Mark	Frequency (number in this class)
2	//	2
3	///	3
4	//	2
5	/	1
7	///	3
8	///	3
9	///	3
10	/	1
12	/	1
14	/	1
21	/	1
24	///	3
28	/	1
Total	25	25

There are two types of frequency tables:

3.1.1 Simple Frequency Tables. Simple frequency tables classify according to their values and the distribution of frequency of data in each class, as shown below in example 2.

Example 2:

Age (months)	Number (person)
2	2
3	3
4	2
5	1
7	3
8	3
9	3
10	1
12	1
14	1
21	1
24	3
28	1
Total	25

It can be seen that this table is awkward. When there are many classes of data, the calculation will be very time-consuming. The frequency distribution in class intervals is then adopted as discussed.

3.1.2 Frequency Distribution in Class Intervals. This is the distribution of data into ranks which may have equal or unequal intervals in each classes. (For convenience in analysis, however, the intervals should be equal).

Before understanding the rules of forming tables of frequency distribution in class intervals, an understanding of simple array, maximum value, minimum value, range, class, and class interval is necessary. These terms are explained below.

The simple array is the arrangement of raw data from low to high values or vice versa without showing the frequency distribution. When weights for 25 children from example 1 are arranged from low to high values, and vice versa, they can be shown as below :

Table 21.2 Weights (Kilogram) of 25 children.

From Low to High Values (Lowest)				
3.2	3.9	4.1	4.2	4.4
4.4	4.0	5.4	5.8	6.0
6.2	6.4	6.5	6.6	7.5
7.6	7.7	7.9	8.0	8.2
8.2	8.9	9.7	10.5	11.4
(Highest)				

Table 21.3 Weight (Kilogram) of 25 children.

From High to Low Values (Highest)				
11.4	10.5	9.7	8.9	8.2
8.2	8.0	7.9	7.7	7.6
7.5	6.6	6.5	6.4	6.2
6.0	5.8	5.4	5.0	4.4
4.4	4.2	4.1	3.9	3.2
(Lowest)				

From the arrangement of the children's weights we can know the maximum value, the minimum value, and the range. The maximum value is 11.4 kg and the minimum value is 3.2 kg. The range is the difference between the maximum and the minimum values; thus, the range is equal to $11.4 - 3.2$, or 8.2 kg.

Class interval is the wideness of class which is equal to the difference between class limits (low and high values of the specific class). As in Example 3 the class interval of class number one is equal to $7 - 2$, equals 5. Class number two is equal to $11 - 6$, equals 5.

There should neither be too many classes nor too few classes in the formation of frequency distributions. There should be about 5 to 20 classes. If there are less than 5 classes, some significant content may be lost. There should not be more than 20 classes because the classification of data and the statistical calculation will be very time consuming.

Rules for the formation of a frequency distribution table are to:

1. Find the maximum value of data,
2. Find the minimum value of data, and
3. Find the range.
4. Determine the class interval and determine the number of classes. Class interval and the number of classes should have relationship as follows:

$$\text{Class interval value} = \frac{\text{range}}{\text{number of classes}}$$

When determining class intervals the value of the number of classes can be found using the following calculation.

$$\text{Value of number of classes} = \frac{\text{range}}{\text{class interval}}$$

5. The arrangement of classes may be arranged from high marks to low marks or otherwise. The important thing in arranging classes is that it must cover minimum and maximum values, and it must distribute the frequency of all data with values belonging to different classes.

Example 3 (Using data from Example 2)

Maximum age	=	28 months
Minimum age	=	2 months
Range	=	26 months
If class interval	=	5 months

$$\begin{aligned} \therefore \text{Number of classes} &= \frac{26}{5} \\ &= 5\frac{1}{5} \end{aligned}$$

Approximately 6 classes.

Next, arrange the children ages into classes and distribute the frequency as follows :

Table 21.4

<u>Class</u>	<u>Age Group</u>	<u>Tally</u>	<u>Frequency</u>
1	2 - 6 months		8
2	7 - 11 months		10
3	12 - 16 months		2
4	17 - 21 months	/	1
5	22 - 26 months		3
6	27 - 31 months	/	1

Then, draw up a table showing the number of children who utilize services at the health center, grouped by age in months as follows :

Table 21.5

Age (months)	Number (person)
2 - 6	8
7 - 11	11
12 - 16	2
17 - 21	1
22 - 26	3
27 - 31	1
Total	25

The class arrangement need not necessarily start from the maximum or minimum marks. The arrangement depends on the objectives of the presentation of data. For example, the children's ages also may be arranged as follows :

Table 21.6

Age (months)	Number (person)
0-4	7
5-9	10
10-14	3
15-19	0
20-24	4
25-29	1
Total	25

There are two ways to define age :

(1) Age at last birthday means to count using the full year age (or using full month, depending upon the case study). For example, if a child's age is 5 years 4 months 2 days, the age is considered to be 5 years. A child whose age is 4 months 2 days is considered to be 4 months old.

(2) Age at nearest birthday means the real age is rounded up or down. For example, a recorded age of 5 years can mean any age between 4 years and 6 full months and 5 years and 6 full months. A recorded age of 4 months can mean any between 3 months, 15 days and 4 months, 15 days.

In practice, details of age can be obtained from birth certificates. The interviewer or data collector must apply consistently the same rule (s) of data recording all the way through (type 1 is commonly used) so that data with the required characteristics that are suitable for analysis can be obtained. From Example 1, it can be seen that the data on children's ages are whole numbers. If the age recording is of type 1, and the arrangement of ages for the group is 0 - 4, 5 - 9, . . . , 25 - 29, we can tell that, for example, children more than 4 months old are grouped into the 0-4 category. The age group of 0-4 covers children from newly born to 4 months 29 days 23 hours 59 minutes and 59 seconds (because there are 30 days in a month). In the same way, the group of 5 - 9 covers children from 5 months until 9 months 29 days 23 hours 59 minutes and 59 seconds (because there are 30 days in a month).

If the recording of age is of type 2 and the arrangement of age group is, for example, 0 - 4, 5 - 9, . . . , 25 - 29, meaning children aged 4 months 15 days are grouped into the 0 - 4 category, age group 0 - 4 covers children from newly born to 4 months 15 days (if there are 30 days in the month), and in the same way for category 5 - 9 covers children 4 months 16 days to 9 months 15 days (if there are 30 days in that month).

Using the same data as in Example 1 : (children's age):

Maximum weight	=	11.4 kg
Minimum weight	=	3.2 kg
Range	=	8.2 kg
If class interval	=	2 kg
. . . Number of classes	=	$\frac{8.2}{2} = 4.1$
Approximately	=	5 Classes

In the same way as example, after distributing frequency, the following table is obtained:

Weight (kg)	Number (person)
2.0 - 3.9	2
4.0 - 5.9	7
6.0 - 7.9	9
8.0 - 9.9	5
10.0 - 11.9	2
Total	25

The tally marks are arranged from highest to lowest values as shown in the following table.

<u>Weight (kg)</u>	<u>Number (person)</u>
10.0 - 11.9	2
8.0 - 9.9	5
6.0 - 7.9	9
4.0 - 5.9	7
2.0 - 3.9	2
Total	25

The determination of the limit of each class must reflect the reality of data collecting or the value counting of such data in order to frequency distribution results which are as close to reality as possible.

3.2 Measures of Central Tendency

Measures of central tendency are statistics use to obtain average values which represent data. For example, if we say the children in grade III of school A have an average weight of 18.31 kg, this does not mean that every child in the class weighs 18.31 kg. It means that if we pick a random sample we can estimate the weight of such a child at 18.31 kg.

The measures of central tendency generally used are : (1) arithmetic mean ; (2) median ; and (3) mode.

Here we discuss only arithmetic mean, because it is used most widely.

3.2.1 Arithmetic Mean. This is called "mean" or "X". It is an average value of a set of data indicating the middle (overall) characteristic of the data. The calculation of arithmetic mean from the obtained data distributes frequency by totalling all values of data (depending on the case) and then dividing by the total number of data.

Example 4 A midwife weighs 20 children in grade III of a school, and finds the following weights : 16.0, 16.8, 16.9, 17.1, 17.2, 17.2, 17.5, 17.6, 18.3, 18.4, 18.4, 18.9, 19.0, 19.7, 19.8, 19.9, 20.0 and 20.1 kg.

Method. Arithmetic mean of children's weight =
$$\frac{16.0 + 16.8 + \dots + 20.1}{20}$$

$$= \frac{366.2}{20}$$

$$= 18.31 \text{ kg}$$

This means the children in grade III have an average weight of 18.31 kg.

3.3 Measures of Dispersion

The measure of dispersion is a statistical data analysis method for the calculation of different values of a set of data about differences in terms of magnitudes and dispersion. If any set of data has a high dispersion, this indicates that values of such data have a big difference in terms of magnitude, or otherwise indicates the values of such data are close to each other.

Measures of central tendency alone cannot adequately tell the characteristics of data. It is necessary to consider the dispersion of data also. For example :

Data set 1 : 1, 4, 4, 4, 7

Data set 2: 4, 4, 4, 4, 4

Both sets of data have the same arithmetic mean, but data set 1 has a higher dispersion than data set 2.

Measures of dispersion can be made in many ways, but the most simple and fastest way is to find a range. However, this is only a rough measure. The better and more popular method is the calculation of standard deviation, which is not discussed here because it is too complicated.

3.4 Ratio

Ratio is a compared value between 2 numbers in which the numerator is not part of the denominator. A ratio does not have units, i.e. :

$$\text{Ratio} = \frac{a}{b}$$

or, it is written as ratio = a : b

when a is number of data of A

b is number of data of B

Example 5

From a physical examination by a health officer, of 20 children in grade III, it is found that 5 children have lice, 3 have skin disease, 2 have colds, and 1 has lice and colds. Find the ratio of children having lice and children having skin disease, the ratios of children who do not have any problems and children having lice, and children having skin disease and children having colds.

The ratio of children with lice and children with skin disease is 4:3

The ratios of children who have no problems to children with lice, children with skin disease, and children with colds = 12:4:3:1

3.5 Proportion, Percentage, and Rate.

3.5.1 Proportion. Proportion is the comparison of numerator and denominator : numerator is a part of denominator.

Proportion does not have units, i.e.

$$\text{Proportion} = \frac{a}{a + b}$$

when a is number of data of A and b is number of data of B

3.5.2 Percentage. Percentage is the relative value in terms of a proportion of the total number when divided into 100 units. Percentage is equal to the relative proportion multiplied by 100, i.e. :

$$\text{Percentage} = \frac{a}{a + b} \times 100$$

3.5.3 Rate. Rate is proportion multiplied by a constant, k, which may be 10,000.

$$1,000, \text{---}, \text{i.e. :} = \frac{a}{a + b} \times k$$

Example 6

Using the same question as in Example 5, find the proportion of children with lice to the total children, and the proportions of children with lice, with colds, and with skin disease to total children. Also find the percentage of these two proportions.

Method

Total number of children in grade III	=	20
Total number of children with lice only	=	4
Total number of children with lice, skin disease and colds	=	8
Proportion of children with lice to total children	=	$\frac{4}{20}$
	=	$\frac{1}{5}$
Proportion of children with lice, skin disease and colds to total children	=	$\frac{8}{20}$
	=	$\frac{2}{5}$
Percentage of children with lice only	=	$\frac{1 \times 100}{5}$
	=	20

This means that if there are 100 children in grade III, there will be 20 children with lice only.

$$\begin{aligned} \text{Percentage of children with lice, skin} \\ \text{disease and colds} &= \frac{2 \times 100}{5} \\ &= 40 \end{aligned}$$

This means that if there are 100 children in grade III, there will be 40 children with lice, skin disease and colds.

Example 7

The number of births (from birth certificates, the Registration of Population) in Hang Chat District, Lampang from September 1, 1975 to August 1, 1976 was 753. The population on March 1, 1976 was 43, 116 (from calculation). Find the birth rate per 1,000 population.

Method

$$\begin{aligned} \text{Total number of births} &= 753 \\ \text{Population at middle of academic year} &= 43,116 \\ \text{Birth rate from September 1, 1975 to} \\ \text{August 1, 1976.} &= \frac{753}{43,116} \times 1,000 \\ &= 17.46 \end{aligned}$$

It means there are 17.46 births per 1,000 population.

4. VITAL STATISTICS

The vital statistics used most often are crude birth rate, crude death rate, population growth rate, infant mortality rate and maternal death rate.

4.1 Crude Birth Rate (CBR)

Crude birth rate indicates for any community or country how many live births per 1,000 population there are in any year:

$$\text{Crude Birth Rate} = \frac{\text{Number of live births during the calendar year}}{\text{Total population at midyear}} \times 1,000$$

Live births refer to infants, delivered by any method, who at birth are breathing or show other signs of being alive, such as heart beating, pulsation, umbilical cord pulsation, or the movement of muscle.

The total population at midyear means population at certain date at the middle of the given year. For example, to find the crude birth rate for 1976, the population in the middle of that year is the population as of July 1, 1976.

Example 8

In 1976, in village A there were 30 live births and the population was 1,000 in the middle of the year. In village B, there were 45 live births and the population was 1,800 in the middle of the year. Which village has a higher birth rate?

Method

$$\begin{aligned}\text{Birth Rate of village A} &= \frac{30}{1,000} \times 1,000 \\ &= 30 \text{ births per } 1,000 \text{ population.} \\ \text{Birth Rate of village B} &= \frac{45}{1,850} \times 1,000 \\ &= 25 \text{ births per } 1,000 \text{ population.}\end{aligned}$$

Therefore, village A has a higher birth rate than village B.

From Example 8 we can see that the birth rate in village A is higher than in village B although the number of births in village A is lower than in village B.

4.2 Crude Death Rate (CDR)

Crude death rate is the value indicating how many people die per 1,000 population in a community or a province or a country in one year:

$$\text{Crude Death Rate} = \frac{\text{Number of deaths during the calendar year}}{\text{Total population at midyear}} \times 1,000$$

Example 9

In 1976 there were 40 deaths and 1,000 population at midyear in village A. There were 18 deaths and 1,888 population at midyear in village B. Which village has a higher death rate?

Method.

$$\begin{aligned}\text{Death Rate of village A} &= \frac{40}{1,000} \times 1,000 \\ &= 40 \text{ deaths per } 1,000 \text{ population.} \\ \text{Death Rate of village B} &= \frac{18}{1,800} \times 1,000 \\ &= 10 \text{ deaths per } 1,000 \text{ population.}\end{aligned}$$

Therefore, village A has a higher death rate than village B.

It can be noticed that in village A, the birth rate is 30 births per 1,000 population and the death rate is 40 deaths per 1,000 population, indicating a decrease in population in that year; this might be because of an epidemic in village A or other reasons.

4.3 Growth Rate, or Rate of Natural Increase

The population growth rate in any year is the difference between the birth rate and the death rate for that year. The unit used is percentage, or per 1,000 population:

$$\text{Growth Rate} = \text{Birth Rate} - \text{Death Rate.}$$

Example 10

From the questions in Examples 8 and 9, find the growth rate of village B.

