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CHANGING HEALTH ENVIRONMENTS THROUGH LAND
DEVELOPMENT: THE CASE OF THE FEDERAL LAND
DEVELOPMENT AUTHORITY IN PENINSULAR MALAYSIA.

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Geography

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CHANGING HEALTH ENVIRONMENTS THROUGH LAND DEVELOPMENT
THE CASE OF THE FEDERAL LAND DEVELOPMENT AUTHORITY
IN PENINSULAR MALAYSIA

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
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DOCTOR OF PHILOSOPHY

IN GEOGRAPHY

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By

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ABSTRACT

To test the premise that the environment being created by Felda land development programs poses new hazards as well as offers new benefits to the health of the rural population, a land scheme was studied for population composition, dynamics, and health behavior including mobility and exposure to four complexes of regular relationships: the locational, biotic, constructed, and organizational. A stratified random sample of 60 households (from a population of 558) was chosen and a register of mobility and morbidity was maintained for five months on the basis of weekly recall. In addition to interviews, other sources of data were clinic, family planning, and Felda records, price surveys, field mapping, a rat trapping project for mites, and a helminth survey. The study was duplicated in briefer form in an adjacent traditional village in order to better delimit changes. A sample of Felda schemes of various types, ages, and locations was surveyed to identify the unique and more generalized aspects of the settlement studied in depth.

It was found that not only the stage reached in the development process, but also relative location with respect to accessibility, were the critical aspects of health environment. Fevers and enteric conditions particularly, and most health complaints generally, have decreased under the more sanitary and prosperous

conditions of the mature land schemes. The organization on the schemes was effective at delivering information and in implementing the family planning program. Changed interaction patterns involved little contact of the population with the jungle, swamps, streams, or similar vector habitats. Endangering alterations in the biotic complex included the creation of foci of malaria in new schemes and the extension of wasteland into the settlement area with increased potential for scrub typhus. Locationally, the remoteness of the schemes together with their prosperous conditions had induced a proliferation of motorcycles and a greatly increased hazard of vehicular accidents. Other adverse consequences of location, which were often severe in the early phases of development, included inadequate food supply, difficulty of access to medical and especially emergency facilities, stress induced by distance from relatives and friends, and more scattered and distant journeys by the population with consequent hazards of pathogen dispersal.

The major health concerns are not those of deteriorating conditions, however, but of failure to achieve potential. Poor health conditions maintained by personal hygienic behavior have shown little improvement. The agricultural potential of the settlement area for vegetables and protein production has not been developed. Educational programs have been weak, despite organizational efficacy.

The behavioral changes necessary to make the new environment habitable and to fulfill its potential are not complete. The social stress of isolation, strangeness, and economic discipline have resulted in some limited desertion from the schemes, violence, and psychological aberration. Despite the hazards of vectors, migration, locational disadvantages and behavioral stress, the health conditions on mature schemes are a genuine improvement over those that prevail in traditional rural villages. Furthermore the Felda environment as a whole is characterized by an active, dynamic adaptation of institutions and behavior which is healthy.

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENTS	iii
ABSTRACT	vi
TABLE OF CONTENTS	ix
LIST OF TABLES	xi
LIST OF FIGURES	xiii
LIST OF ILLUSTRATIONS	xv
CHAPTER I: LAND DEVELOPMENT IN MALAYSIA	1
Malaysian Development	2
The political and economic framework	
The demographic framework	
The Federal Land Development Authority	10
Felda's achievements	
Organizational goals	
Transformations of Place	22
Alterations to the Biotic Habitat	
Alterations to population and ways of life	
New health environments	
References	30
CHAPTER II: APPROACH AND METHODOLOGY	34
Conceptual Background	34
Exposure to health environments	
Complexes of health significance	
The Procedure	45
Study site	
Data and sources	
Analysis and interpretation	
References	58
CHAPTER III: SELISEK AND GEDANGSA: CHARACTERISTICS OF PLACE	59
Landscape and Livelihood	60
The Population	68
The Morbidity	73
Clinic cases	
Surveys	
References	84

Page

CHAPTER IV: SELISEK AND GEDANGSA: CONTRASTING MEDICAL GEOGRAPHIES	85
Organizational Complex	85
Groupings	
Information and contact	
Constructed Complex	93
Domestic	
Public	
Biotic Complex	103
Mosquitoes	
Mites	
Fevers	
Locational Complex	115
Economic and Service contacts	
Social contacts	
Behavior, Exposure, and Morbidity	133
References	140
CHAPTER V: THE DIVERSITY IN FELDA: COMPARATIVE LOCATION THROUGH TIME	141
Types of Schemes	143
Accessible schemes	
Remote schemes	
Highly accessible schemes	
Population Movements and Community Health	159
Transportable disease	
Social conditions	
Changes in Plan	167
CHAPTER VI: AS HEALTH ENVIRONMENTS	170
Some Comments on Approach	170
Alterations through Development	175
Auspicious alterations	
Endangering alterations	
Failure to achieve potential	
Toward Healthier Places	182
References	186
APPENDIX I: SAMPLE AND SURVEYS	187
References	196
APPENDIX II: HEALTH COMPLAINTS	197
BIBLIOGRAPHY	202

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Population by Ethnicity and Degree of Urbanization, Malaysia, 1970	6
2	Percentage of General Medical Conditions Observed in Peninsular Malaysia, 1970	11
3	Land Development by Type of Program	13
4	Felda Projects: A Statistical Summary, 1973	18
5	Population of Villages in Selisek, 1972	62
6	Inches of Rainfall in Tanjong Malim	64
7	Percentage of Households with Amenities	65
8	Outmigration, Gedangsa and Serigala Tengah	72
9	Clinic Cases, 1970-72	74
10	Concurrent Register Complaints	76
11	Helminth Survey of Pre-School Children	77
12	Clinical Examination of Pre-School Children in Sungai Selisek, 1971	79
13	Helminthiasis of Children in the Gedangsa Sample	99
14	Ectoparasites from Rats Trapped in Gedangsa	113
15	Distances to Gedangsa	116
16	Purpose of Trips	118
17	Comparative Prices of Basic Provisions	120
18	Source of Food	123
19	Origin of Visitors in Register	125
20	Destination of Trips, by Major Purposes	126
21	Exposure to Motor Vehicles	129

TablePage

22	Exposure Time for Activity Pattern	139
23	Example of a Household Summary of Individual Register Cards	189
24	Standard Error of Key Variables	194

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Total Population by Major Ethnic Groups, Peninsular Malaysia, 1970	7
2	Infant Mortality Rate, Peninsular Malaysia, 1971	9
3	Felda Development Acreage as of 1973 and Planned Development to 1975	15
4	Location of Felda Schemes	17
5	Location of Gedangsa and Its Vicinity	48
6	Location of Villages in Selisek	61
7	Population of Register Samples	70
8	Serigala Tengah Landuse	105
9	Gedangsa Landuse	106
10	Malaria in Serigala Tengah	114
11	Gedangsa Health Complaints in Register by Occupational Role	137
12	General Field Survey: Location of Schemes Studied	145
13	Net Migration by State for Felda Settlement, 1958-1973	161
14	Migration of Settlers for Jengka I Scheme and Prevalence of Chloroquine-Resistant Malaria and of Filariasis by Districts	163
15	Sample of Register Page for Weekly Interview	188

MAP ACKNOWLEDGEMENTS

Figure 4 and Figure 12 are based on an updated map of the Felda survey department. Figure 9 utilized the Felda survey plan of house lots for Gedangsa as base. Figure 6 is compiled from maps of the district malaria eradication office at Kuala Kubu Baru. Figure 5 is selectively copied from

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LIST OF ILLUSTRATIONS

<u>Plate</u>		<u>Page</u>
I	a. Air View of Gedangsa b. Illegal Provision Shop c. Phase III House d. Children Playing in Ravine Stream	81
II.	a. Indian House in Phase I, Gedangsa b. Phase IV House c. Ordinary Phase III House d. Modified Phase III House	82
III	a. Wooden Village House, Serigala Tengah b. Banana Leaf Latrine c. Standing Water Near Houses d. Atap House	83
IV.	a. Contract Laborers Residence in Felled Jungle b. Rubber Saplings and Ground Cover c. Swamp Within Settlement on New Felda Scheme d. Cement Settler House Built in Highly Accessible Scheme in Johore	152

CHAPTER I

LAND DEVELOPMENT IN MALAYSIA

Development is generally a popular concept, but variously interpreted in Southeast Asia. To some, it means increasing consumption and raising the standard of living. To others, it means increasing opportunity, expanding the range and role of choice, and realizing generally greater freedom. Seldom is development thought of in an ecological perspective. Yet, whatever else it is, development is intentional change. Development attempts to alter the ecosystem to a state more preferable to man. In recent times, this preferred state has been defined almost entirely in terms of economic variables. Public health is often a matter of concern, but with economic development it is commonly expected to improve as a matter of course. Deficiencies in basic data have discouraged efforts to incorporate explicit medical concerns at various levels of planning for socio-economic development.¹ Yet, the diseases which have followed upon urbanization, migration, dam construction and the extension of irrigation, especially in Africa, have become well known.²⁻¹⁰ The complexity of population-behavior-habitat interrelationships and the health hazards attendant upon radical ecological disruption are increasingly a cause of concern in development planning.

Land development in Malaysia involves alteration in the vegetative cover and vector distribution, in settlement pattern and population migration, in demand for marketing, health and administrative services, and in social organization and value systems. Although such scourges of ecological alteration in tropical lands as human trypanosomiasis, human schistosomiasis, and onchocerciasis, do not occur in Malaysia, there are other endemic diseases which are wide-spread in the country including malaria, filariasis, helminthiasis, scrub typhus, and nutritional deficiencies. The intensity and pattern of occurrence of such diseases, as well as of social conditions, will inevitably be affected by the development effort underway. This study is concerned with certain changes in the complex relationships among biotic, physical and cultural elements which are being brought about through land development by the Federal Land Development Authority, and with the implications for the health of the residents on present and future land schemes.

MALAYSIAN DEVELOPMENT

The Political and Economic Framework

Since independence from the British in 1957, the original federation of eleven peninsular states was extended in 1963 to include the two Bornean states of Sabah and Sarawak, and, from 1963 to 1965, Singapore (Fig. 4). A parliamentary democracy with a constitutional

monarch chosen for a year term from among the sultans of the several states, the Federation of Malaysia has been governed continuously at the national level by the Alliance Party, composed of the major Indian, Chinese, and Malay parties. Other parties have been influential or even dominant at the state level in Penang, Kelantan, Sabah, and Sarawak. Sabah and Sarawak have a greater degree of autonomy than the peninsular states and several federal undertakings, such as those of the Federal Land Development Authority, are limited to Peninsular Malaysia, formerly known as West Malaysia. The states are subdivided into districts under a district officer, and the districts are further subdivided into mukim administered by the penghulu, a state official. The official religion of Malaysia is Islam and the national language is Malay.

Malaysia is one of the most prosperous countries in Asia. Its Gross National Product has been increasing at seven or eight per cent a year in constant prices and in 1973 the per capita income was M\$ 1,360 (U.S.\$ 569).*

The mainstay of the economy continues to be rubber, which accounts for one-third of exports in value, but timber has

*During the time of this study, the exchange rate for US \$1 fluctuated between M\$2.75 and M\$2.24. To avoid spurious fluctuations in incomes and cost of living, all monetary values will be quoted in Malaysian ringgit, a stable currency.

displaced tin as second in export value, and exports of palm oil have increased to constitute two-thirds of the world supply. Overall unemployment already varies between seven and eight percent, however, and the number of people entering the labor force and seeking jobs is increasing each year.

The Demographic Framework

Malaysia is a prime example of a "plural society" which incorporates several of the major cultural traditions of the world. At the time of the census in 1970, the population of Peninsular Malaysia (8,810,348 people) was composed of 53 percent Malay, 35 percent Chinese, 11 percent Indian, and 1 percent others. But Sabah and Sarawak, formerly called East Malaysia, had a combined population of 1,629,182, whose inclusion in 1970 changed the national ethnic proportions to 47 percent Malay, 34 percent Chinese, 9 percent Indian, 4 percent Dayak, 2 percent Kadazan, and 4 percent others. The sex ratio, which until recently reflected in its great predominance of males the heavy immigration prevailing before World War II, now--at 102 males per 100 females--reflects the population's increasingly settled and indigenous status. The population is one of the most urbanized in Asia. Until recent years, the Chinese predominated in the cities, the Malays in rural areas, and the bulk of the Indian population labored on estates. This is one of the most rapidly

changing aspects of Malaysian society under the impact of industrialization and urbanization. Two quantitative definitions of urban are in current usage: for census purposes, urban is defined as all localities of 10,000 persons or more, and for certain planning purposes, as all localities of 1,000 persons or more.

The population is young, with 46.5 percent of the rural population and 40.4 percent of the urban population being under 15 years of age in 1970 (Fig. 1). Since independence in 1957, the crude death rate has been reduced from 12.4 to 6.8 per thousand, the infant mortality rate from 75.5 to 38.5 per 1000 live births, and the rate of natural increase from 34 to 28 per 1,000 population. The national goal of the family planning program established by the Family Planning Act of 1966 is to reduce the annual growth rate to 2.0 percent by 1985. Stationary and mobile family planning clinics have been established throughout the country to promote this goal. Since 1971 the program has been increasingly integrated with the rural health services. Between 1967 and 1971 there were over 277,000 acceptors of contraception, largely urban, with over 93 percent using oral contraceptives.¹¹ Rural services were emphasized under the Second Malaysia Plan, 1971-75, and 60 percent (i.e., 168,000 new acceptors) of the target had been achieved by 1973.¹²

Table 1
Population by Ethnicity and Degree
of Urbanization, Malaysia 1970

Community	Population	Percentage of Population		
		Urban areas over 10,000 persons	Rural areas under 10,000 persons	under 1,000
Malays	4,886,912	15.0	85.0	78.1
Chinese	3,555,879	46.3	53.7	32.0
Indians	942,944	34.7	65.3	55.2
Dayaks	386,260	2.2	97.8	96.3
Kadazans	184,512	3.4	96.6	93.7
Other native peoples	337,395	5.7	94.3	90.8
Others	145,628	31.2	68.8	60.2
TOTAL	10,439,530	26.7	73.3	61.4

Source: Compiled from the 1970 Population and Housing Census of Malaysia: Community Groups. The government of Malaysia uses the term "community" to refer to the ethnicity of its population.