In village B, Birth Rate = 25 births per 1,000 population

Death Rate = 10 deaths per 1,000 population

$$\begin{aligned}\therefore \text{Growth Rate for } 1976 &= 25 - 10 = 15 \text{ persons per } 1,000 \text{ population} \\ &= 1.5\%\end{aligned}$$

4.4 Infant Mortality Rate

Infant mortality rate means the number of infants (aged less than one year) who die in a year per 1,000 live births in that year:

$$\text{Infant Mortality Rate} = \frac{\text{Number of deaths in a calendar year among persons aged less than one year}}{\text{Number of live births during that calendar year}} \times 1,000$$

In any country, if the infant mortality rate exceeds 50 deaths per 1,000 live births, it can be said that country has a high infant mortality rate. This implies the health conditions of the country are poor. One important objective of the mother and child health program is to reduce the infant mortality rate as much as possible by assisting parents to have healthy children, who will not die in infancy or early childhood.

Example 11

There are 3 infant deaths from 30 live births in village A in 1976. Find the infant mortality rate for this village.

Method

$$\begin{aligned} \text{Number of infant deaths} &= 3 \\ \text{Number of live births} &= 30 \\ \therefore \text{Infant Mortality Rate} &= \frac{3}{30} \times 1,000 \\ &= 100 \text{ deaths per 1,000 live births.} \end{aligned}$$

4.5 Maternal Mortality Rate

Maternal mortality rate means the number of mothers who die from puerperal causes per 1,000 live births in community, province, or country:

$$\text{Maternal Mortality Rate} = \frac{\text{Number of maternal deaths attributed to puerperal causes in a calendar year}}{\text{Number of live births in that calendar year}} \times 1,000$$

Maternal deaths refer to pregnant women who die from complications of pregnancy or puerperium. For statistical values, the death of the mother must occur during pregnancy or during delivery or within 6 weeks after delivery.

In some countries there are hardly any cases of maternal death arising from pregnancy or delivery. In many countries where the maternal and child health program is satisfactory, the maternal mortality rate is only 2 to 3 deaths per 10,000 live births.

The infant mortality rate and the maternal mortality rate are very important indices in the public health field, because they indicate the health condition of a community. Therefore, the health service for a community should be primarily aimed at mothers and children.

Example 12

In village A in 1976, there are 60 deaths; 2 of these die from puerperal

complication. There are 500 live births in village A in 1976. Find the maternal mortality rate.

Method

$$\begin{aligned}
 \text{Number of deaths from puerperal complications} &= 2 \\
 \text{Live births} &= 500 \\
 \therefore \text{The maternal mortality rate} &= \frac{2}{500} \times 1,000 \\
 &= 4 \text{ deaths per 1,000 population.}
 \end{aligned}$$

5. PRESENTATION OF STATISTICS

In the daily work, a wechakorn must collect important or interesting data; after data collection is complete, it is necessary to present this information to other people. Proper data presentation reflects the knowledge and ability of the person who presents it. There are many interesting data in public health, and they must be presented correctly so that readers can easily and quickly understand them, without any vagueness.

The presentation of data is very important in reporting. There are many methods used to present statistical data:

- Text presentation
- Semitabular arrangement
- Tabular presentation
- Graphic presentation.

5.1 Text Presentation

Text presentation is normally used for the summary of results of any work containing figures or statistical values.

Example 13

The Personnel Development Division, Lampang Project has conducted training of volunteers in Hang Chat District, Lampang. In 1975 a total of 771 volunteers were trained, including 652 health communicators, 75 health post volunteers, and 44 traditional birth attendants.

5.2 Semitabular Arrangement

A semitabular arrangement presents information by arranging it in numeral order form.

Example 14

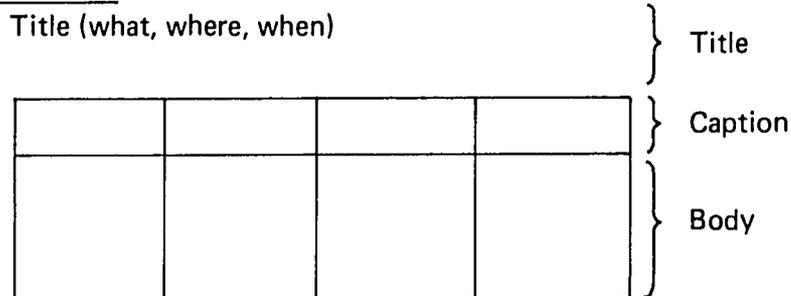
Volunteers training in Hang Chat District, Lampang by Personnel Development Division, Lampang Project, 1975 is as follows:

- Health communicators	652
- Health post volunteers	75
- Traditional birth attendants	<u>44</u>
Total	771

5.3 Tabular Presentation

Tabular presentation is widely used for figures, because it is easy to understand and contains much information in a convenient form. The important components of tables are the title, caption, body, source, and footnotes.

Table Format



Source:

The title. Indicates what the figures in the table are, and where and when they were obtained.

The caption. Explains the meaning of figures in the columns or rows.

The body. Shows the corresponding figure values according to the caption.

The source. Refers to the origins of data or information used by the author in developing the table. If data or information are obtained from books, the names of the books must be acknowledged. When data or information from other sources are not used, the source is omitted.

The footnotes. The footnotes are extra explanations for the data contained in the table. They are normally marked by an asterisk sign (*) beside some value or some statement which requires further explanation. This explanation is written below the table. Where extra information is not required, footnotes are omitted.

Example 15

Number of Volunteers in Hang Chat District, Lampung Who Have Received Training from the Personnel Development Division, Lampung Project, in 1975.

Type of Volunteer	No. of Persons Trained
Health Communicators	652
Health Post Volunteers	75
Traditional Birth Attendants	44
Total	771

Source : Personnel Development Division, Lampung Project.

Example 16

Number of Population, Birth Rate, Death Rate, and Growth Rate per 1,000 Population; and Infant Mortality Rate and Maternal Mortality Rate per 1,000 Live Births, Lampang, 1966 - 1975.

Year	Population	Birth Rate	Death Rate	Growth Rate	Infant Mortality Rate	Maternal Mortality Rate
1966	546,351	28.97	6.71	22.26	38.30	1.57
1967	556,682	26.20	6.02	20.18	25.20	1.70
1968	569,865	26.77	7.29	19.48	31.80	1.57
1969	577,388	24.82	7.69	17.13	28.76	1.46
1970	586,623	23.67	6.04	17.63	35.28	1.22
1971	598,964	25.79	6.76	19.03	47.25	1.94
1972	610,323	24.57	7.78	16.79	31.25	1.67
1973	631,133	21.43	7.61	13.82	21.96	1.93
1974	636,580	14.43	6.89	7.54	23.42	0.62
1975	643,001	14.47	6.72	7.75	34.72	0.98

Source : Yearly Report 1975, Provincial Health Office, Lampang.

Example 17

Villages, Households, and Population According to Subdistricts of Maeta District, Lampon, as of January 1, 1975.

Number	Subdistrict	No. of Villages	No. of Households	Population		
				Male	Female	Total
1	Tha Kat*	10	1,752	4,006	3,875	7,881
2	Tha Khumngern**	8	1,312	3,233	3,152	6,385
3	Tha Sobsao	8	1,781	4,564	4,265	8,829
4	Tha Pladuk	9	1,334	3,617	3,434	7,051
Total		35	6,179	15,420	14,726	30,146

* In Tha Kat subdistrict, 3 Karen villages (villages 5,6,8) were not surveyed. From Population Registration, Maetaa District, July 1, 1974, there were 364 households and 994 people in these three villages.

** In Tha Khumngern subdistrict, 4 Karen villages (villages 7,8,9,12) were not surveyed. From Population Registration, Maetaa District July 1, 1974 there were 188 households and 949 people in these four villages.

Source : Population Survey, Research and Evaluation Division, Lampung Project.

5.4 Graphic Presentation

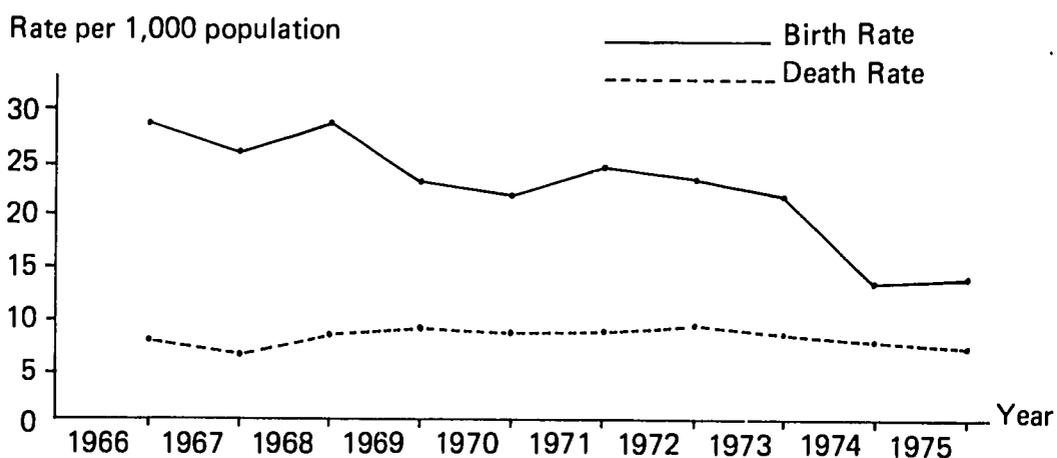
Graphic presentation transforms data or information into pictures which are easy to understand quickly. A graphic presentation can be made in many ways, but it should be suitable and directly related to the objectives. Only often used and convenient methods are mentioned here. They are: line diagrams; bar chart; pie diagram; and pyramid.

The components of these graphs are the same as those for tables.

5.4.1 Line Diagram. A line diagram is a graph with normal units for both horizontal and vertical axes. The line diagram is simple and widely used.

Example 18

Birth Rate and Death Rate per 1,000 Population, 1966 - 1975.
Lampung Province



Source : Statistical Report of Lampung Province, National Bureau of Statistics, Office of the Prime Minister.

5.4.2 Bar Chart. A bar chart is a rectangular graph with the length of bar changeable according to the magnitude of data, while the width is always equal. The bar can be arranged either horizontally or vertically. The bar chart is used to show the comparison of the same kind of data for different places or different times.

A bar chart can be constructed as a vertical or horizontal bar by constructing each bar with the same width and equal distance between bars. The height, however, is different depending on frequency.

Example 19

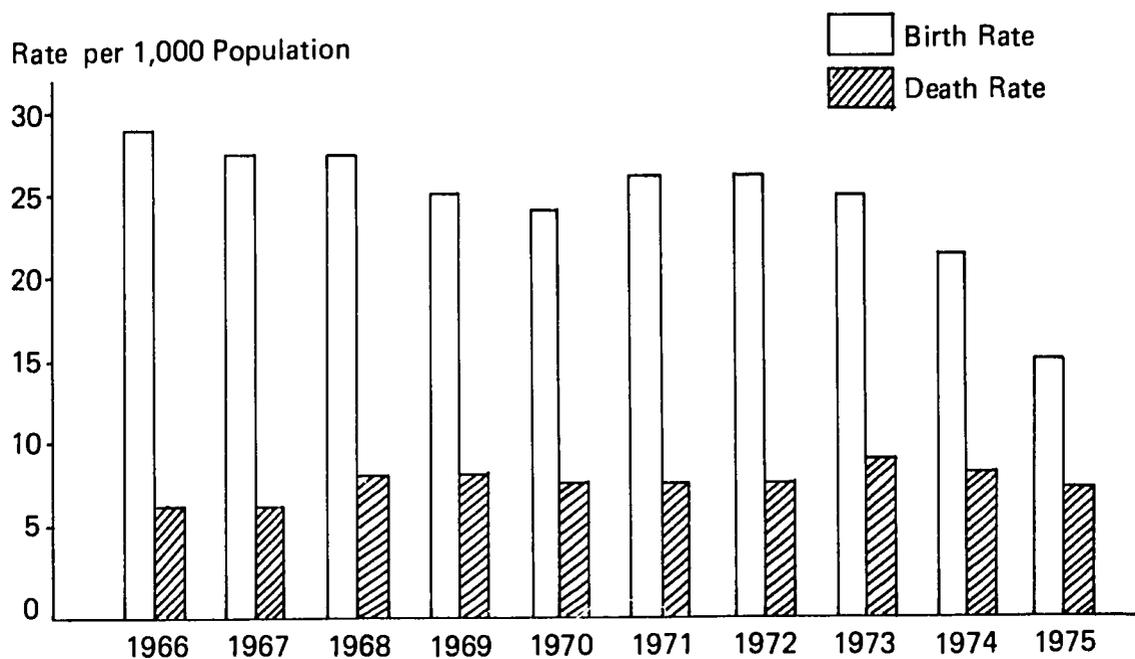
Number of Health Post Volunteers in Hang Chat District, Lampang, in 1975, According to Age and Sex.



Source : Lampang Project Ministry of Public Health.

Example 20

Birth Rate and Death Rate per 1,000 Population, Lampang 1966 - 1975.



Source : Provincial Statistical Reports, National Bureau of Statistics, Office of The Prime Minister.

5.4.3 Pie Diagram. A pie diagram shows all data within a circle. The area is divided into different segments according to the components of data in that group. The pie diagram is used to show the comparison of data components and the comparison of different groups of data at the same time, for easy understanding. Pie diagrams are widely used in health education.

The method for constructing a pie diagram is to draw a circle with the proper radius and then to divide into angles at the center point according to the frequency ratio, by adjusting the total of frequencies to equal 360, the number of degrees in the circle.

Example 21

Draw a pie diagram of education levels of 75 health post volunteers in Hang Chat District, Lampang. The details are as follows:

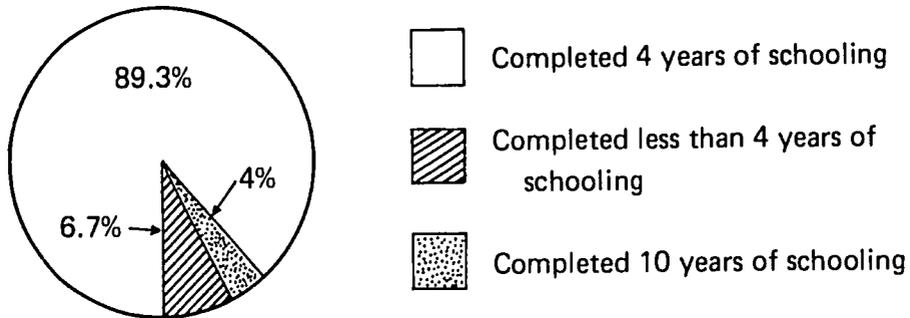
Completed 4 years of schooling	67 persons
Completed less than 4 years of schooling	5 persons
Completed 10 years of schooling	3 persons

Method

$$\begin{aligned} \text{Completed 4 years of schooling, converted into degree} &= \frac{67}{75} \times 360^\circ \\ &= 321.6^\circ \\ \text{Completed less than 4 years of schooling, converted} \\ &\quad \text{into degree} = \frac{5}{75} \times 360^\circ \\ &= 24^\circ \\ \text{Completed 10 years of schooling, converted into degree} &= \frac{3}{75} \times 360^\circ \\ &= 14.4^\circ \\ \text{Completed 4 years of schooling, converted into percentage} &= \frac{67}{75} \times 100 \\ &= 89.3\% \\ \text{Completed less than 4 years of schooling, converted} \\ &\quad \text{into percentage} = \frac{5}{75} \times 100 \\ &= 6.7\% \\ \text{Completed 10 years of schooling, converted} \\ &\quad \text{into percentage} = \frac{3}{75} \times 100 \\ &= 4\% \end{aligned}$$

After converting the number of volunteers into degrees, a pie diagram can be constructed as follows:

Educational levels of 75 Health Post Volunteers
Hang Chat District, Lampung, 1975



Source : Lampung Project, Ministry of Public Health

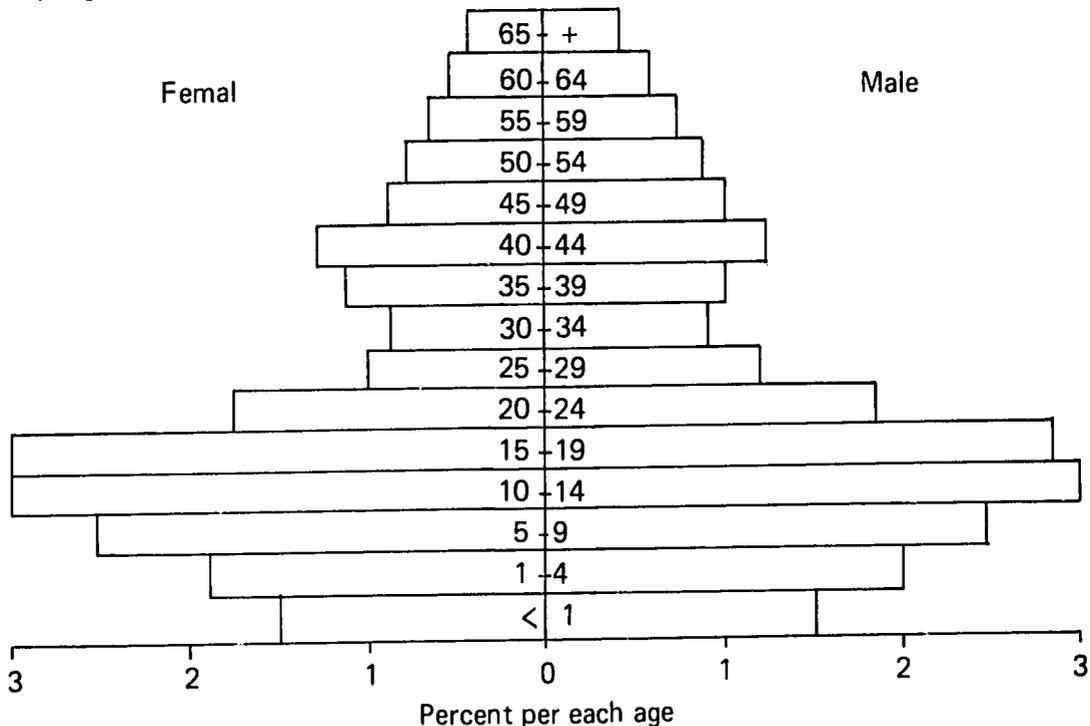
5.4.4 Pyramid. A pyramid is a graph used for data presentation concerning population dispersion in each age and sex group. It can be shown in two ways:

(1) By showing values in terms of number divided according to sex and age group, and

(2) By calculating percentage of population divided according to sex and age group compared with total population or with population of each sex.

Example 22

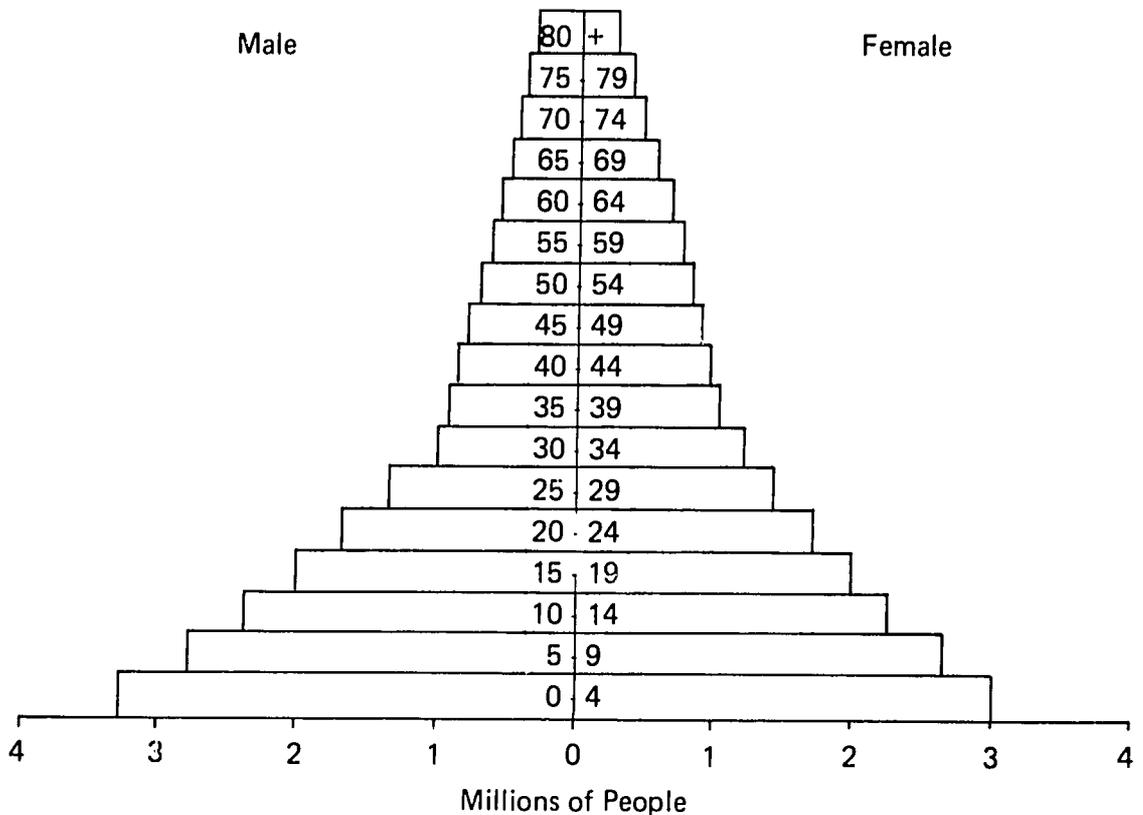
Population Divided According to Age and Sex : Hang Chat District, Lampung, January 1, 1975.



Source : Population Survey, Research and Evaluation Division, Lampung Project.

Example 23

Population According to Age and Sex: Thailand, 1970.



Source : Public Health Statistics 1973, Vital Statistics Division, Department of Health Promotion, Ministry of Public Health.

6. USING STATISTICS IN HEALTH WORK

From a basic knowledge of vital statistics and the presentation of statistics, we can see that the knowledge is very useful for daily life and work, especially in the fields of medicine and public health. For example, epidemiology uses many vital statistics, such as the diagnosis of the health condition of a community by using mortality rate, morbidity rate, etc. Nutrition surveys also use vital statistics; for example, as an indirect measurement of nutritional status, such as the death rate of children aged 2 to 5 months. This rate will be high if there is a vitamin B₁ deficiency. If the death rate of children aged between 1 and 4 years is high, there may be a protein deficiency, etc.

In this section, Table 21.7 (value 100%, 90%, 75%, and 60%, of standard weight of Thai children divided according to age) is used to determine the nutritional status of children in community (normal weight and degree of malnutrition of Thai children in Bangkok, both males and females, age 0 - 5 years, in 1975). To determine in which area a child's weight falls, the following rules are used:

(1) Normal or Good Health. Weight of a child for such age must exceed 90% of standard weight.

(2) Mild Malnutrition (Degree I). Weight of a child for such age must be between 75% and 90% of standard weight.

(3) Moderate Malnutrition (Degree II). Weight of a child for such age must be between 60% and 75% of standard weight.

(4) Severe Malnutrition (Degree III). Weight of a child of such age must be below 60% of standard weight.

Table 21.7

Standard Weights of Thai Children 0 - 5 years (Males and Females)*
According to Age (Values 100%, 90%, 75%, and 60%)

Age		Weight (kg)				Age		Weight (kg)			
Year	Month	100%	90%	75%	60%	Year	Month	100%	90%	75%	60%
0	0	3.0	2.7	2.3	1.8	2	0	11.5	10.3	8.6	6.9
	1	4.0	3.6	3.0	2.4		1	11.7	10.5	8.8	7.0
	2	4.7	4.3	3.6	2.9		2	11.9	10.7	8.9	7.1
	3	5.4	4.9	4.1	3.2		3	12.1	10.9	9.0	7.2
	4	6.0	5.3	4.5	3.6		4	12.3	11.0	9.2	7.3
	5	6.5	5.8	4.8	3.9		5	12.4	11.2	9.3	7.4
	6	6.9	6.2	5.1	4.1		6	12.5	11.3	9.4	7.5
	7	7.3	6.5	5.4	4.3		7	12.7	11.5	9.6	7.7
	8	7.7	6.9	5.7	4.6		8	12.9	11.6	9.7	7.7
	9	8.0	7.2	6.0	4.8		9	13.1	11.7	9.8	7.8
	10	8.3	7.5	6.2	5.0		10	13.3	11.9	9.9	7.9
	11	8.6	7.7	6.5	5.2		11	13.4	12.1	10.1	8.0
1	0	8.9	8.0	6.6	5.3	3	0	13.5	12.2	10.2	8.1
	1	9.1	8.2	6.9	5.5		1	13.7	12.3	10.3	8.2
	2	9.3	8.4	7.0	5.6		2	13.9	12.5	10.4	8.3
	3	9.6	8.6	7.2	5.8		3	14.0	12.5	10.5	8.4
	4	9.9	8.9	7.4	5.9		4	14.1	12.7	10.6	8.5
	5	10.1	9.1	7.5	6.0		5	14.3	12.8	10.7	8.5
	6	10.3	9.2	7.7	6.1		6	14.3	12.9	10.8	8.6
	7	10.5	9.5	7.9	6.3		7	14.5	13.1	10.9	8.7
	8	10.7	9.6	8.0	6.4		8	14.7	13.2	11.0	8.8
	9	11.0	9.9	8.2	6.6		9	14.7	13.3	11.1	8.9
	10	11.1	10.0	8.3	6.7		10	14.9	13.4	11.2	8.9
	11	11.3	10.3	8.5	6.8		11	15.0	13.5	11.3	9.0

Table 21.7 (Continued)

Age		Weight (kg)			
Year	Month	100%	90%	75%	60%
4	0	15.1	13.6	11.3	9.1
	1	15.3	13.7	11.4	9.1
	2	15.3	13.7	11.5	9.2
	3	15.5	13.9	11.6	9.3
	4	15.5	14.0	11.7	9.3
	5	15.7	14.1	11.7	9.4
	6	15.7	14.2	11.8	9.5
	7	15.9	14.3	11.9	9.5
	8	15.9	14.3	11.9	9.5
	9	16.0	14.4	12.0	9.6
	10	16.1	14.5	12.0	9.6
5	11	16.2	14.6	12.1	9.7
	0	16.2	14.6	12.1	9.7

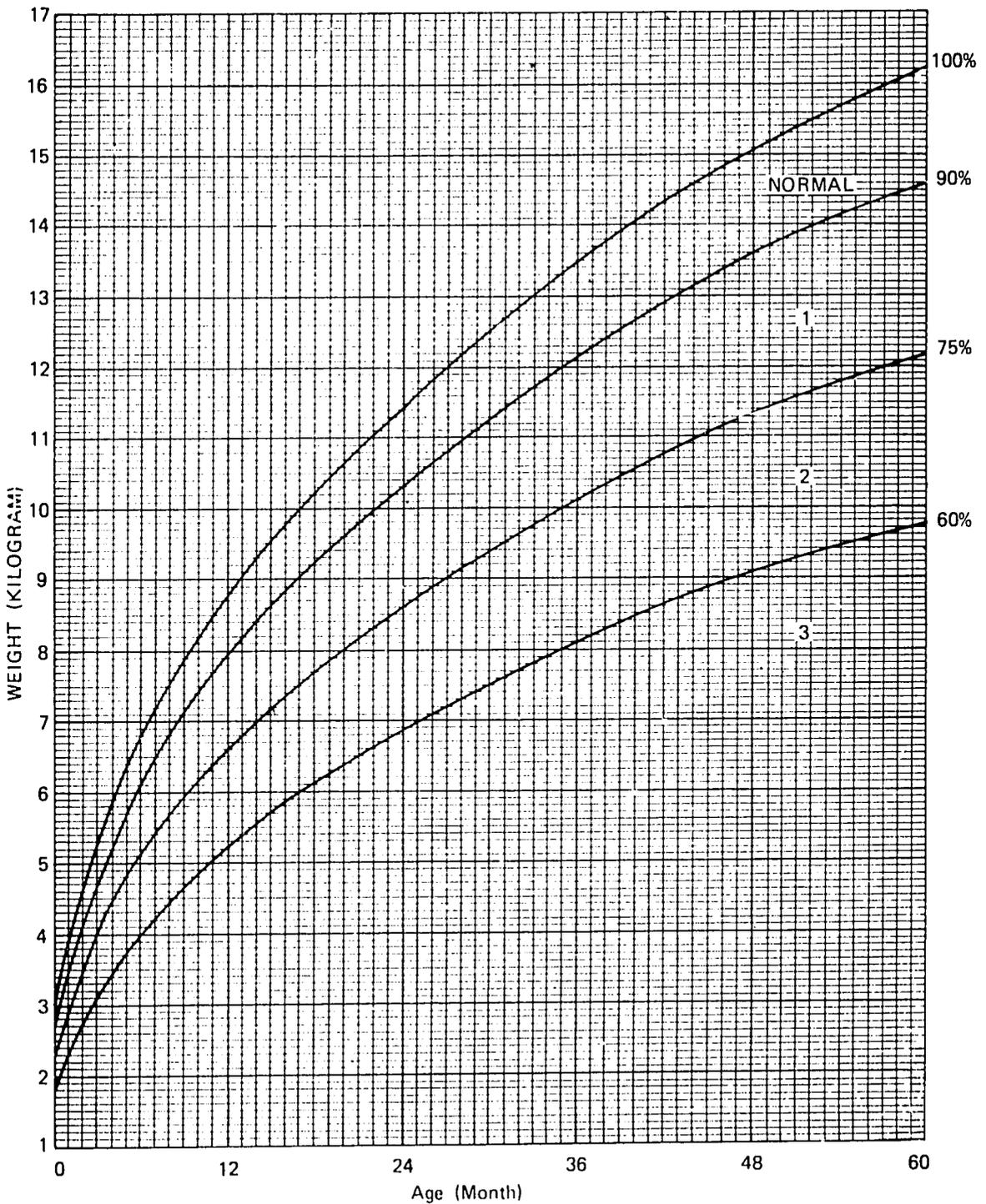
*Weight in Nutrition Terms

1. Normal or Healthy Children (Grade N = Normal) = 90⁺%
2. Mild Malnutrition (Grade I) = 75⁺% - 90%
3. Moderate Malnutrition (Grade II) = 60⁺% - 75%
4. Severe Malnutrition (Grade III) = Below 60%

Source of Data : Reading values from Graph 21.1

Graph 21.1

Normal Weight and Degree of Malnutrition of Bangkok Children Aged 0-5
Year, 1975



Source : Nutrition Division, Ministry of Public Health

Example 24

Find percentage of children who come for weight measurement at your health facility (use Example 1) according to the nutrition status.