The rural health service has been modeled on what is essentially a central place hierarchy.¹³ At the district level there is a hospital, malaria control section, and a section for public health surveillance. The main health center is the heart of a rural health unit which is intended to serve a population of 50,000. It is responsible for the distribution of supplies, services and personnel, including

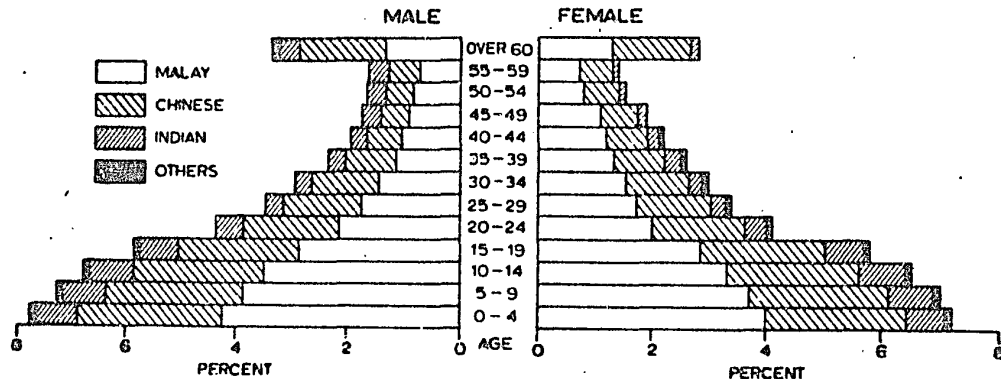


Figure 1

Total Population by Major Ethnic Groups,
Peninsular Malaysia, 1970

one physician, among its five constituent subordinate clinics, one of which is located at the main health center. These subordinate clinics are each intended to serve 10,000 people and are the primary unit of reference for the village population. Each is technically staffed by a public health nurse, a dispenser, a clerk, two assistant nurses, a midwife, a public health overseer, drivers, gardeners, and sanitary laborers. Augmented by visiting personnel from the main clinic, the sub-center staff are responsible for maintaining general clinics, maternal and child care clinics, family planning clinics, and programs of health education and home visiting. The child health responsibilities include an active immunization program for BCG (tuberculosis), smallpox, and triple antigen (diphtheria-pertussis-tetanus). The service area of each sub-clinic incorporates five midwife clinics, each intended to serve 2,000 people. One of these is located at the

sub-clinic. The population service ratios actually achieved in 1970 and projected for 1975 are 1:132,000 falling to 1:110,000 for the main centers; 1:25,300 falling to 1:22,700 for the sub-centers; and 1:5,200 falling to 1:4,300 for the midwife clinics.¹⁴ Future plans, partly in response to problems of land development, call for an approach resting on the services of a community nurse (jururawat desa) who will be broadly trained in basic health services, education and midwifery.

There are, of course, inequalities of health services within Malaysia. Many rural areas continue to be remote and most private physicians tend to congregate in the major cities. Government and private health services of the Western school are variously supplemented by such other schools of scientific and traditional practice as the Chinese, Ayurvedic, and Malay-Islamic schools of medicine. In the rural areas among the Malay population traditional bomoh and midwives continue to tend to the needs of the villagers. The relatively good health conditions prevailing and rising life expectancy are evident in the map of infant mortality, perhaps the best overall indicator of health conditions (Fig. 2). Reliable data on the health status of the rural population, however, is highly inadequate. Only 32.3 percent of deaths are certified as to cause, and these are mostly those reported from urban areas. Of the two-thirds of deaths which are uncertified, 54 percent

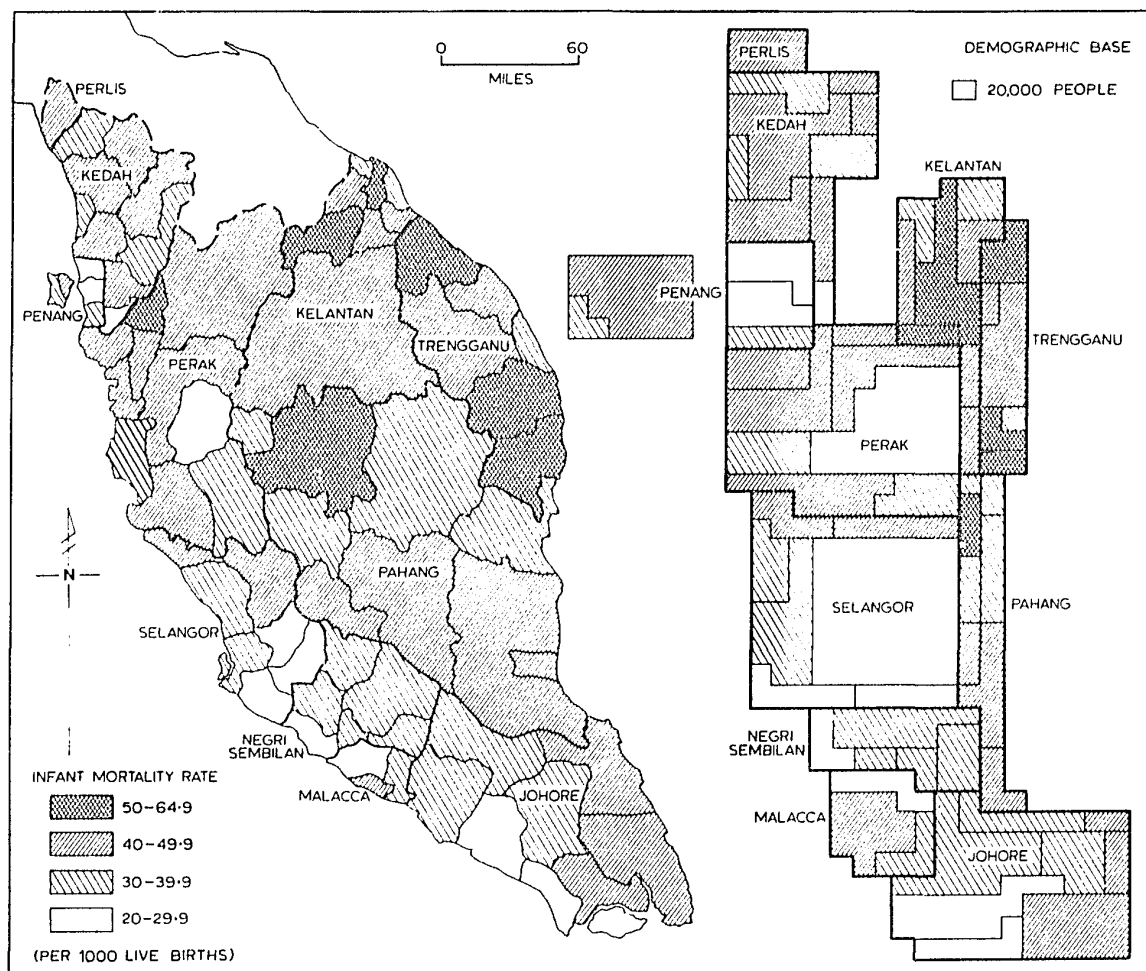


Figure 2

Infant mortality rate per thousand live births
Peninsular Malaysia, 1971, for districts on areal
and demographic bases

Source: Data from Vital Statistics.

are listed as due to "unspecified causes," 39 percent to "fever."

The Ministry of Health in 1970 carried out a sample survey of administrative districts which provides the only national data of morbidity revealed in clinic utilization. It found that at the subordinate clinic level, 53 percent of the patients were male, that over 70 percent of child visits were for immunization purposes, and that most people made few visits. A small number of people made more than ten visits in a year for respiratory, gastro-intestinal, and skin disorders. These conditions reportedly constituted the major complaints treated at the clinics.¹⁵

THE FEDERAL LAND DEVELOPMENT AUTHORITY

In 1956, before independence, there were over 200,000 applicants for land in the midst of such problems as cityward migration, unemployment and rural discontent. These problems stimulated a wide range of ad hoc, uncoordinated attempts to provide more land which included expansion of the estates, a major program of "fringe alienation" and a variety of state and federal land schemes.

The "fringe alienation" program was designed to make land available to existing small holders within a few miles of their villages. By the end of 1967 there were 401 fringe schemes, involving 25,802 families. These schemes were financially assisted by the federal government but

Table 2
Percentage of General Medical Conditions
Observed in Peninsular Malaysia, 1970

Condition	General Hospital	District Center	Main Center	Sub Center	Percent- age of condition seen at sub- center
Respiratory tract	28	23	26	22	27
Gastro enteritis	5	9	7	10	37
Mouth, eyes, ears, teeth	6	4	8	10	41
Cardiovascular	6	6	2	2	16
Abdominal organ	-	2	1	2	29
Nervous system	1	-	1	1	55
Fever	3	5	4	4	30
Malaria	1	3	2	4	46
Genito-urinary	3	4	2	1	13
Other incl. psycho- logical, endrocrinal	10	17	6	12	31
Skin	19	13	18	19	33
Anemia	1	1.3	2	1	23
Abnormal pregnancy	2	12	14	9	28
Abnormal development	-	0.2	-	1	87
Unspecified clinical sickness	13	0.5	2	1	8
No abnormality	2	1	5	1	12
Total	100.	100.	100.	100.	
Total number of cases in sample	546	608	787	820	2761

Source: Report on Operational Research Investigation of
the Ministry of Health with the Assistance of the
World Health Organization.

were administered under state authority. Suitable land within a few miles of villages, however, proved to be generally unavailable and the fringe schemes were seldom attentively cultivated. In 1966 the National Land Rehabilitation and Consolidation Authority (Felcra) was established to rehabilitate the fringe schemes that had failed due to inadequate administration and supervision and excessive political interference.¹⁶ The private estate sector similarly failed to develop the expected acreage. The Federal Land Development Authority (Felda) proved more successful. Felda had been established by federal ordinance on July 1, 1956 primarily for indirect development through loans. Initially the planning remained under the control of state governments, but with the establishment of a new Ministry of Rural Development, Felda received the power and developed the expertise to enter directly into land development. It eventually emerged as an efficient, specialized organization which today dominates, although does not monopolize, land development in Peninsular Malaysia.

Felda's Achievements

In the Second Five Year Plan (1961-65) Felda received M\$175 of M\$270 million allotted for all forms of agricultural development. During the First Malaysia Plan (1966-70), target acreage of 29,000 acres per year was exceeded and in the Second Malaysia Plan (1971-75) the

Table 3
Land Development by Type of Program Peninsular Malaysia

Program	Second Malaysia Plan				
	Acreage developed (,000 acres)		Expenditure (M\$million)	Percent of 1971-75 allocation expended by 1973	Revised 1971-75 allocation (M\$million)
	1961-65	1966-70	1971-73		
Felda	119.3	179.0	305.4	65.7	520.0
Felcra ^a	--	--	29.6	81.3	56.6
Youth Development ^b	--	5.3	13.8	18.5	76.0
Public Estate ^c	108.2	42.0	11.3	18.9	38.0
S.E.D.C. ^d	21.8	30.3	18.3	88.6	35.8
Land Development Board ^e	34.8	15.3	47.2	35.0	127.5
Fringe alienation	115.6	11.7	--	--	--
Private estate	140.1	46.0	--	--	--
TOTAL	539.8	329.6	425.6	53.4	853.9

^aNational Land Rehabilitation and Consolidation Authority-also youth schemes, established 1966.

^bState-run settlement scheme for unemployed youths financed and run entirely by state governments. Each settler is allotted five to eight acres but must repay part of the costs.

^cStates make available large blocks of land for development. Settlers repay rent charge and all capital developed.

^dState Economic Development Council, mainly Trengganu. It includes public sector estates and joint ventures. Workers are paid as laborers.

^eBlocks of land are provided by state governments in holdings adequate to support a family six to eight acres. Clearing is financed by the rubber industry replanting board and the housing by state low-cost housing schemes.

Source: The Second Malaysia Plan, 1971-75, and Midterm Review of the Second Malaysia Plan, 1973. Adapted from tables "Land Alienated and Developed for Agriculture by Type of Program" and "Public Expenditures for Agriculture Development."

annual target acreage was increased to 65,000 (275,000 acres for five years). This too has been exceeded. In 1973 Felda actually developed 103,257 acres and anticipates a five year total of 403,510 acres. Total Felda development will then amount to approximately 800,000 acres (Fig. 1).¹⁷ In addition, Felda is rapidly building palm oil mills and storage and harbor facilities, but the construction of Felda rubber factories has been restricted by the interest of the Malaysian Rubber Development Corporation in providing processing. Oil palm production is presently increasing at 57 percent annually. By the end of the Second Malaysia Plan (1975), Felda will be producing 235,000 tons of palm oil a year, or twenty percent of the projected total Malaysian palm oil output. As planted acreage comes into production, this is projected to increase to 33 percent of projected national production by 1985, or over one million tons. Similarly, by 1975 Felda will be producing 66,000 long tons of rubber, increasing at 38 percent annually. Together palm oil and rubber will earn approximately M\$171 million in foreign exchange by 1975 and an estimated M\$622 million by 1985 (estimates made before the 1974 commodities boom).¹⁸ In addition, Felda is diversifying into sugar cane and cocoa. Funds for this ambitious land development program have come in loans from the national treasury (M\$340 million), from New Planting Grants, and from the Commonwealth

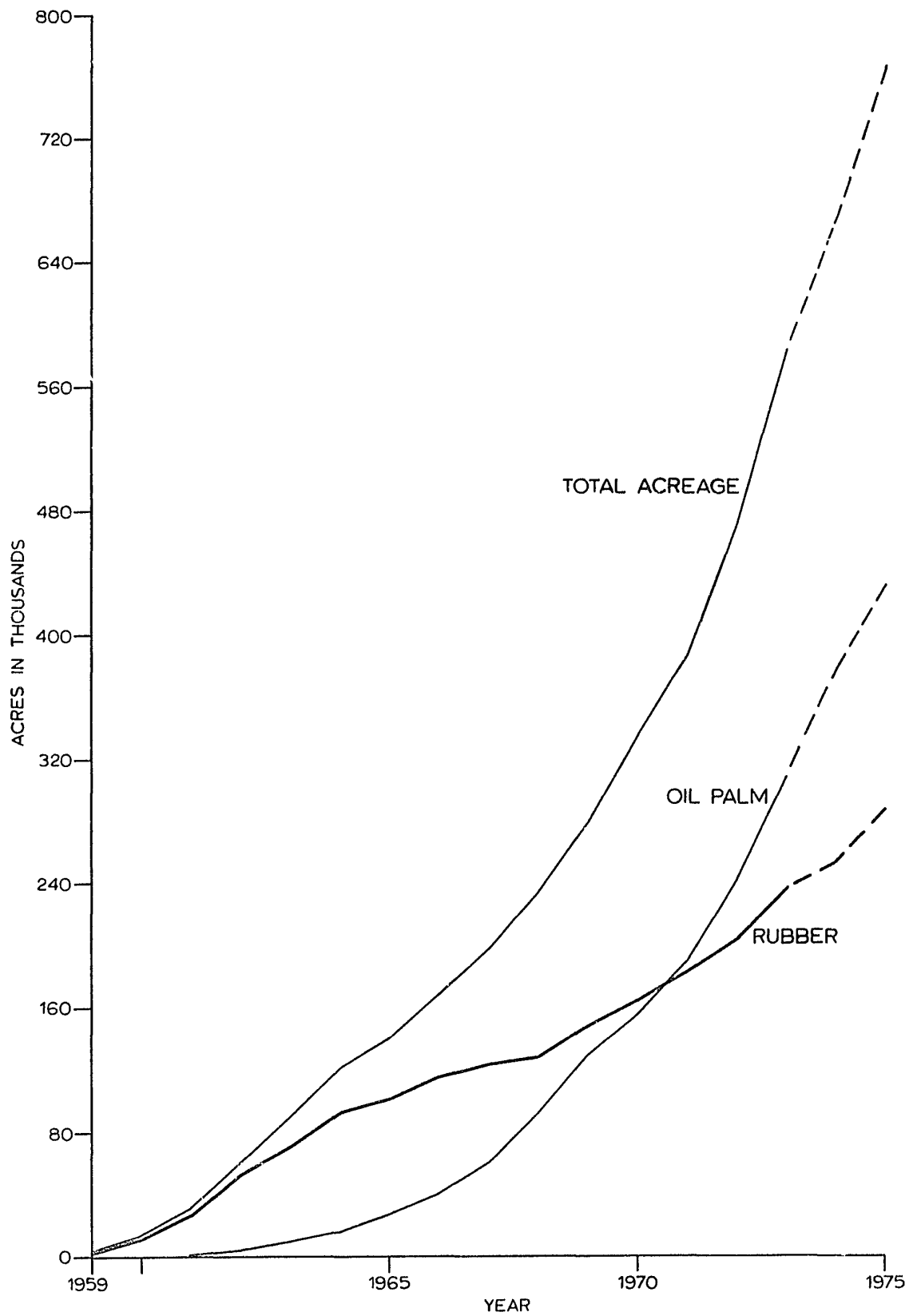


Figure 3
Felda development acreage to 1973 and
planned development to 1975

Development Corporation, the Asian Development Bank, and, especially, the World Bank.¹⁹

Organizational Goals

The central administration of Felda in Kuala Lumpur presently operates more than one hundred schemes grouped regionally under resident directors. Each scheme is under the authority of a manager supported by an assistant manager, field supervisors, a settler development assistant for women, and clerical workers who keep track of payments, loans and shop credit. Schemes are usually developed in several phases, so that on any given scheme there may be settlers already harvesting their crop, settlers still maintaining lots, and houses under construction. Until the crop is mature enough to harvest, settlers are supported by a monthly allowance of M\$69 which is added to the development loan. After a commercial income is achieved, a prorated proportion of the income is deducted monthly for debt repayment. When the cost of land and housing development, supplies and support--but not administrative services--is fully repaid, the settler will own his land, subject only to the legal stipulation that it cannot be subdivided. The exact future of the scheme administration when all the settlers own their land has not been fully deduced, but the settler association is vaguely expected by everyone to assume power.