Method:

Arrange weight of each child to see who has what kind of nutritional status by comparing age and weight of each child with Table 21.7. The results obtained are as in Table 21.8 which can be summarized as follows ;

Degree of Malnutrition	Number of Children(person)	Percentage (%)
Normal or Good Health	10	40
Mild Malnutrition	9	36
Moderate Malnutrition	5	20
Severe Malnutrition	1	4
Total	25	100

Table 21.8 Age, Weight and Nutrition Status of 25 Children Measured

Child's Number	Age (Month)	Weight (kg)	90 ⁺ %	75 ⁺ %-90%	60 ⁺ %-75%	Below 60%
1	9	7.9	✓			
2	8	7.5	✓			
3	12	6.4		✓		
4	8	7.6		✓		
5	8	6.6		✓		
6	4	6.0	✓			
7	14	8.2	✓			
8	7	6.2		✓		
9	10	5.4			✓	
10	3	3.2				✓
11	2	4.2		✓		
12	9	7.7	✓			
13	3	4.1			✓	
14	2	4.4	✓			
15	28	9.7		✓		
16	3	5.0	✓			
17	24	8.2			✓	
18	4	3.9			✓	
19	7	5.8		✓		
20	9	8.0	✓			
21	21	10.5	✓			
22	5	4.4			✓	
23	24	8.9		✓		
24	7	6.5		✓		
25	24	11.4	✓			

It can be seen that by using statistical methods, the percentage of children with different degrees of malnutrition can be used as comparisons for different communities. By this method we can tell which community has more problems of malnutrition than others.

Please test your understanding by doing this exercise. Find the number and percentage of children aged below 5 years who are weighed by the Health Officer during a nutrition survey in village A in February 1977. Twenty children are weighed (data appear in Table 21.9).

Table 21.9 Age, Weight of 20 Children Measured for Determination of Nutrition Status and extent of Nutrition Problem in Community.

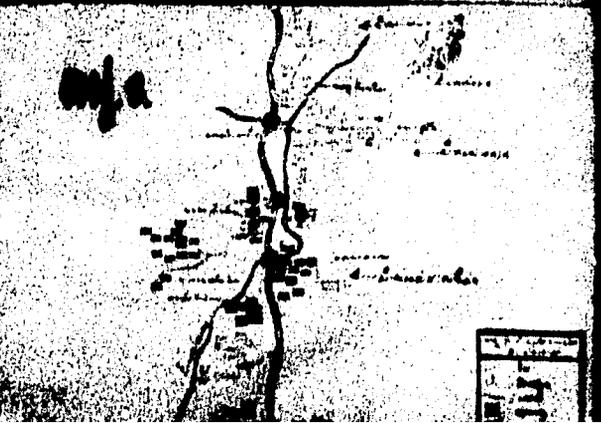
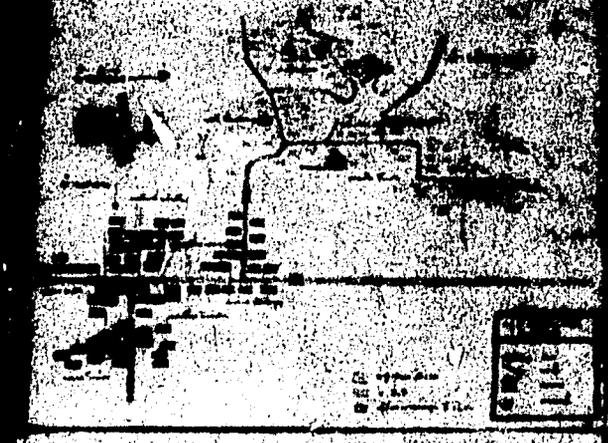
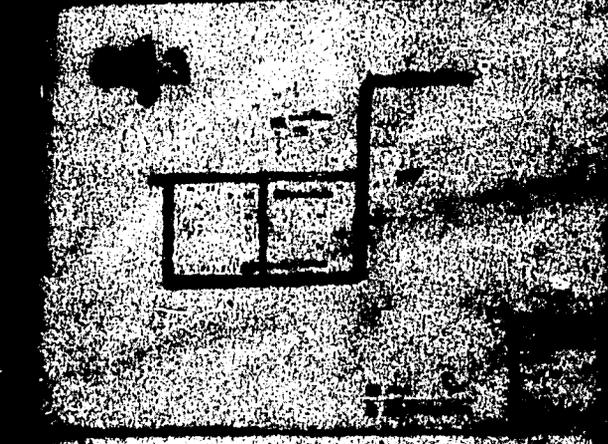
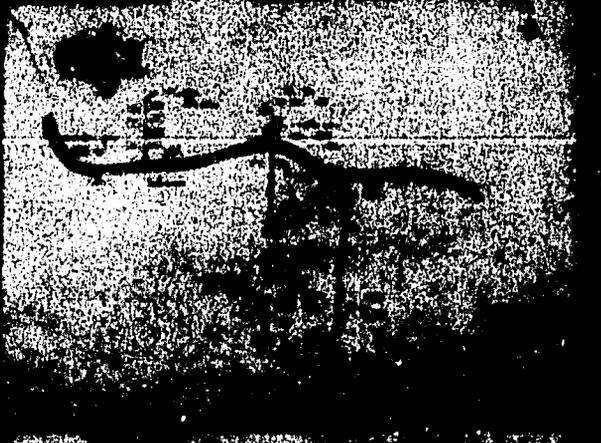
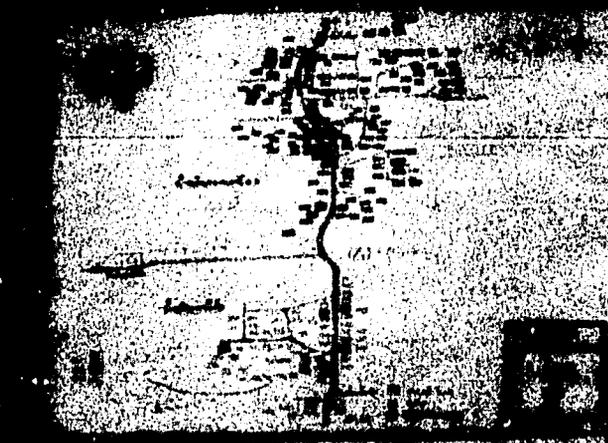
Child's Number	Age		Weight (kg)	90+%	75+%-90%	60+%-75%	Below 60%
	Year	Month					
1		0	2.1				
2		1	3.8				
3		3	3.7				
4		5	8.6				
5		9	8.5				
6		11	7.6				
7	1	0	8.0				
8	2	2	6.0				
9	2	3	11.4				
10	2	8	8.5				
11	2	10	11.1				
12	3	6	14.6				
13	3	6	12.4				
14	3	9	14.8				
15	4	2	15.1				
16	4	8	16.7				
17	4	11	11.2				
18	4	11	16.2				
19	5	0	16.3				
20	5	0	15.0				

MODULE 22

EPIDEMIOLOGY

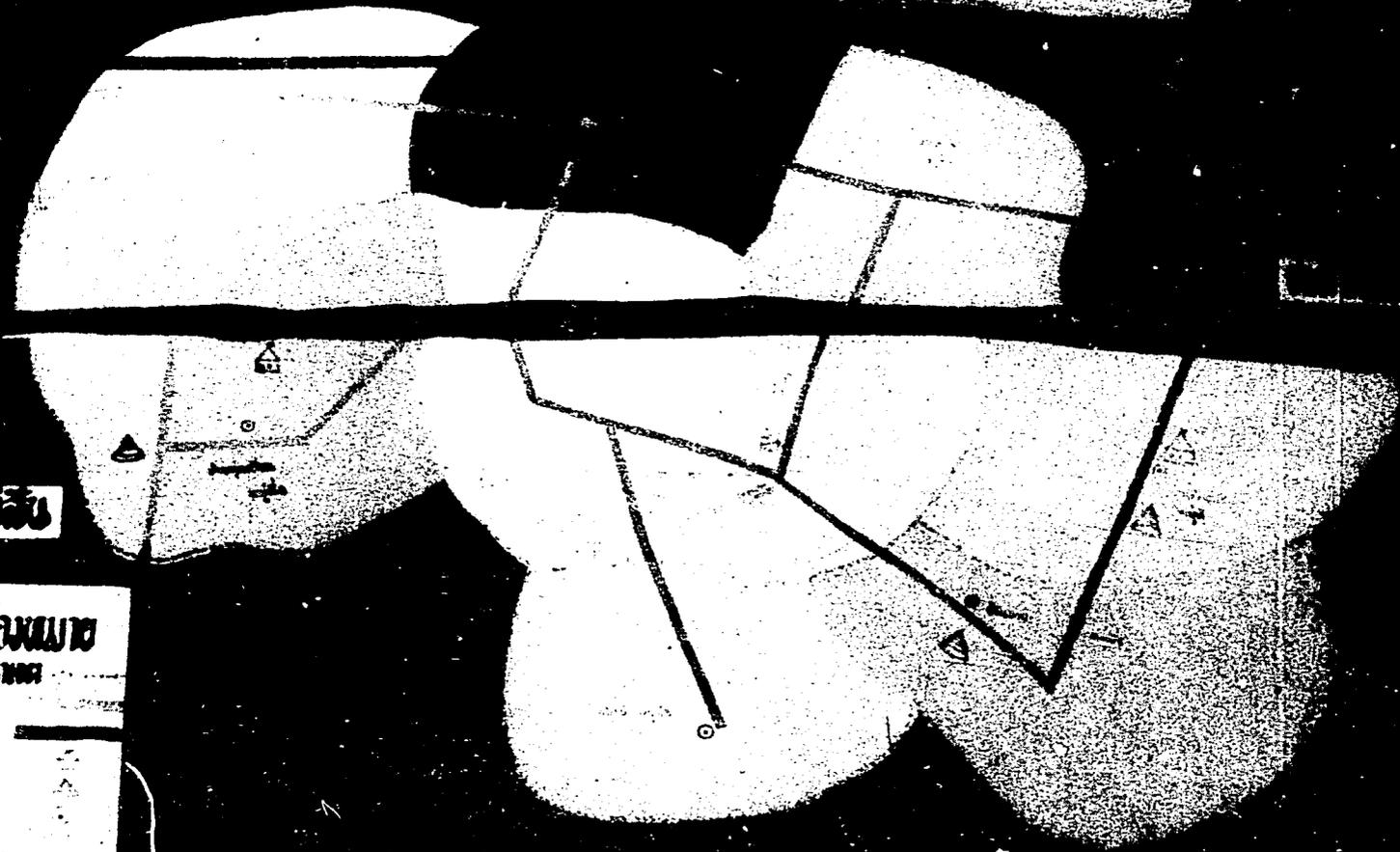
CHOOMNOOM PROMKUTKAO, M.D., Dr. P.H.

မြန်မာနိုင်ငံတော်ပြန်လည်တည်ထောင်ရေးအဖွဲ့၏ အစီအစဉ်



เขตเมือง

แผนผัง. ตำบล. ไร่พนา. อ.บ้านฝาง



ต. บ้านฝาง

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MODULE 22

EPIDEMIOLOGY

1. INSTRUCTIONAL OBJECTIVES

At the end of this course, the wechakorn will be able to:

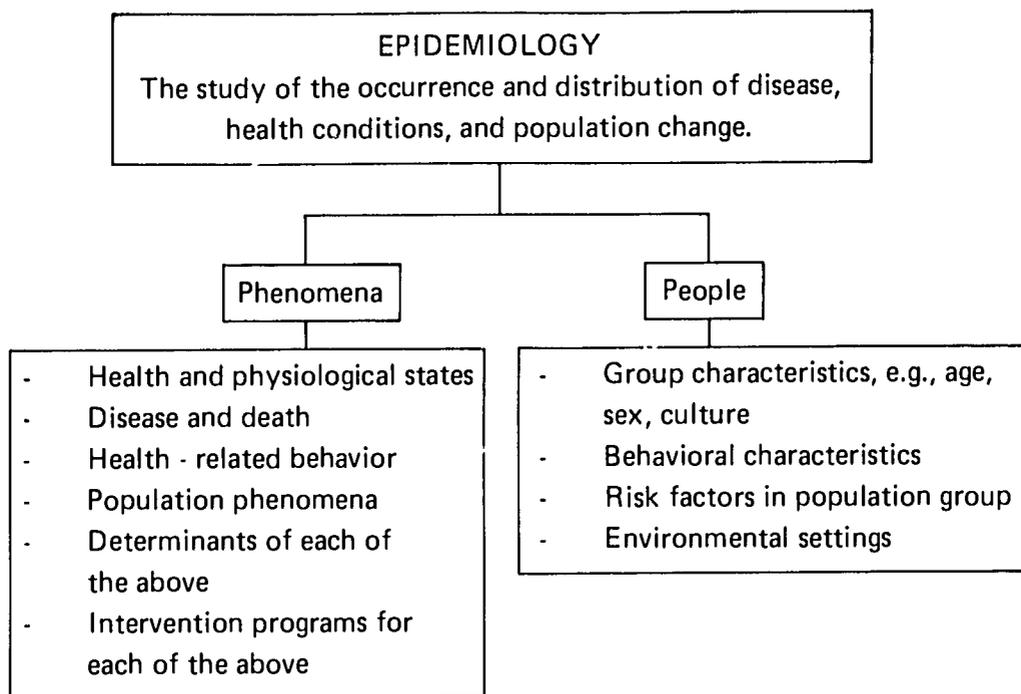
- (1) Describe the definition and roles of epidemiology,
- (2) Describe the causation of a disease,
- (3) Describe the methods used in epidemiology, and
- (4) Describe the common indices used in epidemiology.

2. INTRODUCTION

Humans have observed the relationship between disease occurrence and the environment for long time. Hippocrates is considered to be the first person who noticed and studied this relationship to search for the determinants of disease prevalence and distribution, and how to prevent such disease. The study of epidemics has been developing ever since; for example, John Snow studied the epidemic of cholera in London in 1855.

“Epidemiology” means the study of the factors that influence the frequency and distribution of diseases in man. At first, this word had a narrow meaning, specifically, the study of the occurrence of epidemic diseases. However, later on the meaning of epidemiology changed a lot, to cover the study of all diseases, not only those that are epidemic. Accordingly, A.R. Omran defines epidemiology today as “the study of the occurrence and distribution of health conditions and disease and population change, as well as their determinants and consequences in population groups.”

The scope of epidemiology can be presented diagrammatically as follows:



The study of epidemiology has 3 important characteristics:

- (1) Epidemiology always deals with groups of peoples, not with individuals.
- (2) Epidemiology always compares one group with another group.
- (3) Epidemiology is concerned with persons within the same group who have a certain characteristic or who are subject to some phenomenon, and with those who do not have that characteristic or who are not subject to the phenomenon under study. The epidemiologic investigation always answers the questions: Why do those who have a condition have it, and why are those who do not have the condition spared.

The study of epidemiology requires knowledge of disease treatment, microbiology, parasitology, zoology, demography, anthropology, sociology, administration, logic, and statistics. These factors are compiled together for use in the study process and for application in problem solving as required.

2.1 Descriptive and Analytic Role of Epidemiology

2.1.1 Natural History of Disease. This refers to the description of the course of a disease as it occurs in a group of people, differences in the course of a disease among groups with different characteristics or in different environments, and changes in the course of a disease in response to various preventive or therapeutic interventions are the major concern of epidemiology.

2.1.2 Description of Patterns of Health and Disease in Communities. The epidemiologic description of the pattern of health and disease is sometimes called "community diagnosis." It is a comparison of changes in a community or population over time or a comparison of different communities or populations at the same time, using health indicators such as incidence or prevalence rate.

2.1.3 Description of Population Dynamics. Population growth is considered as one form of disease in developing countries. The descriptive study includes the interactions of fertility, mortality, and migration as related to health.

2.1.4 Development of Descriptive Indices. Descriptive indices and measurements developed are, for example, birth rate, death rate, infant mortality rate, maternal mortality rate, and population growth rate.

2.2 Determination of Disease Causation Role of Epidemiology

Epidemiologic investigations usually focus on the discovery or documentation of a causal relationship between an associated factor agent or characteristic, and disease or condition. While the association of an infectious agent with a specific disease (e.g., tuberculosis, cholera, malaria, or V.D.) is now obvious, causal associations in noncommunicable disease (e.g., hypertension, lung cancer, accident, and malnutrition) is more obscure.

The purpose of this type of study is to find the origin and causal relationships of a disease as a basis for its control and prevention.

2.3 Experimentation Role of Epidemiology

Most of the above mentioned uses of epidemiology depend on observation methods in which the variables are not under control. However, in some studies such as animal experiments and clinical trials, variables can be controlled.

2.4 Operations Research Role of Epidemiology

Operations research studies have been increasingly conducted in developing countries. An example is the Lampang Health Development Project. The objective of the Project is to evaluate the impact of the Project's innovations on health conditions and the results of the study can be applied in other areas.

3. DISEASE CAUSATION

In the old time people believed diseases were caused by the punishment of gods, spirits, or simply the result of wrong-doing or sin. Later on it was proved that diseases were caused by germs or some specific disease agent. Nowadays it has been proved that disease is a result of the interactions among hosts, environment, and agents. The causative agent may be direct or indirect. Therefore, the causation of any disease is rather complex. The important factor here is the environmental factor.

3.1 Hosts

Normally, a host has many processes for destroying germs, and each host reacts to disease differently, depending upon the host's characteristics. The characteristics of a host are:

3.1.1 Biological factors. Biological factors include such things as, age, sex, heredity, physiology, nutrition, and stress. These characteristics have some effects on immunity, resistance, or susceptibility to disease.

3.1.2 Behavioral Factors. These include factors concerning cultural background, beliefs, educational level, income, occupation, social values, and race.

3.2 Disease Agent

Disease agent factors are divided into biological agents, nutrient agents, chemical agents, and physical agents. These agents have different characteristics and cause different diseases. These characteristics always vary; for example biological agents (e.g., bacteria, virus, fungus, protozoa, and others) normally have varying ability in affecting disease severity, drug resistance, immunity, and mutation.

3.3 Environment

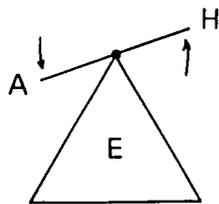
The environment has direct and varying effects on hosts and agents. In general, the environment can be divided into:

3.3.1 Physical environment. This includes geographical conditions, climate, sunlight, etc.

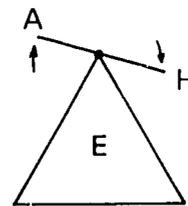
3.3.2 Biological environment. This includes living organisms and their products.

3.3.3 Socioeconomic environment. This includes social status, culture, education, income, occupation, population density, and even the form of government. The socioeconomic environment is a very important factor with regard to exposure, susceptibility and resistance to disease.

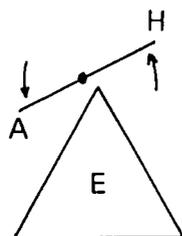
The interactions of host, agent, and environment in terms of disease occurrence can be shown in diagram form as follows :



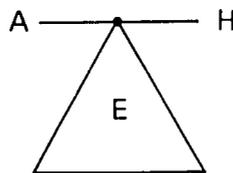
Increase in the ability of an agent to infect and cause disease in man.



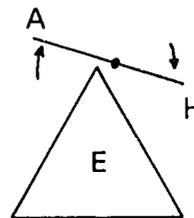
The proportion of susceptible persons in the human host population is increased.



Environmental change facilitates agent spread:



At equilibrium.



Environmental change alters host susceptibility:

4. METHODS USED IN EPIDEMIOLOGIC INVESTIGATIONS

A very important objective of the epidemiologic investigation is the finding of causes of disease. When these causes are eliminated, then the epidemic or disease occurrence can be eliminated. Causes of some diseases such as cholera can be determined easily; causes of others, such as lung cancer, are more difficult to determine.

The most often used method is observation. Every public health official has a chance to conduct a study by observing the increase or decrease of diseases which relate to the environment, starting with the observation of the patient and his family, their contacts and environment, and then correlating this information with other information about the persons concerned, time, and place. This method requires a knowledge of statistics in order to perform an analysis which will produce reliable conclusions.

Another method requires use of theoretical principles. This method is used for predicting course and estimating magnitude of the occurrence of an epidemic by using mathematical calculation.

Experimentation is another method often used. An example would be an experiment with cholera vaccination to see whether, and how much, it can prevent the disease, or an experiment using iodated salt to prevent endemic goiter.

The experimental investigation needs a very clear study design, a high quality of data collation and procedure, and scientifically - based methods of data analysis for correct interpretation.

In rural practice, health personnel often use descriptive epidemiology and the observation method in conducting studies or research.

5. DESCRIPTIVE EPIDEMIOLOGY

The role of descriptive epidemiology is the comparison of the frequency of epidemiologic phenomena occurring in population groups or subgroups according to certain characteristics of person, time, and place. Therefore, descriptive epidemiology requires the collection, classification and examination of data. The indices used are community health indicators.

Details of variables in descriptive epidemiology in determining who is affected, when, and where, are:

5.1 Person

This includes such factors as age, sex, and ethnic group, occupation, education, and socioeconomic status; marital status. Age is a very important variable in the description of the frequency of many diseases or other mass phenomena, due to age differences in physiological development, immunity, resistance, diet, or customs. The effect of age can be studied by examining cross-sectional data from a population group and cohort study.

5.2 Time

This includes changes over decades; seasonal variations, other cyclic variations; and daily variations. Explosive outbreaks of disease reaching an epidemic peak within a day or so may be indicative of a "point" source of the causal agent. Study of daily variations in disease occurrence may give clues as to its nature. Seasonal variations in a disease suggest the operation of etiologic factors with short latent periods, e.g., malaria, encephalitis, or diphtheria.

5.3 Place

This includes locations such as province, district, subdistrict, urban, or rural. Factors related to location involve such things as environment, migration, ethnic groups, socioeconomic status and so on. Each health center should have a "spot map" for plotting cases according to place of residence and water supply, factories, market, school, temple, etc.

Sources of information or data may include death registrations, disease reports, health records in school or factory, hospital or health center records, health post volunteers' records, or health communicators' reports.

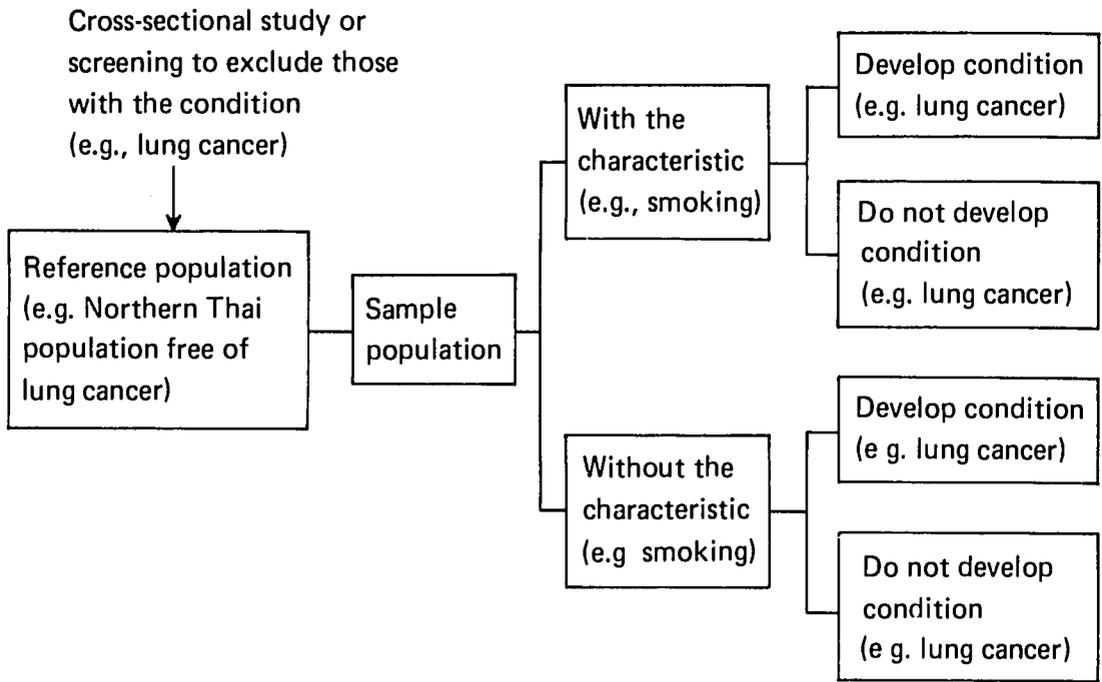
At the end of this module, the descriptive epidemiology of cholera is shown as example.

6. ANALYTIC OR SURVEY EPIDEMIOLOGY

Analytical or survey epidemiology includes the collection of data to explain observed phenomena or to test hypotheses. Analytical epidemiology may be based on data from clinical studies, laboratory studies, field studies, or records. Types of study design include (1) cohort or prospective studies, (2) case history or retrospective studies, (3) cross-sectional studies, and (4) follow-up studies.

6.1 Cohort or Prospective Study

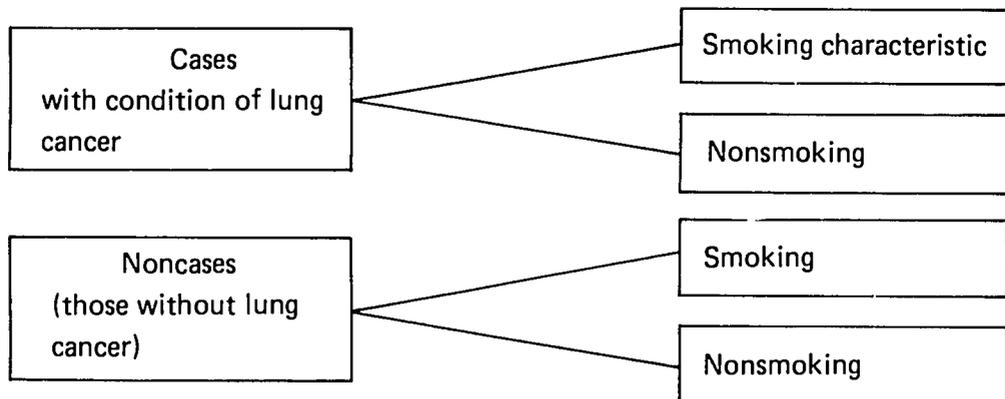
A cohort or prospective study is designed to discover whether or not there is a relationship between a particular characteristic and a particular condition; generally a characteristic is suspected of playing some part in causing the condition. The study population for a cohort or prospective study must consist of people who do not have the disease condition to be studied, but some of whom have the characteristic of interest and some of whom do not, as shown in the following diagram. A sample taken from the reference population is then followed for a specified period of time to determine the proportions in each of the sample and control groups who develop the condition under study.



This type of cohort or prospective study can show the degree (magnitude) of association between smoking and lung cancer with some degree of certainty, without bias. However, this kind of study is costly and time-consuming.

6.2 Case History or Retrospective Study

A retrospective (case history) study starts with people who have a condition and then investigates them retrospectively to see whether or not they have the contributing characteristic of interest. Controls who are free of the condition are also selected. Such a study, of the condition of lung cancer and the smoking characteristic, is shown diagrammatically below:

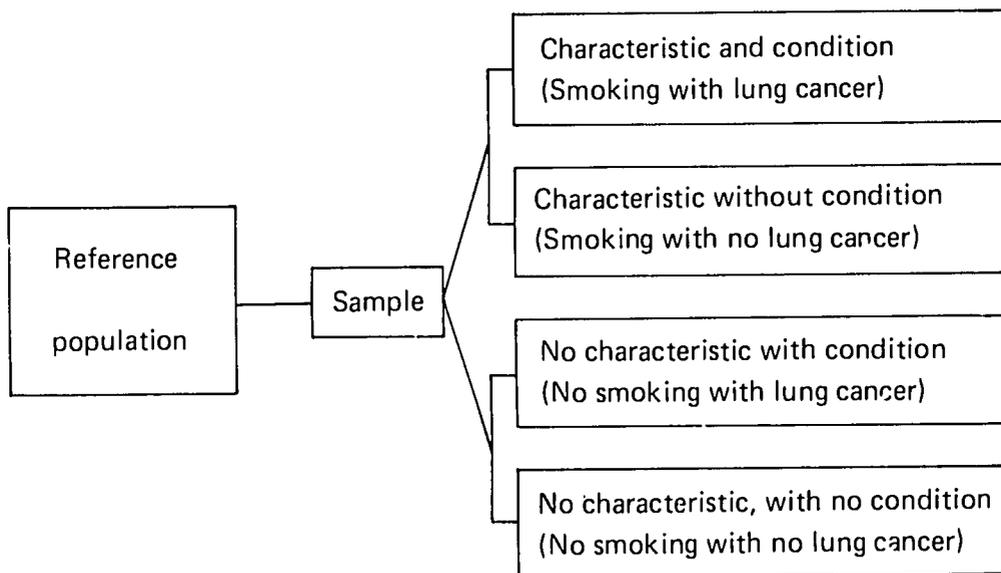


$$\text{Excess Risk} = \frac{\text{Those in sample with characteristic and condition} \times \text{Those in control group without characteristic or condition}}{\text{Those in control group without condition but with characteristic} \times \text{Those in sample without condition and without characteristic}}$$

A retrospective study is a short-term study which is cheap. But its generalization is limited and it is not possible to determine whether the characteristic or the condition is the antecedent or to determine which is the consequence.

6.3 Cross-Sectional Study

The cross-sectional study has the great advantage over a case history study of starting with a reference population from which a sample is taken and examined for both the characteristic and the condition at the same time, as follows:



This kind of short-term study makes it possible to generalize from the sample to a population, but it is not possible to determine in some cases whether the characteristic preceded the condition, or vice versa.

6.4 Follow-Up Studies

Follow-up studies have traditionally been used to check on patients who have been subjected to a particular prophylactic, disease condition, or therapeutic measure (e.g., follow-up of a tuberculosis patient after treatment, IUD accepters, or DPT vaccinated children). The purpose is to evaluate the consequences of the condition or treatment.