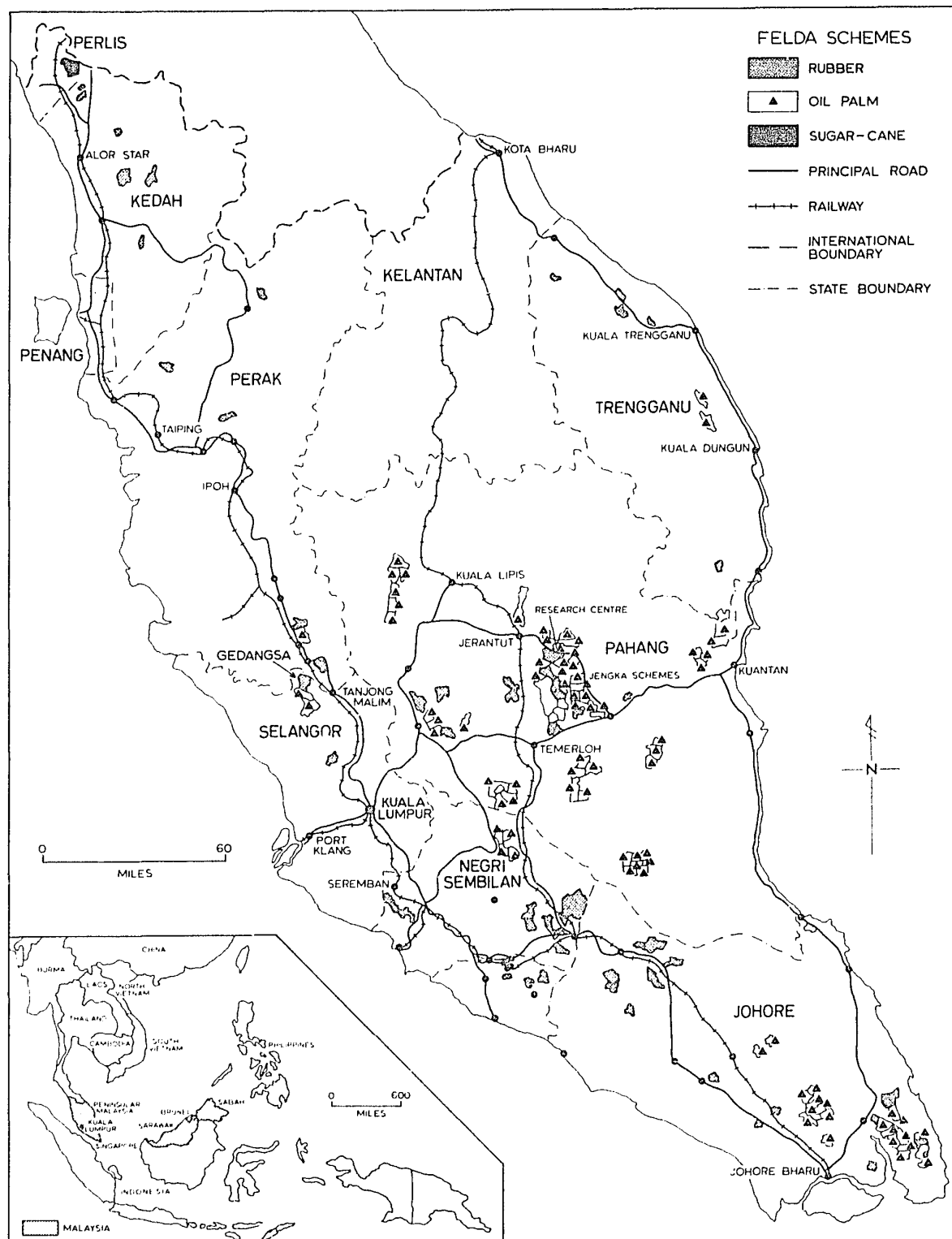


Figure 4

Location of Felda schemes showing crop type, 1973

Table 4

Felda Projects: A Statistical Summary, 1973

State	Total no. projects to 1973	Eventual perimeter acreage	Total acreage planted	No. rubber schemes	Rubber acreage	Planned Schemes					
						No. oil palm schemes	oil palm acreage	No. 1974 rubber	no. 1975 palm	rubber	palm
Johore	33	156,573	132,027	18	57,334	14	74,693	-	5	1	3
Kedah	6	18,138	13,158	6	13,158	-	-	-	-	-	-
Kelantan	-	-	-	-	-	-	-	-	-	-	-
Malacca	5	15,922	11,727	5	11,727	-	-	-	-	-	-
Negri Sembilan	15	79,569	65,668	11	47,687	4	17,981	2	-	3	-
Pahang	52	287,358	227,358	15	94,057	37	173,301	-	9	4	8
Penang	-	-	-	-	-	-	-	-	-	-	-
Perak	7	36,010	27,779	5	16,082	2	11,697	-	-	-	-
Perlis	-	-	-	-	-	-	-	-	-	-	-
Selangor	4	27,487	21,855	2	7,761	2	14,094	-	-	-	-
Trengganu	8	43,248	30,879	5	11,517	3	19,362	-	1	-	2
TOTAL	130	713,298	530,451	67	219,323	62	311,128	2	15	8	13

This table may be compared with Table 2, page 67 of R. Wikramatilke.²⁰

Source: Planning office, Federal Land Development Authority.

The term "settler," as used here, follows Felda terminology in referring only to the person who enters into the contract for land, and it does not include dependents. Thus the almost 30,000 settlers who have been resettled by Felda up to 1973 represent a total population of over 160,000 people. These numbers are below what was originally planned, partly because of difficulties in providing the necessary infrastructure but also because land allotments have been raised. Settlers on new schemes are now allotted twelve rather than ten acres of rubber, or fourteen rather than ten acres of oil palm. Selection of settlers is handled by local boards that have favored established families with many children and with an agricultural background. The original point system for evaluating such factors, however, was much compromised by local political exigencies, and procedures have been somewhat rationalized by federal influences. The original age limits of 21 to 50 have been lowered, for example, to 18 to 35, except for ex-servicemen who continue to receive special dispensation.

In addition to changes in the age of settlers, the size of allotments, the size of schemes, and the proportion of schemes for oil palm or rubber, shifts have occurred over the last ten years in the siting of schemes. The early emphasis upon small, accessible schemes distributed among all the states has been replaced by a federal, large-scale approach in the undeveloped areas of the east coast,

especially the state of Pahang.²¹ The corollary is that, whereas on early schemes the settlers came generally from the vicinity and almost entirely from the state in which the scheme was located, on new schemes settlers are re-settled from throughout Peninsular Malaysia.

Land development for agriculture within the Malaysian context entails identifying forest land without primary mining potential, logging its commercial timber, and clear-felling the remaining forest. Settlements must be constructed which include houses, schools, clinics, access roads, and water systems. Either rubber or oil palm seedlings previously developed in a nursery are then planted and settlers must be supported during three to five years of crop maintenance, weeding and fertilizing before any yield can be harvested. Support of this development requires elaborate systems of management, agricultural and administrative training of personnel, extension measures and plant research, and credit and marketing, including port construction and the establishment of oil palm and rubber processing plants. In achieving this efficiency, Felda moved from a primary concern for social change to one for economic production. As Ness puts it:²²

The original dream, Fiennes' dream, of using the FLDA to bring forth good Malayan Calvinists to open the land and to increase the wealth of the state has partly miscarried. The demand for land, the vulnerability of government to that demand, the capacity of specialized organization and the slowness of others, together with the distinctive view of Malayan leaders of the causes of poverty, all led the FLDA in the direction of a major goal change.

The original commitment to a mixture of cultural and output goals gradually gave way to an almost exclusive commitment to output goals. FLDA emerged in 1959 concerned largely with opening new land and getting settlers on that land. The major obstacle to the full achievement of its output goals lay in state prerogatives and the authority's political impotence in the face of the rest of the slow-moving bureaucracy.

Felda is trying to maximize production from the land and to improve the rural sector by promoting higher standards of living. Its aim is to settle "as many families as possible on land development and settlement schemes provided with all major essential services, and to produce at the end of the development period, normally of six years, prosperous farming communities with economically viable farms."²³

Felda has gained experience over the years in avoiding social problems and in administering viable communities. Many early settlers had been politically led to expect that the subsistence pay was a right, and were angered at the requirement of minimum work and standards. Others were in poor health or were too old to labor intensively. While controversy continues over the degree to which settlers should be regimented, disciplined, or induced to accept new social values, greater federal control over settler selection and greater public awareness of Felda requirements has overcome many of the earlier problems.^{24, 25} Felda has established a division for settler development, and the need for settler political organization, for social programs for home economics, and for youth activities,

has been recognized. Economically, Felda has shown considerable success. However debatable its social success, its tremendous impact on the settlement and land use in Malaysia is highly visible and indisputable.

TRANSFORMATION OF PLACE

Under the impact of Felda, roads that once wound through the rain forest of interior hills now run for miles through territory planted in rubber and oil palm. Settlements of more than three thousand people, together with schools, clinics, water plants, and roads, occupy areas previously populated by small populations of shifting cultivators. The migration paths of tens of thousands of people have been redirected. The biotic impact is less apparent because, once the cover crop has clothed the devastated earth, the jungle is purposefully forgotten.

Alterations of the Biotic Habitat

The growing of tree crops on hills formerly covered with jungle continues such functions as the recycling of nutrients, transpiration, soil-retention, and rain absorption, and represents sound agricultural use of hilly tropical soils. The effect, however, is to simplify greatly the local ecosystem. A monoculture of trees, a planted ground cover, and an invasive, coarse grass lalang (Imperator cylindricus) replace the multifarious species of trees and saprophytes. The rich fauna, including tigers, monkeys and hornbills, as well as innumerable

species of insects, is almost entirely eliminated. During the period between the clear-felling and burning of the forest and the establishment of the ground cover, the land is laid open to erosion and the rivers may be afflicted with silting and flooding. Such drastic alteration of the biotic environment inevitably changes vector ecology and has profound influence on the natural foci of such diseases as malaria and scrub typhus.

The Malaysian forest supports hundreds of species of mosquitos, only a few of which bite man. Furthermore, so numerous and complex are mosquito breeding niches that no single species attains great numbers.²⁶ In contrast, botanically simpler formations, such as plantations, present breeding places for only a few species which consequently breed in large numbers. Where the soil is greatly disturbed, as in the felling of the forest, and hill streams are exposed to the sun, Anopheles maculatus breeds prolifically and becomes a major vector of malaria. Because the peak of malarial incidence in May follows the peak of population of A. maculatus in March-April, epidemic malaria has been described as waves of maculatus.²⁷ When the planted trees mature and the streams are again overgrown and shaded, A. maculatus is usually succeeded by A. karwari or A. aitkeni, both non-vectors. The history of the development of the rubber industry in Malaysia is thus a classic of man-made malaria. The establishment of each estate that was pushed into the jungle felled trees and

exposed streams to sunlight, and consequently malaria ravaged the estate laborers. Gradually, as more became known of techniques of sub-soil drainage and stream channeling, water oiling, retention of vegetation cover, and the treatment of the sick, and as the rubber trees themselves matured, the toll was reduced. Now, as the jungle is once more being felled, malaria is again threatening local populations, but present practices of malaria control place reliance on such expedients as the economical residual spraying of houses accompanied by the prophylaxis of those people who become infected.

A second focus of transmitted disease which can be created or adversely altered by forest clearing and land development is one for scrub typhus. Three mites are known to be involved in its transmittal in Malaysia, but the two most important are Leptotrombidium akamushi and Leptotrombidium deliense. The principal rat species of host concern are Rattus rattus diardi, the domestic house rat, R. r. jalorensis, a semi-domestic rat of secondary forest, scrub, oil palm and rubber land, and R. r. argentiventer, a semi-domestic rat of rice fields and grasslands (lalang). R. r. jalorensis is the preferred host of the mite L. deliense, and R. r. argentiventer of L. akamushi. There are also many species of non-vector mites associated with commensal rats occur in enormously greater numbers.

The upsurge in scrub typhus at the end of World War II in Malaysia was widely ascribed at the time to the increase in land abandoned to scrub.²⁸ It is now believed that scrub typhus occurs widely and commonly throughout Malaysia, including areas of deep forest.²⁹ Some of the post-war upsurge must have been due to improved diagnoses by alerted British army medical personnel, for it is seldom diagnosed now, although antibodies among the population are high.³⁰ Much of the typhus upsurge, however, was also due to the contact of the population with mites in the increased areas of lalang grass, where the possibility for physical contact was greater. Another factor may have been the migration of rats with their mites induced by the burning of the scrub grasslands. This is still a common practice for snake control, although the long term effect is to preserve the hardy lalang grassland.³¹ Mites infected with the rickettsia of scrub typhus are known to remain so for generations, while uninfected mites are not known to acquire the infection by biting even from high levels of infected blood; hence, the physical movement of mites to new burrows and niches would seem to be necessary for the spread of the pathogen and would account for the peculiar isolated "island" form of its occurrence. Oil palm areas especially encourage large numbers of rats. Ooi Jin Bee once warned, "where scrub typhus is concerned, the results of man's intrusion into the endemic zones are less predictable and more hazardous. A programme of rural

development which envisages the extension of agriculture into new land, and the entry of a non-immune population into this land, cannot be successfully carried through without a heavy toll unless great efforts are made to reduce, if not to eliminate, the risks of infection."³²

Alterations to Population and Ways of Life

The several thousand people who live on a Felda scheme come mostly from villages of a few hundred, but they may originate anywhere in the country. Although these people are almost entirely Malays, they may speak different dialects and have different customs and prejudices. The new settlements, moreover, are usually far from original villages and relatives, and are often isolated from towns or markets. Family incomes may be tripled over levels prevailing in source villages, but for this, settlers must accept new work disciplines and learn to cooperate in new forms of social organization. Thus, added to the alterations in the biotic habitat discussed above, there are also alterations in settlement conditions. For example, probably for the first time settlers have access to chlorinated water and to latrines. Not only the epidemiological consequences of such changes, but also the role of population migration and mobility itself in spreading and maintaining such diseases as malaria, has been little considered. In past times when estates were developing new land, it was noted that "...there is a constant coming

and going of laborers and their dependents, especially on plantations that one regards as unhealthy. The floating population naturally forms a most efficient mechanism for the distribution of malaria parasites, and it provides excellent fuel for outbreaks of the disease."³³ More recently, a longitudinal entomological study has been carried out on the Kampong Sertik land scheme. Since 1967 five blood surveys have been completed which have recorded two to three percent of the settlers as being positive for malaria despite an anopheline index considered too low for transmission. In the report of these surveys, it is suggested that the fluctuations of the settler population--new arrivals, replacements, and people visiting in villages endemic for malaria--account for the low persistence despite the absence of transmission.³⁴ Higher rates involving transmission have been recorded, however, on Felda schemes such as Ulu Tebrau in Johore, where 24.3 percent of the settlers were infected with P. falciparum.³⁵ Another aspect of the importance of population movement is illustrated by the fact that 43 percent of these P. falciparum cases were resistant to treatment with chloroquine. There is obvious potential for transporting these resistant strains to new areas, and it is noteworthy that the study in Kampong Sertik found two cases of resistant malaria, which were the first known to occur in central Pahang. These infections "almost certainly were

contracted in Perlis before travel to Pahang."³⁶ Nor is malaria the only disease the patterns of which may be affected by population migration. Some areas of the country remain endemic for filariasis, for example, which tends to vary in occurrence locally from village to village. On new land schemes, marshy pools and swamp grasses near the forest edge provide breeding places for the Mansonia uniformis and annulata vectors of Brugia melayi,³⁷ while the urban form of filariasis, Wuchereria bancrofti, is potentially transmittable by Culex fatigans breeding in the stagnant, polluted waters of drainage channels and latrines.³⁸ Natural nidi conditions are thus common in Felda settlement areas, needing only the introduction of the pathogen for establishment of a new focus of filariasis.

New Health Environments

The land development effort of Malaysia thus not only has significance for economic phenomena of national production and rural standards of living, but it also has wide implications for health. People living on the land schemes are experiencing new forms of social organization, new conditions of sanitation and supply, new associations of vectors and pathogens, and new economic stresses and opportunities. New levels of interaction and mobility may also be important epidemiologically. Some of these changes may be beneficial, others harmful, while most are probably of only passing or minor significance for health.

Collectively, however, the alterations being brought about by land development are resulting in new places which need to be evaluated as human environments so that places developed in the future can be made healthier.

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CHAPTER II

APPROACH AND METHODOLOGY

The objective of this study is to consider the Felda schemes as health environments, as places where young couples will experience most of their lives, and to examine the idea that the environment being created on these schemes by land development poses new hazards as well as offers new benefits to the health of the rural people. The sweeping and swift change in the biotic habitat, in the population characteristics, social organization, and ways of life, have created places which are, in effect, ecological experiments supported by extensive economic planning and agricultural research. By examining certain critical aspects of the population's interaction with its new environment and indicators of the state of health which result, it is believed that patterns can be identified which are variously supportive or endangering of health. Such a perspective on the effects of land development is essential in accentuating the positive, restructuring the negative, and creating healthier places in the future.

CONCEPTUAL BACKGROUND

When health is considered as a dynamic quality of adaptability, a study must necessarily be holistic in approach and be concerned with the interactions of a whole system, including physical, biological, and cultural attributes in their historic development. A community

ecology, furthermore, includes not only the physical world, but the culturally-constructed surrogate world of conceptualization with which people also interact.

Health: Audy has defined health as a "continuing property potentially measurable by the individual's ability to rally from insults whether chemical, physical, infectious, psychological, or social."¹ He further notes that rallying to a challenge is an educational process, and that after successfully rallying to a challenge by measles, for example, the individual is better able to rally to future challenges--his health has been increased.² The insults may be so severe that the stress overwhelms the capacity for adaptation, lowers health, and results in permanent impairment, or death; but, paradoxically, stress is essential for strengthening health. Community health may also be considered in terms of adaptability compounded of the health of its individual members and of social processes which transcend them. A collective challenge, such as a flood or invasion, may be excessive and destructive, or it may stimulate the development of organizational structures, leadership and morale which better fit the community to cope with other collective problems. Similarly, the introduction of a new biotic element into a local ecosystem may overwhelm it and degrade it or, as in the case of African grasses in Asia which increased adaptability to variation in rainfall, it may

increase fitness. Fitness, as health, is not to be adapted, but rather to be adaptable to the demands of changing relationships.

Health, and therefore disease, cannot be considered in terms of specific etiology because its state results from the interactions of a whole system. The tubercle bacillus, for example, is obviously necessary for tuberculosis; but, the disease and its course is also the result of the individual's genetic or acquired immunological status, his nutritional status and other ill-defined physical factors, and his housing conditions with their setting of socio-economic situation and local climate, his human relationships and behavior in contacting other people, his conceptions and attitudes regarding sickness and compliance with authority, and the diagnostic and treatment facilities available to him.

A place is a system, one which includes the human population with its behavior and concepts. It may be delimited at various scales of generality and inclusiveness. The connections with other levels of the geographic system and between places on the same level may be measured in terms of population migration, marketing, communication messages, and other flows of information and energy. Within a place various states of health are possible, and in planning an attempt is made to induce a more favorable state through internal re-arrangement, or through alteration of the connections with other places.

Medical Geography: Medical Geography is the study of the health of places, and of the interactions among their parts which result in the state of health. Geographers may thus be concerned with the factor complexes that maintain the circulation of a disease, with the quality and accessibility of treatment for the sick, with the etiology of specific diseases, with the diffusion of health practices within a place, or with many other specific and specialized delimitations of parts and processes which contribute to understanding the complexity of the system. Since it is about places, however, and not about individual human organisms (medicine) or specific diseases in a population (epidemiology), it must constantly aspire to the level of holistic integration of places--to a human ecology.

Attempts are made to promote a preferred status of health through increasing health care services, through vaccination programs to alter the immunological status of the population, and through such changes as rehousing and economic development. Attempts to change behavior are made through health education and regulations about such matters as food handling or limits on the size of crowds. The broad-gauge impact of such interferences makes them powerful, but it also circumscribes their use because, as the alterations reverberate through the system, they have unpredictable effects. Significantly, any planning (including the failure to plan) inevitably limits future options: once hospitals are located, they

do not adapt to population shifts; doctors trained in one specialty may not readily become expert in another; food preferences, once established, have proved exasperatingly abiding. For development planning it is necessary to include health considerations, and for health planning it is necessary to achieve a better understanding of the parts and interactions of the place to be developed.

Exposure to Health Environments

Complex systems considered holistically present difficulties for human comprehension, and efforts must inevitably be made to simplify through selection for relevancy, and often through reduction of scale to a simpler system. For example, a pond may be bounded and studied as an ecosystem, whereas the parts of the hydrological sphere cannot yet even be enumerated. Similarly, a village is a more comprehensible place than is a nation. The essential and enduring problem is one of reducing the whole without compromising its integrity, the whole being more than an assemblage of parts because of the added dimension of interaction.

Even at the village level, people do not interact with a place as a whole but rather with an infinite series of micro-environments. Density taken as numbers of contacts and interactions, for example, changes minute by minute as people come and go at home, or take a bus to the market. Temperature and humidity, noise and

psychological stress, similarly differ at various sites. The concept of relative hazardness of site is best developed in studies of arthropod-borne disease. The primary interest of such studies is with the associations necessary for disease to occur. The intricacies of the confluence of the many factors necessary for disease--such as human population densities and susceptibilities, vectors, pathogens, temperature and humidity and other breeding conditions--attracted attention to those specific places where the confluence was most often achieved: the particular associations of riverine brush, abundant livestock, black flies, and the filaria of Onchocerca which promote onchocerciasis, for example.

The existence of such associations has led to the development of "landscape epidemiology" based on the ideas of Pavlovsky, particularly the concept of a "natural nidus" of vector-borne disease.³ While the role of man in influencing the dynamic contraction and expansion of such foci has not been excluded in later work,⁴ such nidi are generally admitted to exist regardless of man, and to effect his health when he enters into them. May, for instance, recognized that the occurrence of the associations necessary for various two, three, or four-factor diseases constitutes a "silent zone of disease."⁵ which existed in the absence of man but which might become manifest when he entered into it.⁵

Complexes of Health Significance

Such concepts as those above need not be limited to or regarded as a-cultural phenomena. Many of the nidi of disease, even in the most remote "silent zones," were promoted by man in his capacity as an agent of organism dispersal and habitat disturbance. The relative hazardness of their sites to man are inseparable from his protective clothing and other cultural practices, and from the nature and frequency of his interactions with them--his behavior. Various micro-environments can be considered whose associations, not only of pathogens but of cultural practices and characteristics, present challenges in varying degrees of hazardness to the health of people exposed to them. Armstrong has noted:

Given that human health is conditioned in many ways by the environment and by man's behavior, it is of interest in medical geography to try to identify specific environments according to their effects on health and to measure population exposure to them. While sources and intensities of certain environmental hazards, such as radioactivity and air pollutants, have been studied, the questions of community exposure to health risks associated with certain environments remain to be seriously investigated.⁶

In conception, this study attempted to approach culturally-maintained diseases from a nidus perspective. Helminthic infections, for example, are maintained by cultural practices of sanitation, cooking, water use, and behavior such as crawling and dirt-eating. Respiratory and other contagious diseases are maintained by patterns of behavioral contact between people. Degenerative

diseases and even accidents, especially vehicular ones, are also products of cultural behavior creating and maintaining the appropriate micro-environment.

In attempting to construct such cultural nidi, it soon became obvious that they were community-wide. Their factor associations were horizontal, formed and expressed at the scheme level of place. It was attempted to identify the factors associated with certain "marker" diseases involving the major types of disease causation, transmission, and control: tuberculosis, helminthiasis, malaria, malnutrition, divorce, and contraception (for health information). Around these type associations, complexes of factors were defined which involved the whole community, horizontally rather than in the vertical, site nature of micro-environments as usually considered. As the complexes evolved, it became obvious that the "public complex" conceived for contagious diseases was an unrealistic fabrication, for the relevant interactions were not only those of "crowds" but also of familiar and social interactions in homes. In the end, the Felde schemes were considered in terms of four complexes of associated factors--the organizational, constructed, biotic, and locational complexes--and the state of health which is promoted by the interactions within them.

The Organizational Complex: Any place is organized culturally in ways that gather, distribute, and channel information and feedback within it and connect it to other places. There are administrative structures and social organizations, for example, and formal and informal roles which may be filled by people belonging to that place or, alternatively people from a higher order of the system who possess information and organization not produced within the place. Groups of people are selected and brought into contact in different ways. There are various people who preserve and present the accumulated experience of the society, such as the religious leaders and traditional midwives, as well as people who have direct knowledge of special kinds from their own individual and signal experience. Within a framework of group dynamics, new and old ideas circulate, are interpreted in terms of collective experience, and find expression in behavior which alters (1) the form, structure and substance of the groups themselves, and (2) the interactions with various factors also associated with other health complexes. Through the circulation and modification of beliefs, goals and ideas this complex is integral to the formulation of health-related behavior expressed throughout the system.

The Constructed Complex: A place is in large part continually modified by the behavior (culture) of its

people. Certain parts, moreover, are entirely constructed by people. Since people spend most of their lives interacting with those parts which they have constructed, these associations constitute a significant complex for health. They include both associations which may be considered to lie within a private context, especially those of the home, and also those within a public context, such as those of schools and markets, roads, water supply and sanitation structures. The duration of interactions and their intensity or form are directly related to behavior, which differs by age, sex, and other demographic characteristics. Contagious disease agents and semi-domesticated pathogens, such as helminths, are also important parts of the complex.

The Biotic Complex: People share a place with various other forms of life which are characterized by especially dynamic interrelationships and dependencies. In the biotic complex, these may be strongly associated with houses, cropland, or forest. Indeed, jungle, rubber forest, settlement gardens and fields, and household lifeforms have often been considered as micro-habitats. Their extent, form, and very existence, however, are constantly being altered through interaction with human behavior. The presence of suitable breeding conditions and effective vectors, the presence of a disease agent such as a malaria protozoa, the susceptibility of any potential hosts and

the behavior which exposes them, are all parts of the complex which results in a particular state of human health. These are not, moreover, isolated in any micro-environment, but extend throughout the system. Mosquitoes may fly from the forest to bite in the houses, and perhaps to breed in the latrines; people may acquire a blood protozoa at one site and infect a mosquito at another; household insects may be as involved in disease transmission as forest insects. This complex, therefore, includes all biotic elements, wherever occurring.

The Locational Complex: The situation of a place with regard to other places and the arrangement of space within it greatly affect both the substance and frequency of contacts with higher levels. This, in turn, affects the functioning and resultant state of the parts within it. The state of health is affected by the supplies of services, materials and information which arrive and by their distribution. Medical care, food supply, income, and communicable pathogens are parts of the locational complex. These relationships, moreover, are not static, but rather are constantly being affected by human behavior which may establish transportation connections affecting mobility, for example, or alter habits of diet.

These four complexes are not definitive. No finite number of such associations could be, for other groupings are always possible. Some, such as agricultural productivity

complexes or political complexes which establish policies and goals, have especially obvious, albeit indirect, effects on health. The interactions within the four complexes mentioned, however, are basic.