7. EXPERIMENTAL EPIDEMIOLOGY

The evidence from experimental epidemiology is very often more solid and more difficult to dispute, while the evidence produced by observational epidemiologic studies is primarily circumstantial. Experimental epidemiological studies usually are animal studies and clinical trials. The usual design of such studies require the selection of two comparable groups, one of which receives the drug or treatment to be evaluated, while the other (the control group) does not. The two groups are then compared to evaluate the effectiveness of the therapy or prophylactic method under study (e.g., prevention of

endemic goiter by using iodated salt). The double-blind method, meaning that the investigators and subjects studied do not know who is in the control and who is in the treated group until the analysis is conducted, is commonly used in clinical trials.

OPERATIONAL EPIDEMIOLOGY

Operational epidemiology is the systematic study of community services operations, especially health services, with a view to their improvement. Operational epidemiology depends heavily on descriptive, analytical, and experimental methods as well as many techniques modified from, for example, social sciences, statistics, economics, systems analysis, operations research, and business administration. The concerns of operational epidemiology include evaluating the effect of health or other programs in relation to their objectives, studying the program process, cost analysis, program acceptance, and evaluation. The Lampung Health Development Project is a good example of this kind of study. For example, the Lampung Project studies of changes over time in family planning, mother and child health and nutrition programs, in terms of their cost-effectiveness, coverage of target population, and level of community acceptance by comparing baseline data or preprogram conditions with postprogram conditions.

COMMON INDICES FOR DESCRIPTIVE EPIDEMIOLOGY

The common measurements or indices used in epidemiologic description are as follow:

9.1 Incidence

Incidence is the number of new cases of a condition that occur over some specified period of time in a defined population. Incidence is usually expressed in terms of number of persons affected in a given time period, but it may also refer to the number of illness episodes. Incidence rates are obtained from cohort studies.

$$\text{Incidence rate or attack rate} = \frac{\text{Number of new cases of a disease during a year}}{\text{Population at risk (midyear population)}} \times 100,000$$

9.2 Period prevalence

This is the frequency with which a condition is encountered during a specified period of time.

$$\text{Period prevalence} = \frac{\text{Total number of cases of a condition (old and new) existing during a period of time (month, year, etc.)}}{\text{Average population during that time period}} \times 100,000$$

9.3 Point prevalence

Point prevalence is the frequency with which a disease is encountered at a given point in time. Prevalence is the frequency obtained from cross-sectional studies.

$$\text{Point prevalence} = \frac{\text{Total number of cases of a condition (old and new) existing at a fixed point of time}}{\text{Total population at that point of time}} \times 100,000$$

9.4 Crude death rate

$$\text{Crude death rate} = \frac{\text{Number of deaths during a year}}{\text{Midyear population}} \times 1,000$$

9.5 Crude birth rate

$$\text{Crude birth rate} = \frac{\text{Number of live births during a year}}{\text{Midyear population}} \times 1,000$$

9.6 Infant death rate (Infant mortality rate)

$$\text{Infant death rate} = \frac{\text{Number of deaths of infants aged below 1 year}}{\text{Number of live births during that year}} \times 1,000$$

9.7 Maternal death rate (Maternal mortality rate)

$$\text{Maternal death rate} = \frac{\text{Number of maternal deaths from puerperal causes in a year}}{\text{Number of live births in that year}} \times 1,000$$

In addition, indices used in demography, economics, and sociology, for example, population growth rate, dependency ratio, income per year, and illiteracy rate, are commonly used.

Note : In the application of these indices one must recognize the levels of accuracy and the reliability of the methods of measurements, because the data obtained may have limitations concerning analysis and interpretation.

10. EPIDEMIOLOGY OF CHOLERA

Cholera has been an endemic disease in Asia for many thousands of years, and now it is pandemic on many continents. Cholera is endemic in Thailand, with sporadic outbreaks.

The causative agents of cholera are *Vibrio cholerae* and El Tor. The agents are very sensitive to heat, dryness, and disinfectants (e.g., chlorine and potassium permanganate); therefore, it is easy to destroy the cholera vibrios in water and food. The organisms can survive but usually do not multiply in surface water, foods, fruits of neutral or alkaline reaction, fish and other sea food, and on contaminated clothing for some time, depending on strain, pH, temperature, moisture content, and carbohydrate and salt content. El Tor organisms seem to survive outside the human body for a longer time than "true" cholera vibrios. Man is the only known reservoir of cholera vibrios.

After an incubation period of one to five days, and, exceptionally, as long as ten days, either clinically manifest cholera or a carrier status develops. Cholera occurs in only 5% to 10% of the infected and susceptible persons in its classic form, with profuse diarrhea, vomiting, dehydration, acidosis, and subsequent shock. The remaining 90% to 95% either show only a mild cholera or cholera-like disease that cannot be easily distinguished from other acute enteric infections on clinical grounds alone, or they present a very mild, self-limited diarrhea with a few evacuations, without dehydration. Some persons do not have symptoms at all and may become vibrio carriers. Children frequently present atypical symptoms. Signs of meningitis and fever may present in children with cholera.

Cholera is endemic in low-lying riverine areas of Asia where climate, moisture, poor hygiene habits of the population, overcrowding, brackish water, and other factors are favorable for its survival. Irregular outbreaks of cholera occur at about 5-year intervals, spreading away from its homeland in Asia to other continents. The El Tor biotype was not originally considered to be cholera-like, until in 1961 it spread from Indonesia to Southeast Asia and the Middle East. This spread of cholera caused by the biotype El Tor was due, among other factors, to the migration of people and accumulation of nonimmune individuals within the population at risk. El Tor infections were not considered true cholera by international agreement between 1958 and 1962.

The criteria for a case of cholera are strictly defined. In some instances this results in the interpretation that cholera is only reportable when the clinical picture is typical and when a laboratory reports a finding of cholera vibrios. Unfortunately, only about 70% to 80% of the cholera cases with classical symptoms yield positive bacteriological results. In many areas, laboratory work-ups are not available, or specimens are not submitted for examination for one reason or another. Thus the statistics on the incidence of cholera must be carefully interpreted.

The principal vehicle for the spread of cholera agents is water. Epidemics that are spread through water contamination are explosive but may have a different character if they occur in an endemic area where there are significant numbers of immune individuals. Since the life of the vibrios in water is not indefinite, water must be contaminated repeatedly to remain infectious for any length of time.

Cholera vibrios have often been isolated in water from slow river deltas with brackish water, from shallow wells, and from household water jars. Food may be contaminated at its source, in the market, during preparation, or during storage. Sweets and sweet homemade drinks, and milk and milk products are the usual offenders. Kitchen and eating utensils as well as chopping blocks have been found to be contaminated with cholera vibrios.

Persons infected with cholera vibrios may shed them during the incubation period and even after the acute symptoms have disappeared. Some develop only a subclinical disease and are contact carriers. Excretion of the organisms usually ceases within two weeks. Exceptionally, carriers are detected who have shed cholera vibrios for months, and reinfection has to be considered.

Epidemics that begin as water-borne outbreaks often become carrier-borne; that is, they spread from person-to-person. The infection often follows devious routes, as from patient to carrier to water to food to carrier to the individual who develops clinical cholera. The epidemic curve has a steep ascending branch in water-borne outbreaks. Then, when man-to-man transfer begins to predominate, the curve levels off after an initial descending phase, or continues to descend slowly. New peaks appear usually when a new water supply becomes infected or a commonly used food source is contaminated.

Human carriers are especially dangerous when they enter a large and susceptible population living in an unhygienic environment. Religious festivals were often occasions for cholera outbreaks. Insects and flies can transfer cholera mechanically, but they are less often the vector of cholera transmission than is sometimes believed. Fomites, such as letters, books, coins, and paper money, do not transmit cholera frequently. Vibrios can survive on soiled linen and clothing for about one week and may convey the infection to susceptible persons.

It has been observed that cholera appears principally during the dry season. Water becomes scarce during the dry season and people drink unsafe water from unreliable sources. The first rains, however, bring an increase in the incidence of the disease because of the contaminated dirt that is washed into water holes, rivers, and unprotected wells. Later the dilution factor of the water by rain comes into play and fewer organisms are consumed with each drink of water, decreasing the inoculum and decreasing disease rates. High humidity is not necessary for the spread of cholera.

Areas with brackish water are favorable for cholera. Fishermen who often work along the shores or at the mouths of rivers are frequent victims and spreaders of the infection. The role of the macroclimate is important in cho-

lera but it is believed that socioeconomic and educational factors play a much greater part than the geographic situation of the endangered areas.

Age, sex, and ethnic origin do not contribute to the general distribution of cholera. The disease affects all groups but seems to prefer young, hardworking adults at the beginning of an epidemic. Under endemic conditions and during the latter part of an epidemic, children and old people are more frequently the victims, due to their lack of immunological defense.

Cholera is a disease of the poor and the uneducated. The unemployed, unskilled laborers, marginal farmers, and poor fishermen are most often its victims. It seems that well-nourished persons living under proper hygienic conditions seldom develop clinically manifest cholera.

It is not known how long immunity lasts after one attack. There seems to be considerable cross-protection against all choleraenic vibrios after the disease.

To prevent cholera outbreaks many measures must be taken. Case finding is a difficult task in areas with few or no physicians, and with a lack of transportation and shortage of laboratory facilities. The first cases are frequently misdiagnosed. Bacteriological examination of stools and vomitus is recommended. Rectal swabs are satisfactory for the investigation of patients with diarrhea, but not for carrier studies if only one specimen is examined. The isolation of patients is mandatory. Carriers and contacts should be segregated, but this is seldom possible. International Sanitary Regulations require notification of all instances of cholera, and impose quarantine on affected areas for 10 days.

Disinfection of contaminated objects is mandatory. General improvement of sanitary conditions, especially providing safe water, must be attempted. During a cholera epidemic, emergency pipelines are usually laid and water is brought in tanks and barges; surface wells cannot be properly chlorinated and it is best to close them. A latrine-building campaign is a feasible but rather long-range project. Fecal disposal can be improved in many instances at short notice, however, after checking on the means by which nightsoil is being handled. Garbage disposal and fly breeding are also matters of concern.

The preparation, storage, and distribution of food and drinks has to be brought under control. Street vendors constitute a problem because they are difficult to supervise.

The most important task is that of public health education and propaganda. Hospital facilities must be adequately equipped. Carriers should be treated with, for example, tetracycline. Vaccination should be encouraged, though its efficacy is only about 50% to 60%. The initial vaccine dose is 0.5 ml, followed by 1 ml seven days later. However, sanitary improvement is of the utmost importance in any prevention program.

MODULE 23

COMMUNICABLE DISEASES CONTROL

CHOOMNOOM PROMKUTKAO, M.D., Dr. P.H.

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ช่วยกัน กำจัดยุงลายเพื่อ
ยุงลาย ทุกแห่งในบ้าน และรอบ
บริเวณบ้าน •



สร้าง อย่า ปล่อยให้ยุงกัด เด็กในบ่อ
กวางวัน โดยใส่ลูกบ่อในบ่อ
เล่นบริเวณที่มีแสงสว่างส่องถึง •

■ เมื่อสงสัยว่าเด็กป่วยเป็นโรคนี้

ให้รีบพาเด็กไปให้แพทย์ตรวจ •

อย่า ใช้น้ำสกปรก
หรือภาชนะ



MODULE 23

COMMUNICABLE DISEASE CONTROL

1. INSTRUCTIONAL OBJECTIVES

On completion of this course, the wechakorn will be able to use knowledge concerning the control of communicable diseases in practice, specifically, the wechakorn will be able to:

- (1) Explain the natural history of the common communicable diseases,
- (2) Cooperate with government public health personnel in communicable disease control programs, and
- (3) Apply the principles of communicable disease control in every day practice.

2. IMPORTANCE OF CONTROLLING COMMUNICABLE DISEASES

Communicable diseases are a very important problem in Thailand; many people still suffer and die from these diseases. The most significant communicable diseases here are diarrhea, tuberculosis, pneumonia, and malaria. Other diseases which affect many people are colds, influenza, whooping cough, diphtheria, measles, poliomyelitis, amoebic dysentery, typhoid fever, viral hepatitis, encephalitis, hemorrhagic fever, intestinal parasitic infection, liver fluke infection, venereal diseases, rabies, leprosy, and conjunctivitis. These diseases, however, can be easily controlled or prevented at a relatively small cost – by using mid-level health workers, like wechakorn – and the effects of your efforts will be longterm, and can be maintained. But many people still suffer from communicable diseases.

The occurrence and spread of communicable diseases or the natural history of communicable disease as represented in Table 23.1, involve many factors including human behavior, the mutation of organisms, changes in environments, geographical characteristics of areas, and the degree of development of society, laws, and administrative systems. Therefore, effective communicable disease control programs require cooperative efforts and adequate resources.

Table 23.1 Natural History of Communicable Diseases

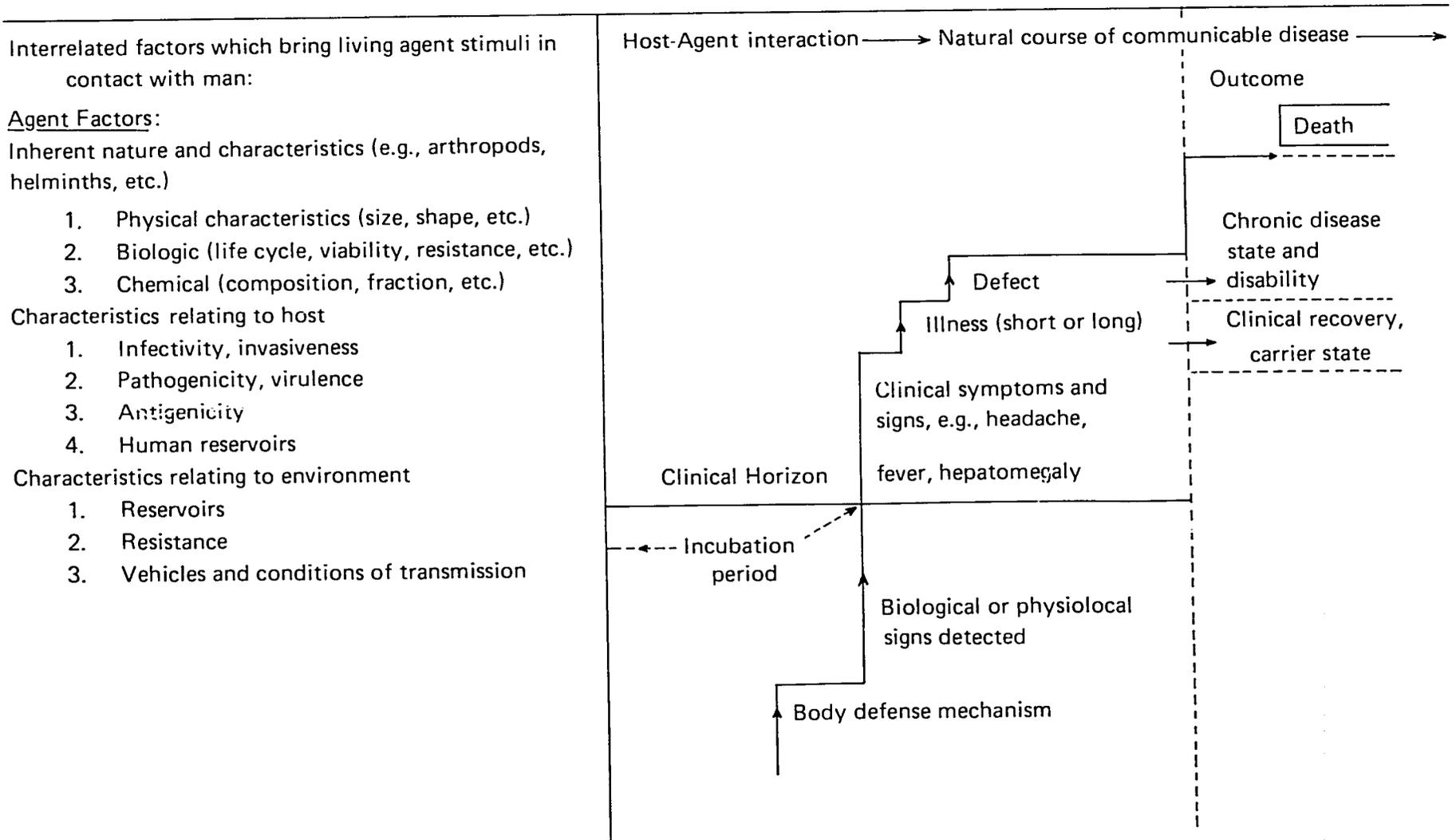


Table 23.1 (cont.) Natural History of Communicable Diseases

Host Factors :

1. Age, sex, race
2. Heredity and personality
3. Habits and customs
4. General and specific defense (immunity)

Environmental Factors :

1. Physical (climate, geography)
2. Biological (animals and vectors)
3. Socioeconomic (education, income, culture)

Successful Parasitism Requirements

1. Presence of agent
2. Satisfactory reservoir
3. Susceptible host
4. Means of transmission

Agent or toxin is stimulus.