THE PROCEDURES

To consider the implications for health in the establishment of Felda land development schemes, one must search for generality in patterns of interaction among a wide range of schemes varying in age, crop type, and location, and must further seek to learn what relationships have been changed. These cultural and physical alterations must be delimited, the characteristics of the people involved defined, and critical aspects of such behavior described in terms of particular patterns of interaction. This study proceeded in three stages: in-depth study, comparison, and generalization. One scheme was studied in depth over a period of six months. The problem of assessing the extent to which patterns had been changed by Felda from those in more traditional villages was approached by duplicating the study simultaneously for a one-month period in an adjacent village. In the third stage, the extent to which the patterns found could be said to be typical of Felda schemes in general rather than a unique expression, was assessed by visiting and interviewing on other schemes representative of the full range of age, type, and location. In analysis, it was found that a

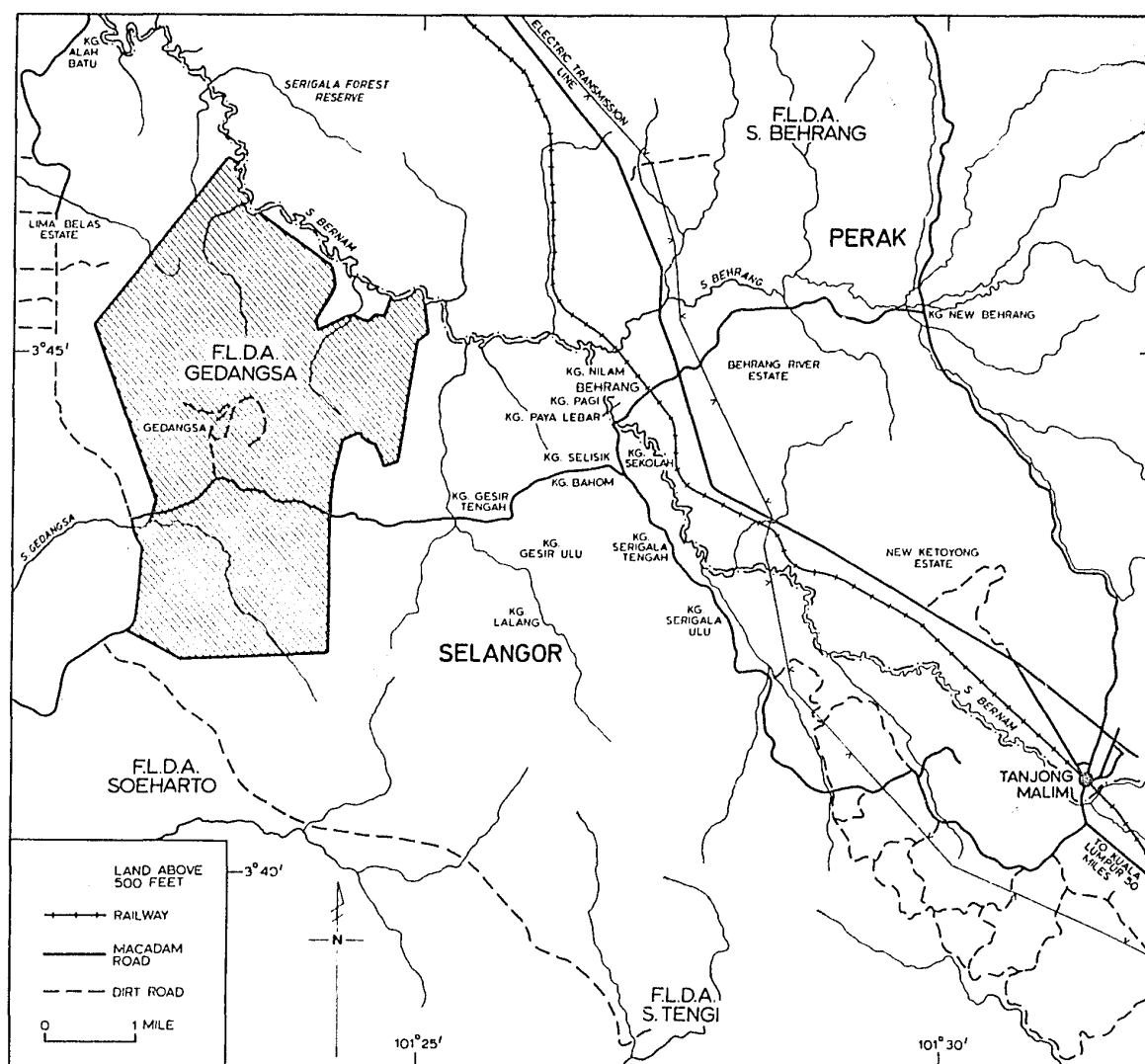
further stage of middle-level integration was necessary and fruitful.

Study Site

In choosing a scheme for detailed study, the chief criteria were (1) that it be established long enough for elementary school children to have been born on the scheme, (2) that there be several phases on the scheme whose establishment at different times might present internal variation in stages of development, (3) that, as a partial control of qualitative differences in population (such as would result from the importation of an alien population differing in culture or skills) the population be drawn from the area in which the scheme is located, and (4) that the scheme be within feasible distance from the research facilities and offices in Kuala Lumpur for maintaining at least monthly contact and access to information. Since the rural scene in Malaysia is quite diversified--with rice-growing villages, rubber-tapping villages, villages combining rice and rubber, and fishing villages each promoting distinctive ways of life--it seemed desirable to compare a Felda scheme with a traditional village which was based on the same form of livelihood as the rural villages from which the Felda settlers were drawn.⁷ It was further desired that as much information as possible should be available about broader aspects of the village and area, and that the

conditions of the scheme should not be exceptionally severe.

These criteria were met in land scheme Gedangsa, located sixty-five miles north of Kuala Lumpur near the northern border of the state of Selangor (Fig. 5). The scheme is over ten years old and is comprised of four phases, the newest of which has not yet reached commercial production. The population is drawn almost entirely from the surrounding Selangor-Perak border area. A number of the Gedangsa settlers come from the village of Selisek, five miles distant, which was the unique site of a two-year study by the Rural Health Division of the Institute for Medical Research. This study gathered economic data, took extensive anthropometric measurements, and included nutritional and helminthic studies and thorough clinical examinations. At the time Selisek was chosen for the present study, it was understood that a detailed entomological survey had also been made, but this was later discovered to be incorrect. One special advantage of the area as a study site is that it also contains two oil palm schemes, one well-established and thriving, and the other new and still rudimentary. Familiarity with these schemes served as a perspective in developing knowledge about Gedangsa. A second and more important advantage was the presence on the scheme of a German volunteer nurse. Felda schemes do not usually have the services of a nurse, and settlers must



LOCATION OF GEDANGSA AND SELISEK

Figure 5

Location of the Felda scheme selected for intensive study, Gedangsa, and its vicinity including Tanjong Malim and the villages of Selisek

utilize the health sub-center whose records do not distinguish them from other villagers in the area. Because of the presence of the nurse at Gedangsa, however, separate health records were available for the settlers.

Data and Sources

Register: The basic source of data was a register of morbidity maintained by the writer and an assistant on the basis of weekly recall among a sample of 59 households out of 558 on Gedangsa (Appendix I). Households were visited on the same day of each week and residents were asked to recall events since the previous visit. All interviews were in the Malay language. Householders were asked three basic questions:

- (1) Was anyone living here sick this week?*

If the reply was affirmative, the name of the person, the illness, its duration, and the treatment were obtained.

- (2) Did anyone here travel outside the village this week?

If the reply was affirmative, the name of the person together with any accompanying household member, their

*Colson notes that the Malay word for sick, sakit, can be defined in four senses: as sickness in a general sense, as a sickness, as a symptom, and as a pain or discomfort. The latter sense includes even temporary discomforts, such as muscle fatigue or hunger pain. Use of the term in the interview, therefore, helped achieve a broad coverage by being inclusive of such things as malaria, loss of appetite, bicycle falls, ingrown toenails, and wasp stings.⁸

destination, means of travel, duration of journey, and purpose of journey were obtained.

(3) Did you have any visitors this week?

If the reply was affirmative, the visitor's age, sex, place of origin, relationship, and duration of the visit were obtained.

This register was maintained for nineteen weeks in Gedangsa and four in Selisek. A census of the sample population for linkage data on age, sex, employment, number and kind of vehicles, domestic animals, rooms in house, and size of garden, was carried out by the writer previous to initiating the register. These provided information on crowding, potential food sources, mobility opportunities, sources of income, and other social variables. In addition, other questions concerned with source of food, use of mosquito nets, and daily schedules were referred to the sample households

Morbidity: The major sources of morbidity data were the records at the Selisek sub-center clinic and the clinic in Gedangsa. The basic data at Selisek clinic consists of daily listings of all patients, their age and sex, with their presenting symptoms and the treatment rendered. Over the period of one year, these patients amount to several thousands. Diagnoses are made by a senior nurse (termed health assistant). There is laboratory verification only for diagnoses of malaria and tuberculosis, but

the diagnostic error is unlikely to be biased by the village of origin or other characteristics of the patients. The diagnoses, however, are crude, and therefore only broad categories, such as upper respiratory infection, enteric infection, and skin infections, were used in analysis. The comparability of diagnoses made by the nurses in Gedangsa and Selisek was favored by the fact that most diagnoses were actually only summaries of symptoms for treatment. Patients were listed, for example, as having diarrhea, cough, or general weakness, without any attempt to identify the cause of these maladies. The one common unsupported identification was treatment for worms.

A serious drawback of the clinic records at Selisek, however, is that only new patients are identified by village of origin, while the clients included people from twelve villages, three Felda schemes, the town of Behrang across the Bernam River, and occasional visitors. To circumvent this limitation, which rendered it impossible to establish rates for a particular community, a one in ten sample was systematically drawn of all clinic files. These identified the address, age and sex of all patients and contained records throughout the life of the attendant. The last three years, during which diagnoses were by the same nurse, were accumulated and utilized for the study. In addition to identifying village of origin, these records had the advantage of being accumulated over time

so that the effect of random and epidemic fluctuations of disease which without a time perspective might result in distortions, was minimized. A similar set of records was established in Gedangsa in the form of one-year records of all settler attendances at the clinic and longitudinal 3-year records of those in the household sample.

One problem faced in the interpretation of clinic records is that of differential use of medical services. Firstly, if people who choose to go directly (without clinic recommendation) to the major provincial hospital or to a private doctor, the information is not recorded in the clinic records. In addition, beliefs regarding disease etiology and appropriate treatment, distance from the clinic, and availability of transport, vary from village to village and among socio-economic groups. The population of the clinic records must be defined as those who have the desire and the means to attend the clinic. The actual effect of distance alone on utilization of the Selisek clinic is apparent when the distances of the villages are plotted against the estimated case rates per hundred. The coefficient of correlation was $r = -.58$. This difficulty in interpreting clinic records was partially circumvented by the use of the register questions on morbidity and treatment, which made it possible to ascertain the comparability of clinic utilization.

Demography: There are four sources of demographic data regarding the scheme and the village. The national census of 1970 was newly published and age-sex data were made available for the vicinity of Selisek and Gedangsa. These data, while complete in coverage, were already obsolete by 1972-73. Selisek is an area of high rates of out-migration, births and deaths, and Gedangsa had acquired a new phase of settlement since the census. A second source of population data for Gedangsa is the settler registration cards which contain considerable detail. These, however, are accurate only for the time of settlers' arrival. Their subsequent updating with births and deaths is incomplete and they do not record that children have left the scheme for work or schooling, or that old parents have arrived to stay. A second data source for Selisek was the census taken by the Rural Health Division of the Institute for Medical Research. This was the source used in this study to establish village-level population for rate computation, but it too was two years old and somewhat unreliable because of vague definitions. Reference can also be made to the public health overseer's annual count of population, housing, water sources, and sanitation, but on the whole, the undercount of this data was too large for utility. Data on births and deaths are available for only the Selisek sub-district as a whole, which includes three Felda schemes as well as the twelve

villages. The only data available specific for place are births recorded by the midwife at Gedangsa and deaths recorded there at the police station. For data which are up-to-date and reliable, the single source is therefore the register of mobility and morbidity maintained during the study. The initial censuses which preceded the registers listed by name, age, sex, occupation, educational level, and location, all those de facto living in the house and all children born to the householders, even if living elsewhere. This record was kept up-to-date during the study period, with absences and arrivals being recorded under the mobility section.

Other Surveys: Additional surveys of various kinds were carried out. To ascertain the level of helminthic infection and the status of transmission within Gedangsa, a survey of infection among children in the sample was conducted using thiomersal-iodine-formaldehyde (TIF) technique (Appendix I). This was designed to be comparable to the helminth survey of children in Selisek previously conducted by the Rural Health Division of the Institute for Medical Research in 1971. In another survey, rats were trapped to establish a population index of the vector mites of scrub typhus. Food prices in area shops were surveyed to ascertain the relative costs of living in different places. In addition, social and political activities on the scheme were observed as a participant

in them, although contact with Selisek was more restricted in this regard. The Felda staff, the midwife, and especially the nurses were most generous with their information and advice. Ten families were developed as case studies to help describe behavioral patterns. One of these included a traditional midwife, and another a bomoh folk practitioner. Police records, absentee records, and divorce records were also examined as measures of social and psychological stress.

The last stage of generalization required extensive visiting of Felda schemes. After visits to schemes in Pahang, interview forms were developed for the manager, settler development officer, midwife, and the nurse on or nearest to the scheme. All the occupied Felda schemes were then classified by region (West Coast, East Coast, South) and by age and crop, and eighteen schemes were chosen to be representative of the wide range of Felda schemes. At each of the selected schemes the staff were interviewed, food prices and the distances to market and major roads noted, and general land use conditions surveyed. In a separate operation, the central registration records for schemes in the state of Pahang kept at the Felda head office in Kuala Lumpur were coded for district of origin, scheme destination, and age and sex of all family members. These migration data were mapped in terms of the occurrence, endemicity or absence of

filariasis and chloroquine-resistant malaria within the districts of Peninsular Malaysia.

Analysis and Interpretation

Although all the sources of data have evident weakness, they were to a large extent interlocking and mutually correcting. The short-term, detailed and personalized register data, for example, can suggest rates of reporting for the clinic data, which for its part furnishes seasonal and long-term variations not available from the register. The reliability of the register data could be checked by locating all reported complaints in the clinic records: they were all present. The largest element of unreliability lies, of course, in the response to the register questions. Cooperation was whole-hearted and good rapport was maintained throughout the register. During the last two weeks before termination there were some indications of respondent boredom, in the form of questions about how long the study would be continued, and extra effort was made to have respondents recall all incidents during the remaining period. There was a tendency regarding the mobility data for respondents to recall the unusual or family trip but to forget the more routine. The most commonly forgotten trip in this regard was a child going to school. Since forgotten trips tended to be routine ones, they were easily checked from week to week. Knowledge of general events, illnesses and outings within

the scheme served to further corroborate the register record.

The small size of the population and the short time involved obviated analyses based upon elaborate assumptions, and facilities were not available for sophisticated, nonparametric analyses. Mobility, morbidity, and demographic data were coded and sorted through many dimensions. For much of the data only totals and percentages were calculated, subject to analysis by chi square and rank correlation techniques. Although some of the demographic and migration data could have borne more complex and powerful analyses, subjecting the morbidity data to which they were being related to such analyses would have been of questionable validity. The basic data of the study, derived from records, registers, surveys and interviews, has largely been qualitatively interpreted on the basis of observation and experience.

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CHAPTER III
SELISEK AND GEDANGSA: CHARACTERISTICS
OF PLACE

The study area of Gedangsa and Selisek is located about sixty miles north of Kuala Lumpur near the Perak and Selangor state border (Fig. 5). It is accessible by macadam road from the town of Tanjong Malim which lies on the main north-south trunklines of the peninsula. The area is in the State of Selangor, District of Ulu Selangor, Mukim of Ulu Bernam. The population of Mukim Ulu Bernam in 1970 was 17,830, of which 3,862 lived in the town of Ulu Bernam situated across the Bernam River from Tanjong Malim. In addition to the town, the mukim includes several rubber estates, twelve villages, and three Felda schemes. The subordinate clinic includes within its health district the three Felda schemes and Selisek.