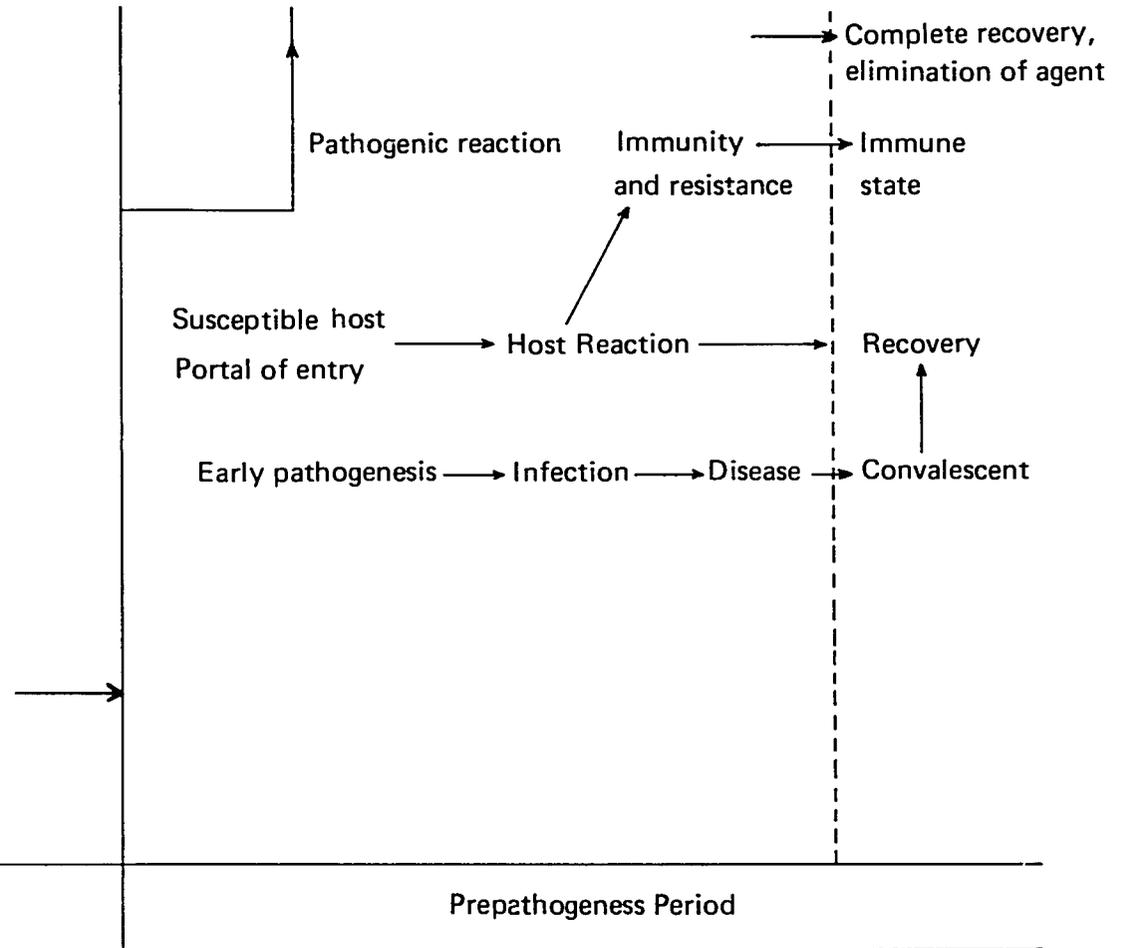


Table 23.2 Methods for Prevention of Communicable Diseases in Prepathogenic and Pathogenic Periods

Prepathogenic Period		Pathogenic Period		
Health Promotion <ul style="list-style-type: none"> - Health education relating to disease and health - Good standards of nutrition - Healthful living habits - Sanitary housing and environmental conditions - Personal hygiene development - Avoidance of fatigue and stress 		Specific Prevention <ul style="list-style-type: none"> - Routine specific immunizations - Good personal hygiene - Proper isolation and quarantine - Proper handling of disease vehicles - Concurrent and terminal disinfection - Vector control - Environmental sanitation measures 		
		Early Diagnosis and Prompt Treatment <ul style="list-style-type: none"> - Case finding by survey and selective examination - Laboratory procedures for case detection - Disease surveillance - Examination of contacts - Adequate treatment of cases - Isolation of cases 		Disability Limitation <ul style="list-style-type: none"> - Comprehensive treatment - Adequate follow up
				Rehabilitation <ul style="list-style-type: none"> - Adequate facilities for rehabilitation - Physical and social rehabilitation - Selective placement
Primary Prevention		Secondary Prevention		Tertiary Prevention

3. NATURAL HISTORY OF COMMUNICABLE DISEASES

If host, agent, and environment are in a balanced situation, there will be no epidemic; when changes occur in any one of these, then the rates of occurrence of the disease will change. An increased occurrence of the disease, beyond the normal range for a given population, is an epidemic.

After an organism or disease agent has entered the human body, it requires an incubation period before the body shows the disease symptoms. When germs have entered the body they will be shed from the body, making these germs spread to other people for a period of time called the communicable or infectious period. The spreading of organisms may begin before the appearance of clinical symptoms and last after their disappearance. This lack of correspondence between communicability of the host and the presence of clinical symptoms is responsible for the lack of success of attempts to isolate some infectious cases. For example, in measles communicability is greatest in the three or four days before the rash appears. In poliomyelitis and infectious hepatitis, communicability also begins well before onset of overt disease symptoms; in cholera, the organisms are shed for some time even after the clinical symptoms disappear.

Since there are changes in many steps after the agent enters the body, there are methods for the prevention and control of diseases which are suitable for different phases, as shown in Table 23.2.

3.1 Disease Transmission

Disease organisms are living creatures. By spreading from one person to another, such organisms can survive. In general, the transmission of diseases can be shown as follows:

<u>Sources of Infection</u>	<u>Modes of Transmission</u>	<u>Potential Host</u>
Patients	Direct contact	General condition
Carriers	Droplet contact	Nutritional status
Vectors	Fomite contact	Hereditary condition
Nonliving sources	Vector contact	Immunological condition

Portals of Entry

Conjunctivae
Respiratory tract
Digestive tract
Genitourinary tract
Mechanical (bite, wound)

It can be seen that the transmission of a disease requires uninterrupted steps.

3.1.1 Sources of Infection. Common sources of infection are human, animals, or objects which harbor organisms. Some types of organisms live only in humans (for example venereal diseases, cholera, and smallpox) while some organisms can live in animals and can also be transmitted to humans (rabies, tuberculosis, hemorrhagic fever, encephalitis, malaria, and plague). Sources of infection can be polluted water, food, soils, and cooking utensils.

3.1.2 Portals of Exit and Entry. Organisms can be shed from the host in many ways. Each disease organism has a specific portal of exit. For example, influenza and leprosy are shed from the host through the respiratory tract, cholera through the digestive tract, venereal diseases through the genitourinary tract, trachoma through conjunctivae, and malaria through mosquito bite wounds. After leaving the body, organisms will enter another host by the same way as they left the first host. If organisms enter a body the wrong way they will not cause disease.

3.1.3 Modes of Disease Transmission. Organisms may be transmitted from one host to another by:

- (1) Direct contact, such as kissing (measles) or sexual intercourse (venereal diseases)
- (2) Droplet infection such as coughing, sneezing, or spitting (tuberculosis, colds, influenza, etc.)
- (3) Fomites such as pencils, clothing, bathtowels, cooking utensils.
- (4) Vectors such as mosquitos, ticks, or fleas which bite diseased persons or animals and then bite new hosts.

Potential hosts include anyone who receives organisms into his body, but such persons may or may not contract the disease.

4. GENERAL CONTROL MEASURES

Measures to control communicable diseases focus on sources of infection, on modes of transmission or infection, and on the condition of potential hosts. These factors differ depending upon types of diseases. Therefore, differing control measures are required. For example, the best control for cholera is to have sanitary drinking water; for tuberculosis, control involves immunization and patient treatment; for leprosy adequate treatment and isolation of patients; for malaria, patient treatment and destruction of mosquitos. Effective controls must be supported by necessary laws. The success of a communicable disease control program also depends on the socioeconomic status of the community and on its health resources. In general, control measures include:

4.1 Reporting and Notification of Patients

When there is an occurrence of a disease, the patient or the persons concerned must report to a health officer. For example, Thai law states that

a case of a communicable disease must be reported within 24 hours. Before reporting a case, the reporter must be sure that he has diagnosed the disease correctly. Reliable reporting of infectious cases requires cooperation among many sectors, and the number of cases reported is less than the actual figure.

4.2 Isolation of Patients and Treatment in Special Wards or Hospitals

When there is an epidemic, wards or hospitals for handling that disease are set up – for example, hospitals for cholera, or for tuberculosis. In a general hospital patients with various diseases are admitted to the same ward, which can cause outbreaks of communicable diseases.

4.3 Quarantine of Patients and Suspected Cases

Every country has laws for the quarantine of patients or suspected of contacting a communicable disease. Normally, suspected persons are quarantined for a period of time which is equivalent to the incubation period of the suspected disease; this practice is very necessary to avoid rapid spread of a disease from place to place, especially with today's speedy transportation systems.

4.4 Disinfection of Disease Organisms

Disinfection can be accomplished using, for example, heat, or chemical solutions. Germs may exist in a person's stool, sputum, or clothes. Appropriate disinfection methods vary according to treatment site (hospital, patient's home) and must also be compatible with the particular economic situation.

4.5 Destruction of Vectors

Insects which are disease carriers include mosquitos, fleas, ticks, cockroaches and others often found in unsanitary places. Insecticides such as DDT, malathion, and dieldrin can be used, but with caution to avoid hazards to humans.

4.6 Sanitation

Sanitary drinking and domestic water supplies, sanitary living conditions, proper disposal of rubbish and other wastes, and control of insects such as mosquitos and flies are all very necessary for control of communicable diseases. This is true at all times, even when there is no outbreak of a disease.

4.7 Immunization

Diseases such as diphtheria, pertussis, tetanus, polio, tuberculosis, and smallpox can be successfully prevented by immunization (vaccination) programs. Diseases such as cholera and measles can be partially prevented by vaccination. To be effective, immunization must be done according to the stated local standards, high risk groups should be immunized first. Maintenance of an adequate cold chain is one of the most important requirements for the success of a widespread immunization program.

4.8 Health Education for the Community

Health education for the community is very important. Control measures will not succeed if people do not understand the problem or change their health attitudes. It is the duty of public health personnel, under the

supervision or guidance of health educators, to provide community health education. The education methods for any health problem or community depend upon the objectives, the situation of the community, and local health resources. Community health education should be a horizontal program; however, a vertical program, such as an areawide or district cholera campaign, can also be carried out.

5. REPORTING COMMUNICABLE DISEASES

According to the Regulations on Communicable Disease Control (B.E. 2477), the following communicable diseases which may require notification, when so declared by health agencies, are the following:

- | | |
|-----------------------|------------------------|
| (1) Paratyphoid fever | (11) Influenza |
| (2) Typhoid fever | (12) Pneumonia |
| (3) Typhus fever | (13) Mumps |
| (4) Malaria | (14) Amoebic dysentery |
| (5) Measles | (15) Anthrax |
| (6) Scarlet fever | (16) Rabies |
| (7) Chicken pox | (17) Tuberculosis |
| (8) Whooping cough | (18) Leprosy |
| (9) Venereal diseases | (19) Poliomyelitis |
| (10) Diphtheria | (20) Encephalitis |

According to the Regulations of the Communicable Diseases Control, health agencies must be notified within 24 hours after the occurrence of any of the following dangerous communicable diseases are noted:

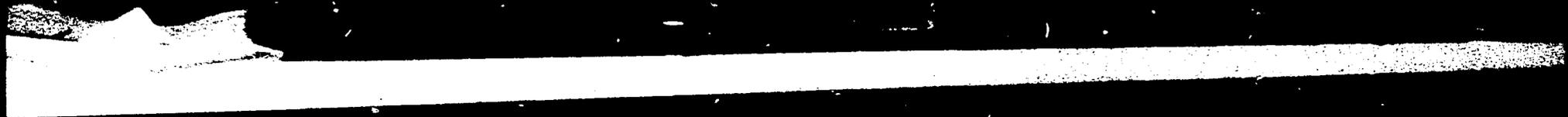
- (1) Plague
- (2) Cholera
- (3) Smallpox
- (4) Meningitis
- (5) Yellow fever
- (6) Relapsing fever
- (7) Typhus fever

It is obvious that changes or revision of laws or regulations concerning with the controlling of communicable diseases are necessary.

MODULE 24

HEALTH EDUCATION

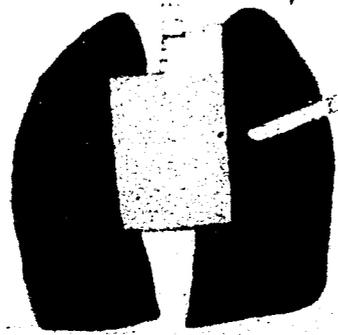
CHOOMNOOM PROMKUTKAO, M.D., Dr. P.H.



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MODULE 24

HEALTH EDUCATION

1. INSTRUCTIONAL OBJECTIVES

At the completion of this course, the wechakorn will be able to:

- (1) Give health education to patients and villagers in need,
- (2) Select the appropriate health education methods for villagers and their community, and
- (3) Motivate villagers to accept health programs and to improve personal and community health practices.