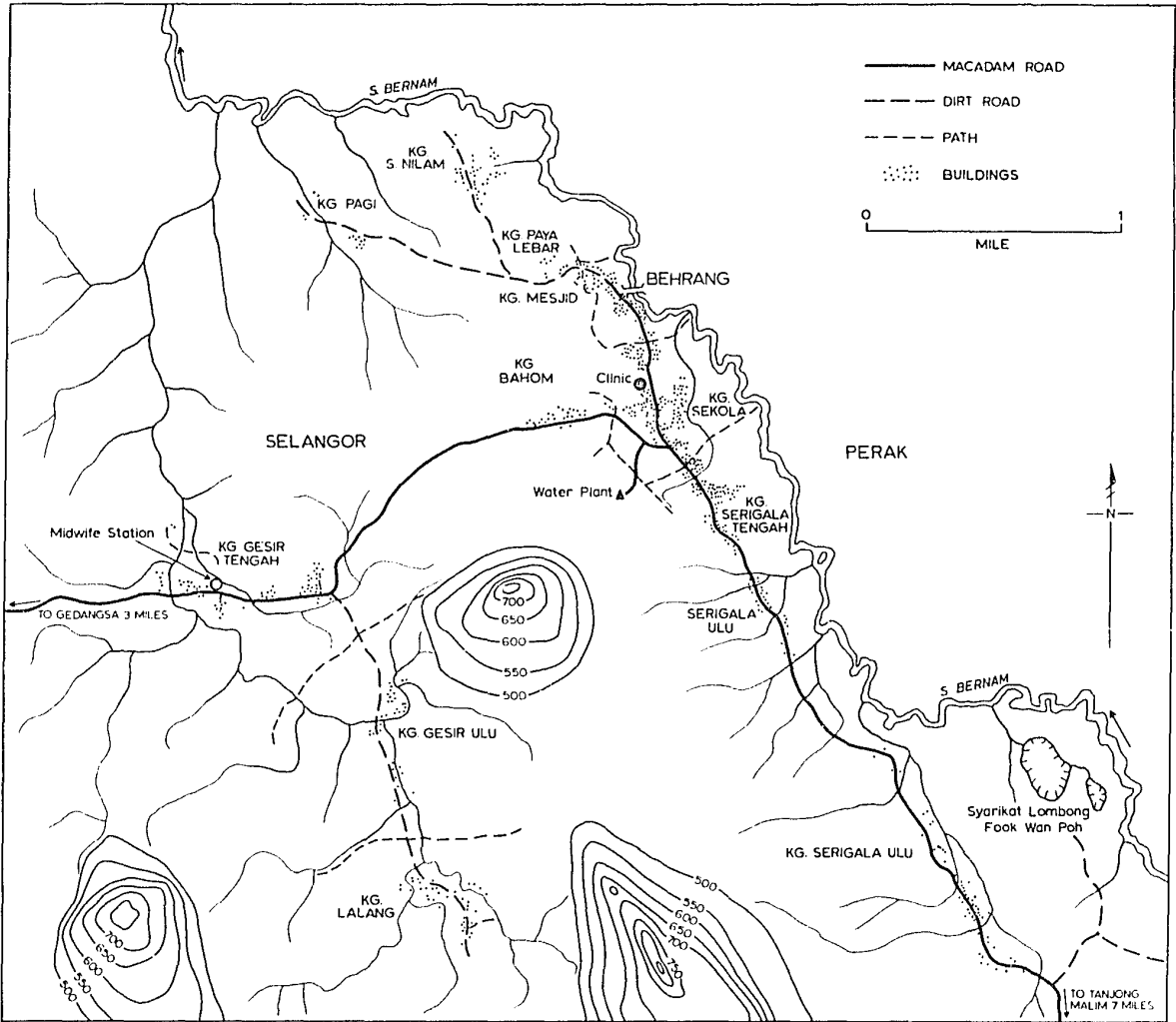
Selisek is an administrative unit composed of the twelve villages of the mukim. One of these, Alah Batu, is administratively included only because the town of Slim River, to which it is connected by road, lies across the state border. Alah Batu is not connected to the remainder of Selisek and for most purposes is not included in this study. The remaining eleven villages stretch along the road from seven to twelve miles from Tanjong Malim. The approximately 2,500 people are engaged almost exclusively in rubber tapping on small holdings. The road forks just

before the administrative center of Selisek where the police, government officer, and health personnel are located. One road runs parallel to the Bernam River for less than two miles, and near its end there is a foot bridge across to the town of Behrang. The other branch goes to the three Felda schemes, Gedangsa, Soeharto and Sungai Tengi. Just before the junction, from $7\frac{1}{2}$ to $8\frac{1}{2}$ miles from Tanjong Malim, is located the village of Serigala Tengah which was the site of the village register (Fig. 6).

Land scheme Gedangsa, located five miles from Selisek, was approved for clearing from the Ulu Bernam Forest Reserve in December, 1960, making it one of the earliest land schemes. It is a rubber scheme with a total area of 8,350 acres. It was developed in four phases which were planted in 1961, 1962, 1964, and 1967 and opened to settlers in each of the following years. An additional small "reserve" was planted to oil palm in 1970. At the time of the study, there was a total of 517 settler families comprised of approximately 3,200 people.

LANDSCAPE AND LIVELIHOOD

The terrain of Gedangsa is one of undulating hills of sandstone and shale, the hills reaching a height of eight to nine hundred feet in the vicinity of Gedangsa and three hundred within. Most of the soils of the hilly land are of the Serdang-Muchong soil association.



SELISEK VILLAGE

Figure 6

Location of villages in Selisek

Table 5
Population of Villages in Selisek, 1972

Village	No. houses	Population
Bahom	25	170
Gesir Tengah	62	330
Gesir Ulu	27	180
Lalang	41	295
Mesjid	37	184
Paya Lebar	36	178
Sekolah	75	440
Serigala Tengah	67	230
Serigala Ulu	49	186
Sungai Nilam	37	198
Sungai Pagi	17	74
TOTAL	473	2465

Source: Census by the Rural Health Division of the
Institute for Medical Research, 1972.

These are derived from sandstone and shale and are average in quality for Malaysian soils, being suitable for oil palm as well as rubber. The flattish terrain tends to be swampy, and the alluvial soils of such lands are at best only moderately drained sandy loams. Adequate drainage is necessary before the low-lying land can be used for rubber or, especially for oil palm.

The rainfall pattern shows some influences of both the north-east monsoon, from which the area is shielded by the Main Range of the peninsular, and the southwest monsoon, from which it is sheltered by the mountains of

Sumatra. The only defined dry period is in June-July, and then only relatively speaking. During the month of February the rubber trees usually "winter," or respond to the decreased rainfall and sunlight by shedding their leaves. Latex production then decreases.

The approach to Gedangsa passes through an arm of the Ulu Bernam Forest Reserve. It is lowland rainforest which is still the habitat of tigers, elephants, and monkeys. Six miles from Gedangsa, two more Felda (oil palm) schemes have been cut out of the forest. Within Gedangsa, the reserve land, once intended for orchard, has been planted to oil palm. Except for this small area of reserve, however, the immediate surroundings of the seven hundred acre settlement area consists of thousands of acres of rubber forest on gently rolling hills.

The villages of Selisek are also surrounded by rubber forest which stretches from the road up the hillsides to the jungle. Houses are constructed almost entirely of wood and are variously roofed with corrugated iron or atap thatch. They are usually surrounded by fruit trees. In Gedangsa standpipes are a prominent feature along the roadside, but in Selisek wells and ponded streams are scattered around the villages. Water supply, sanitation and other amenities are summarized in Table 7.

Both Selisek and Gedangsa are supported by rubber tapping. Within Gedangsa, there is a wide range of

Table 6
Inches of Rainfall in Tanjong Malim

	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
1971	11.4	3.1	11.0	8.7	8.1	4.7	4.2	8.0	10.9	1.7	7.9	19.5	99.2
1972	1.3	7.2	4.2	9.7	9.5	3.3	1.9	7.6	20.0	5.0	1.3*	4.1*	84.1
1973	11.7*	3.8*	8.7*										

*period of study

Source: National Meterological Service

Table 7
Percentage of Households With Amenities
Peninsular Malaysia, 1970

Condition	<u>National</u>		<u>Ulu Selangor</u>		Selisek ^c	Gedangsa ^d
	National ^a	Rural ^a	District ^b	Rural ^e		
Average no. persons/house	6.0	5.5	6.1	5.9	5.3 ^f	6.1
<u>Water Supply, exclusive and shared</u>						
a) piped inside	30.5	15.4	37.6	32.9	?	10.0
b) piped outside	11.0	11.6	17.5	23.3	?	90.0
Total piped	41.5	27.0	55.1	56.2	17.5	100.0
Well	48.1	59.1	38.1	36.5	24.8	--
River	6.3	8.6	5.0	5.4	?	--
Other	4.1	5.3	1.8	1.9	?	--
<u>Toilet Facilities, exclusive and shared</u>						
Flush	15.8	8.2	21.2	21.7	2.4	4.3
Bucket	15.2	4.2	24.4	12.4	--	--
Pit	35.2	43.6	37.9	47.7	28.0	95.7
River	11.4	14.4	8.3	9.0	--	--
No facilities	22.4	29.6	8.2	9.2	69.6	--

Table 7 (continued)
Percentage of Households With Amenities
Peninsular Malaysia, 1970

Condition	<u>National</u>		<u>Ulu Selangor</u>		Selisek ^c	Gedangsa ^d
	National ^a	Rural ^a	District ^b	Rural ^e		
<u>Lighting</u>						
a) Public	37.1	18.4	56.2	40.9	--	4.3
b) Private	2.1	2.8	7.5	12.5	--	1.0
Total electric	39.2	21.2	73.7	53.4	--	5.3
Gas lamp	9.5	11.1	6.3	8.3	?	?
Oil lamp	51.0	67.4	29.8	38.1	?	?
Other	0.3	0.3	0.2	0.2	?	?
<u>Motor Vehicles</u>						
None	90.9	95.8	93.0	93.7	96.5 ^f	98.3
One	7.9	3.8	6.3	5.8	3.5 ^f	1.7
Two or more	1.2	0.4	0.7	0.5	--	--

Table 7 (continued)
Percentage of Households With Amenities
Peninsular Malaysia, 1970

Condition	<u>National</u>		<u>Ulu Selangor</u>		Selisek ^c	Gedangsa ^d
	National ^a	Rural ^a	District ^b	Rural ^e		
<u>Cycles and Scooters</u>						
None	86.3	89.3	87.1	86.6	91.2 ^f	67.8
One	12.2	9.9	12.1	12.6	8.8	30.5
Two or more	1.5	0.8	0.8	0.8	--	1.7

^a West Malaysia Census of Housing, 1970, Final Report.

^b General Housing Tables, Part V, Selangor: 1970 Population and Housing Census.

^c Public health records from the clinic at Selisek.

^d Census conducted during the study.

^e 'Rural' here consists of the district data (b) minus the totals for all town boards, local councils, and New Villages (b).

^f Estimate comes from the census conducted during the study in Kampong Serigala Tengah, within Selisek.

income among the phases which results from the maturity and productivity of the trees. The settlers on the newest phase, Phase IV, are still being supported by the basic M\$69.70 per month. In January, 1973, the other three phases, in order of age, had median monthly incomes of M\$218, M\$172, and M\$128. The individual range was from M\$52 to M\$556, reflecting such factors as vacations, and the number of family members who could help with the work. The per capita income for that month was between M\$28 for Phases I-III and M\$13 for Phase IV. In comparison, the monthly per capita income the previous year in Selisek was M\$13, with a range among villages from M\$8 to M\$37 in a village where many people worked on a nearby estate.¹ In both places there is considerable seasonal variation in income, but in Gedangsa basic income is maintained whatever the adversities of the weather.

THE POPULATION

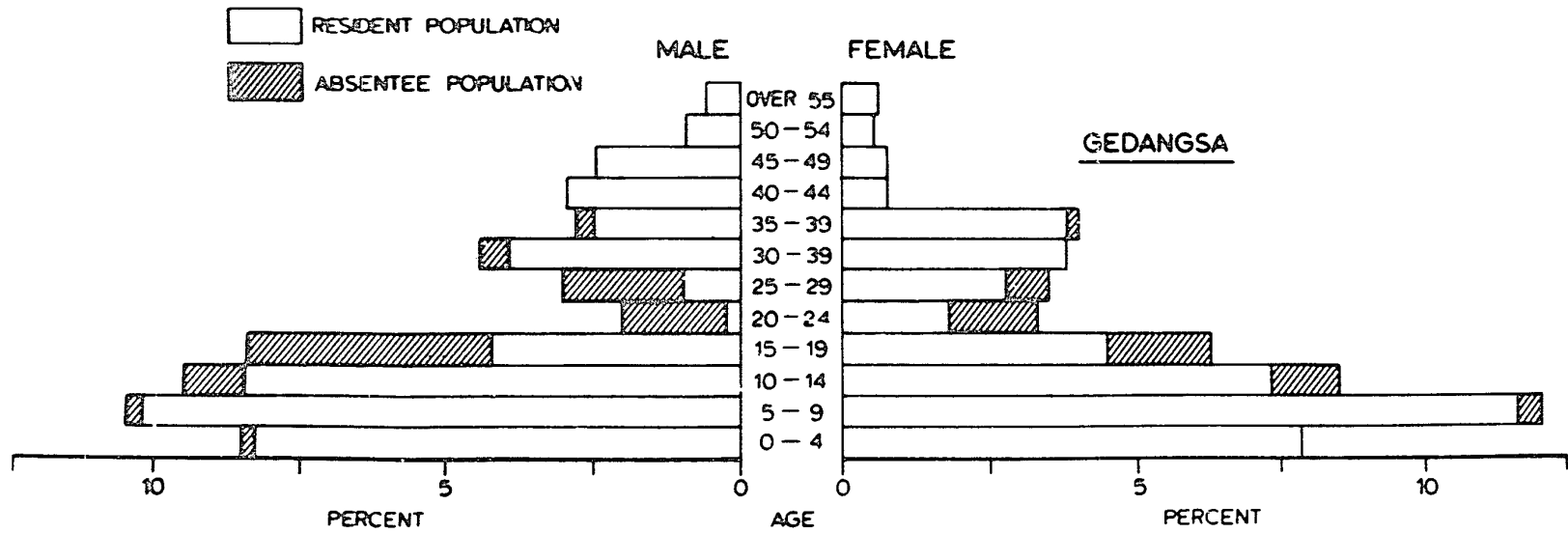
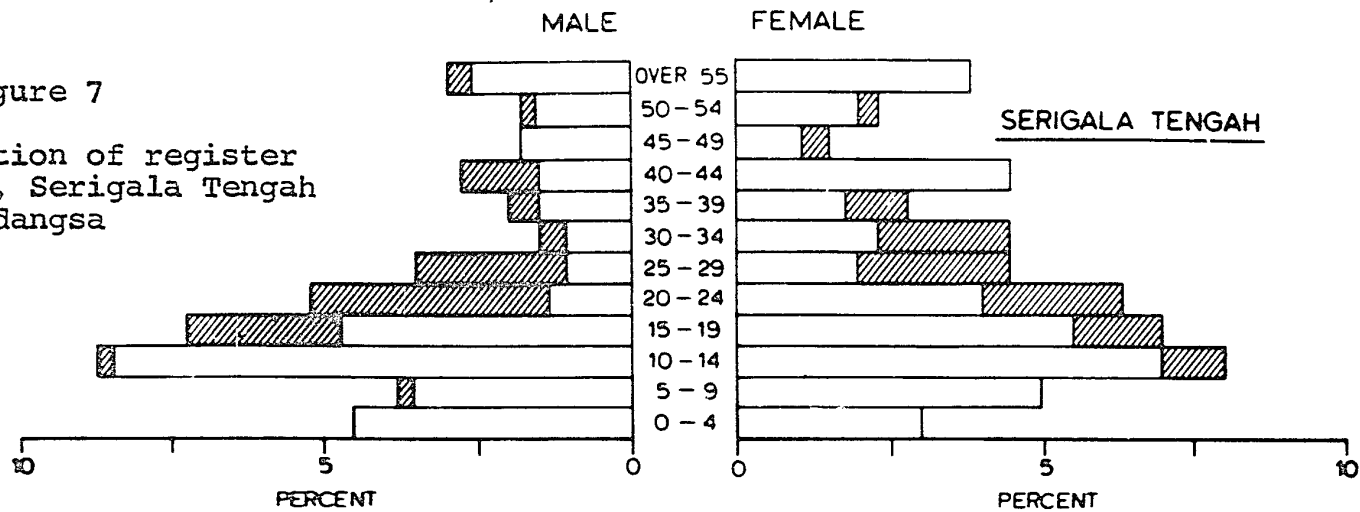
The population of the Gedangsa-Selisek area is over 90 percent Malay with a marked concentration of people of Sumatran origin. Gedangsa has some Indian settlers from nearby estates (seven percent of families) and a few Chinese (one percent of families). Its settlers originate largely from the surrounding area: 13 percent from Selisek, 29 percent from the District of Ulu Selangor, over 90 percent from the State of Selangor, and 7 percent from

villages across the border in Perak. In the study village of Serigala Tengah, the population was entirely Malay.

Because priority was given during recruitment for the early phases to settlers with many children, the population of Gedangsa is young. More than 50 percent of the population is under sixteen and the median age is ten to fourteen. Among the adult population, the predominance of older men is balanced with the predominance of the younger women they have married. These estimates were reached by ageing the population recorded on the settler registration cards and updating it with births and deaths. Because outmigration for jobs or higher schooling among those now in their twenties is neglected in the estimate, the population is probably even younger.

More detail and accuracy is possible when the sample population is considered. The census of this is current, accounts for migrants, and includes non-settler families. The crude birth rates of the register populations in 1972 were 24.7 per 1000 population in Gedangsa and 26.7 in Selisek. The fertility rate in Gedangsa, however, is 130.4 compared with 100.0 in Selisek. Of the total sample population resident in Gedangsa, 59 percent were under fifteen (Fig. 7). One-third of the population was in school, including two-thirds of those aged between five and fourteen. The dependency ratio of those of working age to those under 15 or over 55 is 1:1.5. Of those of working age, however, ten percent are not earning income

Figure 7
Population of register
sample, Serigala Tengah
and Gedangsa



or working as the principal housekeeper. Counting these as dependents, the ratio rises to 1:1.7.

No age data are available for the population of Selisek as a whole (Table 5). At the time of this study, there were 57 occupied houses within Serigala Tengah and a population of 300. Forty-two percent of the resident population is under fifteen and eight percent is over 55 (Fig. 7). The dependency ratio was only 1:1. Of those of working age, a quarter were not earning any income or working as the principal housekeeper, and their inclusion as dependents increased the ratio to 1:1.7. A third of the population was attending school. There were eleven abandoned houses, several houses occupied by old people living alone, and a sex ratio of 79 males per 100 females. Rather heavy outmigration is thus indicated.

A total of 93 people in Serigala Tengah and 63 people in Gedangsa was enumerated as members of families who are no longer living in the settlement. The three major reasons for the outmigration were schooling, marriage and work. The process is well advanced in Serigala Tengah, but in Gedangsa the population has only recently aged enough to include substantial numbers of young adults who might be expected to migrate. One-third of the migrants from Selisek went to Kuala Lumpur, whereas less than ten percent of migrants from Gedangsa went to the capital.

Table 8
Outmigration in Gedangsa and Serigala Tengah

<u>Gedangsa</u>							
Destination	<u>Purpose of Migration</u>			White		Other ^a	Total
	School	Marriage	Laborer	collar	collar		
Vicinity ^b	-	4	-	1	2	1	8
Kuala Lumpur	3	-	-	-	1	2	6
Other Selangor	20	3	1	-	2	7	33
Total Selangor	23	7	1	1	5	10	47
Total Perak	-	-	-	1	-	2	3
Other states	3	2	-	-	-	6	11
Other countries ^c	-	1	1	-	-	-	2
Total	26	10	2	2	5	18	63
<u>Serigala Tengah</u>							
Vicinity ^b	-	7	8	-	-	4	19
Kuala Lumpur	4	6	15	3	2	4	34
Other Selangor	2	-	1	1	-	-	4
Total Selangor	6	13	24	4	2	8	57
Total Perak	-	12	1	-	3	3	19
Other states	-	5	4	3	1	3	16
Other countries ^c	1	-	-	-	-	-	1
Total	7	30	29	7	6	14	93

^aIncludes Felda schemes, the army, looking for work, servant.

^bIncludes Gedangsa, Selisek, Soeharto, Sungai Tenggi, Tanjong Malim, and Behrang.

^cIndia, Indonesia and New Zealand.

Source: author's census.

MORBIDITY

Clinic Cases

The difference in morbidity between Gedangsa and Selisek as reflected in clinic records is marked (Table 9). The register indicated that from 25 to 35 percent of complaints in both places were actually brought to the clinic. There was also no significant difference between the two places in the proportion of complaints taken to folk practitioners or those given home medication. The category "worms" includes not only unconfirmed diagnoses by the nurses, but also requests by the patients. In Gedangsa treatment requests for worms was especially common among those who had previously worked on rubber estates. The category "mouth" consists mostly of dental and gum troubles. A dentist visited the Selisek clinic once a week, but there was no dental treatment available on Gedangsa and settlers had to travel to Selisek. Despite differences in worms and mouth categories, the rank order correlation of percentages of complaints at each clinic was $\rho = .76$.

The picture of morbidity presented is one of similar proportions of complaints in the two places but of an incidence almost twice as high in Selisek as in Gedangsa. The belief that this ostensible difference in morbidity between the two places is truly due to occurrence and not to utilization of services is supposed by the register data showing that the same proportions of complaints were taken

Table 9
Clinic Cases, 1970-72,
Gedangsa and Selisek

Complaint	<u>Average Annual Age-Adjusted Rates</u>				
	<u>Percentage of Cases</u>		<u>per thousand population</u>		<u>Percent difference</u>
	Selisek	Gedangsa	Selisek	Gedangsa	
Respiratory	25	22	337	110	-67.4
Enteric	20	11	233	60	-74.2
Fever ^a	17	11	207	57	-72.5
Skin	11	15	130	80	-38.5
Deficiency	5	2	63	27	-57.1
Chronic aches	4	2	43	13	-69.8
Conjunctivitis					
Otitis	4	6	37	30	-18.9
Allergy ^b	3	4	45	20	-55.6
Mouth	3	1	40	7	-82.5
Accident	3	8	33	53	+60.6
Worms	2	14	23	80	+247.8
Organ ^c	1	2	20	13	-35.0
Other ^d	2	2	23	47	+104.3
Total	100	100	1042	590	-43.4

Note: Standardized on the Malay Population of Peninsular Malaysia.
Population age categories for all of Selisek were estimated
from percentage composition in the Serigala Tengah register.

^aIncludes malaria.

^bIncludes asymptomatic rashes and swellings.

^cIncludes cardio-vascular and urino-genital system.

^dIncludes emotional upset, circumcision, and dressings.

to the clinic. Further register corroboration can be found in the fact that during the four-week period that the two registers ran concurrently, the proportion of registered complaints were also remarkably similar, and the absolute incidence was also almost twice as high in Selisek as in Gedangsa (Table 10).

The only comparable and laboratory-confirmed diagnostic data is for helminthiasis in Gedangsa and Selisek. In Selisek the survey by the Rural Health Division of the Institute for Medical Research found over half the children to be infected with Ascaris and Trichuris, and one quarter with hookworm.² In Serigala Tengah infection rates were high, but no infections were heavy, i.e., over 25,000 Ascaris eggs per gram of feces. In Gedangsa, the rates of infection in the survey carried out for this study were still substantial but considerably lower than in Selisek. More detailed analysis is provided in Chapter IV, Table 13.

The clinic cases categorized as "deficiencies" were mostly complaints of numbness, giddiness, and weakness, the complaints being treated for vitamin and iron deficiencies. There is no substantial nutritional data for Gedangsa, but in Selisek the Institute for Medical Research found several cases of frank malnutrition. Clinical examinations of school and pre-school children in 1971 found clinical evidence of vitamin A and B deficiencies

Table 10
Concurrent Register Complaints
Serigala Tengah and Gedangsa
February 1973

Complaint	Percentage of Complaints	
	Gedangsa	Serigala Tengah
Respiratory	43	46
Enteric	2	5
Fever	19	20
Skin	4	2
Eye-ear-mouth	16	16
Reaction ^a	4	1
Accident	12	-
Internal ^b	-	2
Other ^c	-	8
TOTAL	100	100
Total Complaints	57	105

^aIncludes allergy, in Gedangsa especially reaction to herbicides.

^bIncludes heart, kidneys, uterus.

^cIncludes chronic aches, and giddiness.

Table 11
Helminth Survey of Pre-School Children, Selisek and Gedangsa

Village	No. tested	<u>Percentage Positive, Selisek 1971</u>		
		Ascaris	Trichuris	Hookworm
Bahom	30	66.7	66.7	12.5
Gesir Ulu	33	60.6	63.6	36.4
Lalang	57	61.0	71.2	28.2
Serigala Tengah	24	70.8	62.5	29.3
Serigala Ulu	26	45.5	21.2	11.8
Sungai Nilam	24	79.2	83.3	29.1
Total surveyed, Selisek	194	63.2	62.9	25.2
Gedangsa Sample	75	<u>Percentage Positive, Gedangsa 1973</u>		
		46.7	37.2	14.8

Source: Selisek data from the Institute for Medical Research Annual Report, 1972.
Gedangsa data from survey conducted for this study.

and definite evidence of anemia using hemoglobin levels as criteria.³ Nutrition in Selisek suffers from fluctuating economic levels which result from the adversities of weather for rubber tapping. In Gedangsa, however, a basis of support is maintained through the control over credit, payments, and debt repayment.

The social health of Gedangsa seemed rather stable. There are frictions and deprivations associated with isolation, and there are some smouldering conflicts between settlers and Felda administrative staff. There are also some active group activities and a pervasive friendliness. There was only one divorce in 1972 in over five hundred households. There is no serious crime, and houses are not now being abandoned--although some have been so in past years. In contrast, the social health of Serigala Tengah seemed unsettled. Many women were working as tappers and raising children alone while husbands were away laboring, usually in Kuala Lumpur. These and several old people who lived alone frequently seemed suspicious and frightened. There was obvious resentment and jealousy among unemployed youths toward those who were advancing in education or leaving the village. The community life especially seemed depressed: the community hall was seldom used, one prayer house was dilapidated and in disuse, and the other was frequented only by a handful of old men.

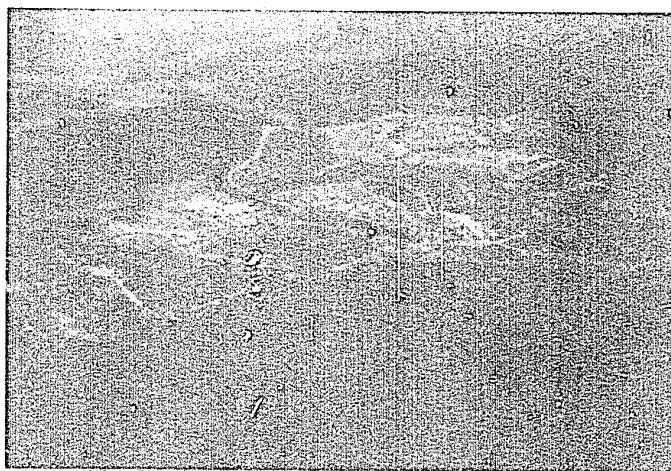
Table 12

Clinical Examinations of Pre-School and
School Children in Sungai Selisek, 1971

Survey	No. children in village	Percentage				
		Percentage Examined	Hemoglobin 11 gm.% and less	Signs of Deficiencies		
				A	Vitamin B	Malaria Film positive
<u>Pre-School</u>						
March 1971	419	95.5	40.0	12.8	12.0	9.3
July 1971	408	91.2	51.0	15.0	7.6	5.4
<u>School</u>						
October 1971	386	100.0	26.9	11.4	25.1	0.8

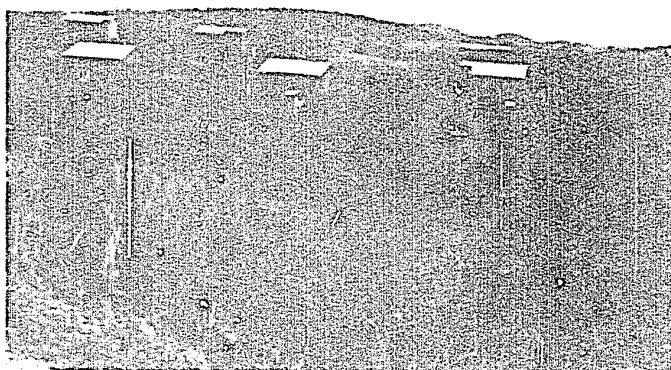
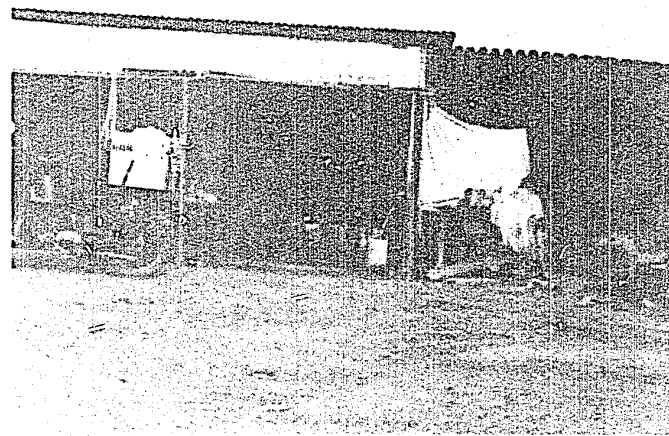
Source: Institute for Medical Research Survey.⁴

The state of health expressed in these patterns of demography and morbidity is an output of an entire system. The origins can be sought in the distinctive associations and interactions of the two places.



a

b



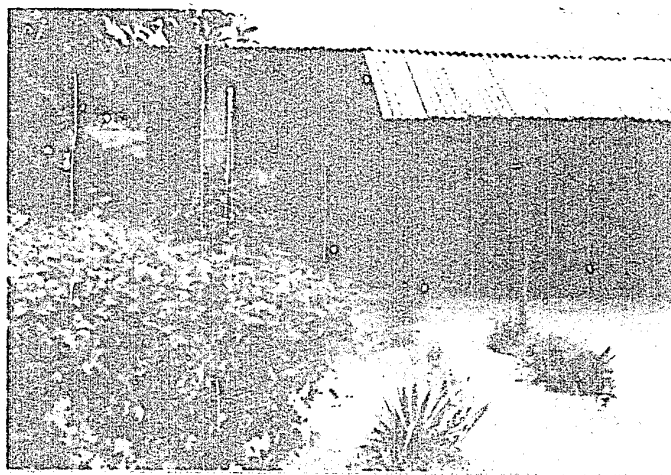
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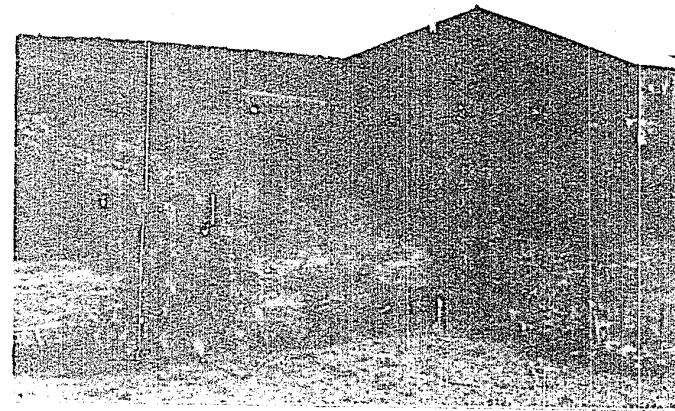


Plate I

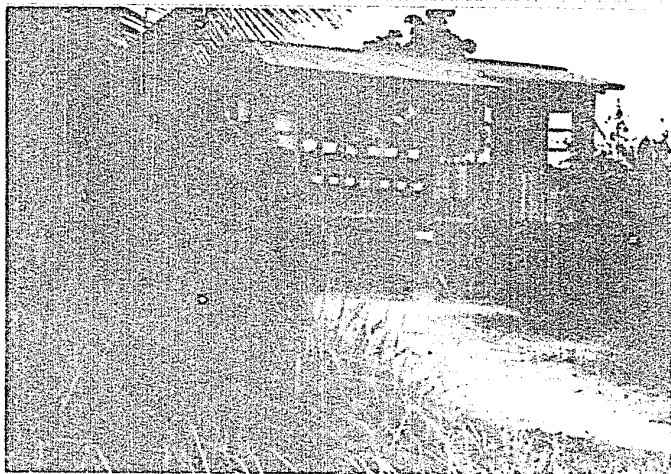
(a) air view of Gedangsa; (b) illegal provision shop by roadside; (c) Phase III houses and latrines across ravine; (d) children playing in ravine stream.