2. INTRODUCTION

Most health problems in Thailand are preventable. The success of disease prevention depends on the active participation of patients and the community. Their participation depends on their knowledge, interest and understanding. The development of health attitudes and health behavior is closely related to how they are informed or motivated. The process of learning or changing behavior relating to health involves health education. Health education is the process and method used in educating people to understand about disease prevention and health promotion and to form sound attitudes toward behavioral changes for better health. The general objective of health education is to help people to help themselves in personal hygiene, family health and community health. The first step is to create awareness of health problems, and this is followed by seeking solutions to community health problems based on their willingness to participate and to share responsibility.

3. SCOPE AND TARGET OF HEALTH EDUCATION

In practice, the scope and target of health education are as follows:

3.1 Health Education in Schools

The target population is school children. Health education will be successful only when a health educator and a teacher closely cooperate and when proper health education methods are selected according to community needs, resources, and problems. Changes in students' behavior can have an influence on parent and community attitudes.

3.2 Health Education in Health Service Facilities

Health education is an important integral part of health activities and programs. Health education, therefore, is the function of every category of health personnel at all levels – midwifery center, health center, district and provincial hospitals and other health agencies. The target population is the

patients and their relatives who usually accompany them to the service units.

3.3 Health Education In a Community

The target population is all people in the community, particularly those at risk. The objective is to develop knowledge, attitudes and practices in health affairs and to organize community efforts in solving community health problems as perceived by the community. Health personnel must have a plan and carefully implement it with optimal utilization of potential local community health resources, such as temple, priests, youth clubs, village health volunteers, influential leaders, teachers, farmers, and housewives.

4. IMPACT OF HEALTH EDUCATION

Health education is the changing of human behavior. It requires adequate time, a proper place and an appropriate method. Evaluating the impact can be done in many different ways with varying degrees of complexity. An immediate impact resulting from health education would be the success of health programs which require active participation by a community, for example, programs to control malaria and tuberculosis. An intermediate impact of health education would be changing human behavior to reduce exposure to disease for example, improving sanitation can reduce the community's exposure to diarrhea, parasitic infections, and respiratory tract infections. The final impact of health education is evidenced by a healthy population. People do not smoke in order to avoid lung cancer; they are not chronic alcoholic drinkers in order to avoid cirrhosis of the liver; they are aware of obesity and its relationship to disease; they make regular appointments with psychiatrists to promote mental health. Such ways of life make the population healthy, and enable them to live longer, free from preventable illnesses. Such a population faces only minor illness and degenerative changes.

5. TARGET APPROACH

5.1 Individual Approach

The Individual Approach refers to patient education interaction between a health provider and an individual client. This approach is very effective since close personal contact allows discussion of detailed questions and answers without interruption. Personal affairs also can be discussed. However, this approach requires faith, acceptance and understanding. This method includes, for example, interviews, discussions, and home visits. Though it is a time-consuming method, the result is quite promising.

5.2 Group Approach

5.2.1 Small Group. A small group audience is not more than 20 persons. For example, a talk to a housewives' club, a village health committee, pregnant women attending ANC clinic, students, or a youth club would use the small group approach. The methods used are lecture, demonstration, questions and

answers, and small group discussion.

5.2.2 Large Group. A large group audience is more than 30 persons. Backgrounds may be widely different and group cohesiveness is usually less than for a small group. The methods used are mobile movies, exhibitions, displays and mass meetings. Health personnel or health educators must carefully analyse the groups characteristics, including differences within the group in socio-economic background, interest, age, sex, occupation, religion, political philosophy as well as group dynamics. These findings are very helpful in selection of proper methods and media.

5.3 Mass Media Approach

This method provides the least personal relationship between the provider and the receiver. Trust is rarely assured. The plan, strategy, implementation, and evaluation for this kind of communication must be extensively outlined. Methods used include radio, television, movies, newspapers, and posters.

6. HEALTH EDUCATION PREPARATION

Specific and measurable objectives should be set for health education activities. These should be thoroughly prepared before implementation of the activities.

6.1 Self Preparation

The health educator must prepare his knowledge, attitude, and practice of the topics that will be presented. The health educator must understand the topics thoroughly and must have no conflict or doubt concerning the presentation.

6.2 Topic Preparation

The health educator should prepare the topics systematically, review the available literature, raise some stories or examples, and select simple methods and media that can convey the ideas directly and promote the understanding of the receivers.

6.3 Audience Preparation

The unique characteristics of the audience – including interests, sex, age, educational backgrounds, occupations, religions, and others – must be analysed, so that the proper communication media and channel can be selected. Sometimes small group discussions are helpful when there are many audience members.

6.4 Place Preparation

Where the health education activity is going to take place and the special and general characteristics of the place should be known. The information gained will help a health educator in developing the proper atmosphere, in preparing audio-visual aids and in selecting an appropriate style and key words. If a place is improper, modifications should be made.

6.5 Aid Preparation

Audiovisual aids should be appropriate for the background and interest of the audience. Advantages and disadvantages of each audiovisual aid must be considered. Equipment should be tested before actual use.

7. HEALTH EDUCATION METHODS

There are many health education methods; all have advantages and disadvantages. Health education methods should be selected according to the audience, topics, place, speaker's calibre, and, above all, the objectives of that particular occasion. Methods often used are as follows:

7.1 Lecture

The lecture method is usually used in lecture rooms, classrooms and meeting rooms. A speaker takes an active role and the audience plays a passive role, the speaker can control the speed, hit the points, emphasize some aspects, and conclude the way he prefers. Long and unprepared talks (lectures) are very boring because the audience cannot actively participate. Therefore, a speaker must prepare a general outline, a systematic and logical presentation with proper emphasis and conclusions. Questions should be asked so that the audience can be strongly motivated to participate in discussion and a friendly atmosphere can be provided.

7.2 Group Discussion

The group discussion method involves discussion among 6 to 20 people who meet as a group with a common interest. Some common groups are: a youth group, a pregnant women's group, a nursing mothers' group, a CNC parents' group, a community leaders' group or a village health committee group. This kind of meeting fosters inter-personal relationships, better understanding and more cooperation. Every member also has good opportunity to acquire detailed information, to discuss the subject openly, to have new or initiative ideas and to gain mutual recognition. Group consensus must be achieved and implemented; a voting system is not suggested. The crucial point of this kind of meeting is that a chairman must be a strong leader with a high calibre in analysing information and presenting sound conclusions. A recording secretary should be appointed, and resource people should be available if necessary.

7.3 Demonstration

A lecture should be supplemented by a demonstration. A demonstration provides the opportunity for questions, physical contact, and practice. Common demonstrations in villages are children's weight-for-age measurements, preparation of supplementary food and family planning activities. Interesting demonstrations that avoid boredom and inactive participation require practice and adequate equipment that is ready to be used.

7.4 Question and Answer

Questions are raised by the health educator and answers come from

the audience. The questions should be simple, to the point and arousing. Do not ask questions that may cause misunderstanding, provoke personal conflict, show a superiority complex, or insult the audience. Direct and indirect questions can be used as necessary. In certain cultures repetitive questions are welcomed and positive answers are assured. Some questions may require more polite explanation for those who are inexperienced. Some audiences may be embarrassed to ask verbal questions, therefore written questions can be submitted and answered.

7.5 Exhibitions

Exhibitions are usually displayed at special occasions such as the celebration of new school, a church fete, a winter fair, an annual fair or an event organized by health personnel. Specific objectives and analysis of the audience's background must be considered. Some exhibitions require special surroundings. Materials used include pictures, models, samples, readable handouts and others.

7.6 Extramural Study or Study Tour

People usually are bored with routine activities. Extramural study or study tours should be provided. New environments create openness and acceptance especially when new information is presented by well-known outsiders. Visiting pilot projects, factories, historical places or related organizations is worthwhile.

8. OPPORTUNITIES TO PROVIDE HEALTH EDUCATION

All health personnel should provide health education at all times and in all places, whenever possible. However, certain opportunities are more favourable for particular health education objectives.

8.1 Health Service Unit

Patient education and health education should be provided at the same time services are rendered. It is likely that the audience will accept advice because they are in need. Health education should be provided along with clinical services (e.g., general out-patient service, ante-natal care clinic, post partum care clinic, well child clinic). A successful health educator, in most cases, comes from the same social class as the audience. In general, wechakorns, nurses, midwives, nurse aides and junior health workers are well-suited to provide health education or to give health education talks to patients and villagers.

8.2 Field Service

Field services and mobile clinics are still necessary for some localities where stationed health services are not yet available. Mobile services, home visits, villager meetings, village health committee meetings, community development committee meetings, sanitary field work outings, school health services, factory inspection tours and social gatherings provide good opportunities to give health education. Proper topics and health education methods should be carefully selected otherwise problems and conflicts can be encountered. Possi-

ble reverse effects must be considered.

8.3 Mass Health Education

The general population is the target audience for mass health education. Mass health education can be channeled through television, radio, and newspaper articles. Health educators conducting public health education programs should aim to create public awareness of public health problems and arouse the public interest in participating in health programs.

9. USES OF AUDIOVISUAL AIDS IN HEALTH EDUCATION

Audiovisual aids can help the audience to understand, accept and practice the presented topic. Audiovisual media are excellent aids in the learning process provided that they are used properly. People learn more when they see, touch, smell and practice; listening or hearing is not enough for active learning. The commonly used audiovisual aids include models, exhibitions, posters, flip charts, films, video-tapes, and slides. Each aid has both advantages and disadvantages, therefore proper selection should be considered.

9.1 Samples or Models

Models are very useful in competency-based training or practice e.g., family planning kits, intestinal parasites kits, human organs models and other equipment used in health technology.

9.2 Slides

Slides can be used to demonstrate rare cases. They can be systematically arranged and repeated to enhance the learning process. Slides can be used in small and large group meetings such as village health volunteer meetings, health education in child nutrition centers, or presenting programs on health activities to village health committees or other local groups.

9.3 Pictures, Illustrations, and Cartoons

These aids are easily prepared in rural communities where slides and models are unavailable or scarce. Children prefer cartoons.

9.4 Flip Chart

Flip charts consist of many pictures which are systematically arranged by topic. The chart can be shown back and forth as necessary without sophisticated equipment. The pictures should be attractive and suited to the background of the audience.

9.5 Movies

Movies are a very popular and attractive medium for the rural population, though they are costly. Usually there is a mobile movies unit for showing movies.

9.6 Others

In rural areas, pictures, drawings, and posters can be developed economically. News letters or newspapers can be widely distributed. The characters should be large and the language used should be simple enough for poorly educated people.

10. PRINCIPLES IN COMMUNICATION

Introduction

People have to communicate with each other everyday. We spend most of our time listening to other people rather than talking. Communication may lead to misunderstanding if the communication method and media are not properly used and the sender's and receiver's characteristics are not considered.

Communication is the process whereby ideas are transmitted from one person to another or to many people for common understanding. It is a two-way process between sender and receiver.

10.1 Components and Process in Communication

The three components of the communication process are sender, media, and receiver. The process of communication entails many steps : sender – encoding –(media)– channel – receiver – decoding.

A communication breakdown can occur during any step.

Usually a sender already has something in his mind to communicate. To communicate that particular thing he must encode his thought into words, writing or gestures (non verbal), and then channel the thought through verbal or nonverbal means e.g., direct speaking, radio, television, gesture, or newspaper. The receiver, then, decodes the media and perceives it and spontaneously feedback. The socio-economic backgrounds of both sender and receiver can play a great role in encoding and decoding which can subsequently have an affect on correct understanding. This can be easily observed in conversation between different social castes or between people of different cultures.

10.2 Types of Communication

10.2.1 Person-to-Person. When the number of senders and receivers is not large, it is easier for senders and receivers to understand each other.

10.2.2 Mass Communication. It is sometimes necessary to communicate to a mass of people whose backgrounds are unknown. The channels of mass communication include radio, television, newspaper, movies, and written documents. A mass can be easily and rapidly reached through these channels, but the impact may be unpredictable or not as planned.

11. MOTIVATION

People will change their habits only when they are fully motivated to do so. People must be motivated to stop smoking, build a latrine, or to wash their hands before eating or after using the toilet. Habits are difficult to change but they can be changed when people realize the consequences of the habit.

Motivation is the method and process of convincing an individual or target group to cooperate, agree, accept or support proposed changes and to change their attitudes and practices. Motivation is a process that requires applying principles of communication, health education, social psychology, and public speaking. Motivation involves both biological and social factors.

11.1 Motivation Technique

Components of motivation include: person to be motivated, techniques used in motivating, and objectives of that motivation. The process will be simple if a number of motivators and the number of people to be motivated is small. It becomes complicated when the numbers are large. Motivation is science and art; it requires many approaches as follows:

- The motivator should not refuse to answer a doubtful questions or rumours. The refusal can result in a personal conflict or the breakdown of the personal relationship.
- The motivator should create interest. The motivator should be neatly dressed, and should show sympathy without being condescending.
- Motivator should help the person being motivated to understand the proposed topic. Motivation cannot be achieved if the person being motivated does not understand the topic discussed. A sample topic is, "how a latrine can prevent illness." The person being motivated should be informed thoroughly about the topic or new factual knowledge. The impacts on community as well as on the individual should be emphasized. And assurance should be given that this is not in conflict with cultural or social values.
- The motivator should convince the person being motivated to change the behavior and practice as planned. For example, if the objective of the motivation is to convince a person to quit smoking, then the person should stop smoking after he or she has been motivated. However, the motivational process consists of many steps, namely: awareness, interest, evaluation, trial and adoption. Each step requires a different approach.
- The motivator should follow up and help the person being motivated to solve problems as they arise. The changed behavior may bring social conflict to the person being motivated. Therefore, he or she should be closely followed-up and fully supported or guided especially where there is social conflict concerning the new behavior.

12. PRINCIPLES OF PUBLIC SPEAKING

It is usual that health personnel have to speak in public. It may or may not be related to health education or public motivation. Public speaking, therefore, must be practiced. Good public speaking can arouse the audience and change their attitudes and behavior. Health education talk is, to a large extent, like public speaking.

12.1 Audience Analysis

A speaker's style should depend on the characteristics of the audience. Therefore, detailed information about the audience must be obtained

and analysed.

12.2 Place and Occasion Analysis

It must be known in advance where health personnel will deliver the address, on what occasion, and for how long. Is it delivered at a birthday party, wedding ceremony, farewell party or religious day?

12.3 Speech Objective Determination

Specific objectives must be determined. Is it an occasion to arouse the public or to calm them? Is public opinion going to be changed or affirmed? It must be clear whether fact or opinion will be presented.

12.4 Topic Preparation

12.4.1 Information Collection. Information can be obtained from literature, experts, members of the old generation or priests.

12.4.2 Arrangement of Content. Content should be logically and systematically arranged. Tedious speech must be avoided.

12.4.3 Circumstantial Information Collection. It is more persuasive if examples, statistics, rhetoric, comparison, and audiovisual aids are used in public speaking.

12.4.4 Introduction Preparation. A good introduction is not easily prepared. It must be arousing, persuasive, logical and clear.

12.4.5 Conclusion Preparation. The conclusion should be short, simple, and memorable.

12.5 Gestures

Impressive gestures must be learned. The speaker should learn to use his eyes, hands, voice, and other body movements. The speaker should be familiar with audiovisual aids. Loudness and rhythm are also very important in public speaking. In addition, dress and manners should be proper.