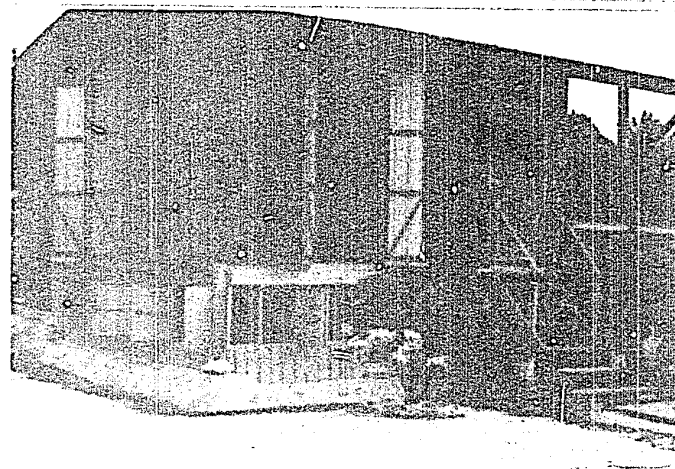
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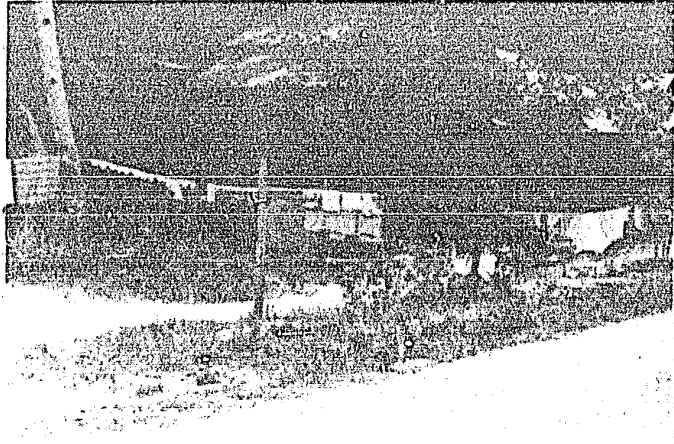
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PLATE II

(a) Indian house on ground in Phase I; (b) Treeless Phase IV house and garden;
(c) Ordinary Phase III house and lot; (d) Modified Phase III house.



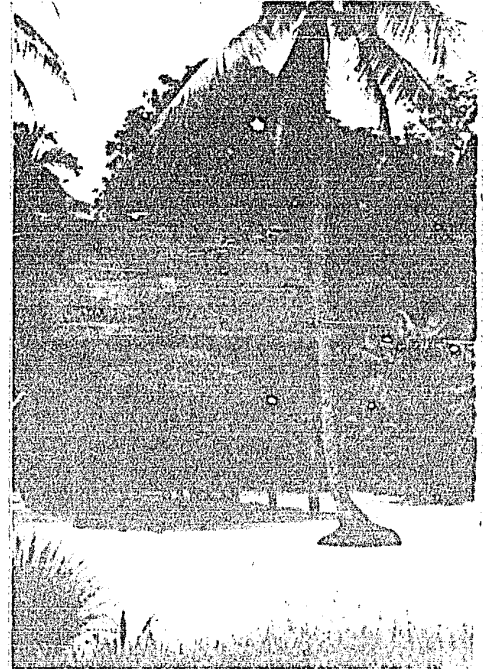
a



b



c



d

Plate III

(a) Wooden village house and lot; (b) Banana leaf latrine in standing water; (c) Standing water near houses; (d) Atap house in well-maintained lot.

REFERENCES

¹Institute for Medical Research, Annual Report, 1970, pg. 127.

²_____, Annual Report, 1971, pgs. 146-148.

³Ibid. Nutritional Survey results from Tables 6, 7, and 8.

⁴Ibid.

CHAPTER IV
SELISEK AND GEDANGSA: CONTRASTING
MEDICAL GEOGRAPHIES

ORGANIZATIONAL COMPLEX

The official structure of Gedangsa's organization has been established by the central Felda administration. Like all Felda schemes, it is headed by a manager who is responsible for production, maintenance, personnel discipline, and for the well-being of the scheme and its population. To assist him there is an assistant manager and several clerks, accountants, drivers, and field supervisors. The field supervisors oversee the work obligations of the settlers and their maintenance of field lots and house lots. They also offer the settlers advice on tree pruning, fertilizing, and other techniques for increasing production. The supervisor for Phase IV, on which settlers are not yet tapping, also enforces maintenance work and encourages vegetable and poultry production. A Settler Development Officer for women visits house to house, organizing instruction in cooking and sewing, and advising generally on child care and family planning. Other government employees are connected to their own hierarchies. The elementary school has five teachers living in Gedangsa and another five commuting from Tanjong Malim. The police have a compound with ten families, the officers being responsible for

three schemes. The Ministry of Health has a midwife and a nurse.

Groupings

The settlers have several associations which enjoy varying degrees of official support. The Women's Institute is concerned with various aspects of home economics. It presently organizes sewing and cooking lessons. The Youth Club is fairly active in arranging sporting competitions and has organized several bus trips. There is a funeral society, and there is a mosque group for encouraging prayers and the reading of the Koran. There is also a Settlers' Association, a political body with elected representatives. Ultimately, when the scheme debts have been paid, the Association may inherit the scheme's administration. Presently it not only is inadequate in many budgeting, agricultural and other technical skills, but is immature and impotent before the strong and skilled central administration. The staff, who are the agents of development and productive efficiency, must assert discipline over many aspects of production standards and work regimen. This creates inevitable tension which usually takes the form of the Association presenting grievances to the manager at public or private meetings. Occasionally the tension is expressed in threats or violence against the staff. At one public meeting, issues included the need for more money than already

allocated to construct a footbridge over a ravine stream, the desire of settlers to be exempt from police regulations about bicycle reflectors, motor-cycle licenses, and other "harassment" (fallaciously implying that a scheme is private property, as are estates), and resentment over being treated "like estate laborers." The issue of loan repayment in particular has created vehement arguments under the pressure of extremely low rubber prices in past years. Confrontation over the method (specific gravity) used to determine the amount of latex brought in for payment, for instance, led to a knife attack against a field supervisor. In the past, settlers were misled by early recruitment efforts about labor discipline and other conditions that would be encountered on the scheme. Many were led to believe, for example, that subsistence pay was a "right," and were later angered that minimum hours of maintenance work were required. Such misconceptions have been discouraged by changes in recruitment practice and by the greater knowledge and experience of Felda among the general population, but the stress of adjustment to new economic, political, and social conditions continues to affect new settlers. Half a dozen new settlers in Phase IV resolved their problems by abandoning their land and houses and disappearing during the first few months. Few of the established settlers, however, complain about anything except loan repayment, and the recent price rises of the world commodities' market are reducing such tensions.

The difficulties that several official social projects have encountered, and the outright failures of several non-official projects of a cooperative nature, indicate weaknesses and immaturity in the social institutions of the new settlement. From 1966 to 1968 a Peace Corps volunteer lived in Gedangsa and attempted to organize cooperatives to raise animals and cultivate fish. Two sets of fish ponds were built and harvested during that period. Soon after he departed, however, arguments over the rewards for work and effort of the members, and poaching by non-member settlers, caused the degeneration of the largest fish pond into a swimming hole. A series of small ponds located in Phase I are still being maintained and harvested for private consumption by a small number of settlers, but the attempt to contribute to the nutritional level of the settlement and incomes of the settlers failed. Similarly, during the period of study, one of the elementary school teachers developed a program with some parents for planting corn and marketing it to raise money for school expenses. Although the Felda tractor cleared a tract of land behind the mosque for the project, the parents failed to plant the corn. On a more official level, those settlers whose trees are not yet producing have been pressed to raise vegetables. Although the staff intended that various green vegetables be grown, virtually all the settlers planted their quarter-acre lots entirely in a tapioca, which needs

little maintenance. No effort is made, moreover, to market the excess tapioca to settlers in the other phases.

There are several informal social groupings. The Chinese, Indians, and Malays do not mix socially. Among the Malay settlers, several groupings are recognized, such as Javanese from Klang, Sumatrans from Perak, and those who originate from the surrounding villages. In the late afternoon people usually visit with their neighbors in regular groupings, which appear to be parallel with the children's play groupings. The traditional medical practitioners (bomoh) and midwives are influential in Gedangsa, but so are the official midwife, certain staff and the mosque leader. Especially in the new phases, the bomoh have not yet established their reputation and settlers still may consult those in their home villages.

The organization of Selisek is in marked contrast. It is administered by the penghulu with a council of the village headmen, whom he selects but who are invariably respected village figures. In Serigala Tengah the headman keeps the vital records and, with the penghulu, mediates disputes and generally promotes the village peace. In Selisek there is also an elementary school, a mosque, a police station, a water treatment and pumping plant, a midwife clinic, and a health sub-center. The mosque and school have their associations, but these are not found at the village level. Such national political associations and agencies as political parties and the government

smallholder replanting grants administration do affect the villagers, but not integrally or daily. Unlike the Felda settler, who delivers latex, purchases fertilizer, receives payment and obtains credit from the government, the villagers have little contact with official organizations or officers. The major social and visiting groups are on the basis of kinship. This contrast in organization between Selisek and Gedangsa has implications for health through the processes of health education and behavior modification. The delivery of health-related information and the progress of the family planning program are examples.

Information and Contact

Within the health sub-center district as a whole, 89 percent of child births were attended by a government midwife in 1972. Another seven percent were born before she arrived, and the remainder were attended only by the traditional village midwives. On Gedangsa, the traditional midwives sometimes assist, but all births were attended by the government midwife. Separate records do not exist for Selisek babies, but the senior Selisek midwife believes that vaccination coverage is almost complete for initial injection and falls to about 70 percent by the third and final one. In Gedangsa the coverage for initial injections is complete and the series coverage is over 90 percent. The midwives and nurses in both places are responsible for home visiting. This is not popular in Selisek and almost

always occurs for a specific purpose. For example, during a minor cholera epidemic on the lower Bernam River a public health overseer chlorinated wells and explained about the importance of boiling water. In Gedangsa, the settler development officer, the nurse and the midwife regularly visit each house.

An important factor in the effectiveness of health education seems to be the age of the population. The nurse in Gedangsa, when advising on the benefits of digging a refuse pit, commonly hears that her idea is good, but there is not time. The public health overseer in Selisek, when advising on methods of protecting wells from contamination, was typically told that grandmother used that well as it was--and what did a youngster (of 32 years) like him know about it? In Gedangsa, the settler development officer has the most difficulty with Phase I, where some of the women are almost fifty. The nurse, who covered the three Felda schemes, believed that receptivity to her instruction varied among the schemes according to the age of the population. The newest scheme, Sungai Tenggi, was established after the age limits had been lowered, and its population is limited to the twenty to thirty year age groups, whereas in Gedangsa many settlers are over forty.

The family planning program exemplifies the positive and effective aspects of Felda's official organization. The midwife has been especially trained as part of the new integrated family planning program. She advises about the

benefits of family limitation while attending women during pregnancy and child birth. The settler development officer also does home visiting and proselytizing. Their major difficulties at first came from the women's reluctance to discuss the subject, their fear of public shame if their participation were known, and their fear of rumored effects. The midwife and development officer through frequent home contacts have allayed their fears. Their embarrassments have been decreased by holding the family planning clinic together with the child clinic. Oral contraception pills are distributed at the clinic at the cost of M\$ 1 a month, but unfortunately no alternative method is available when use of the pill is clinically contraindicated. The major opposition now comes from husbands, so the scheme management requested a visit from a family planning education team from Ipoh. They especially lectured the husbands at a settlers meeting about the economic benefits of limiting their families. These combined efforts have succeeded within two years in convincing 47 percent of women at risk on Gedangsa to use the pill for contraception. In Selisek, in contrast, there is no one trained in family planning and no one doing home visiting. Twice a month a woman from the Tanjong Malim hospital conducts a family planning clinic at Behrang town clinic. Only 25 women within Selisek are acceptors. These include three women, or four percent of those at risk in Serigala Tengah.

The centralized, hierarchical organization of Gedangsa thus provides an effective framework for intensive personal contact and for the distribution of health information, as indicated by the success of the family planning program. The weakness of the public settler organization, in contrast, is most obvious when projects of collective cooperation, such as the fish pond project, have been involved. Any spontaneous forces which may exist for growing and marketing needed foodstuffs have not flourished, and there continues to be a strong dependence on initiative and discipline from above for any improvement in conditions which would affect health.

CONSTRUCTED COMPLEX

Gedangsa was planned and constructed as an entire village, complete with clinic, school, shops, houses, water supply, and sanitation system. Some elements of the planned community have not yet been developed.

Domestic

The basic house has three rooms, or two plus a kitchen. It is of wooden construction with a corrugated iron roof. In the early Phase I period, some square houses were built on the ground and occupied by Chinese and Indians (Plate II), but since this led to a degree of residential segregation, all houses in later phases have been built on piles. Houses are laid out on rectangular quarter-acre plots on both sides of the

street. Thus, as house alignment follows the roads, there is no orientation to prevailing winds or to the sun, and the ventilation of individual houses varies considerably. Since the forest is clear-felled before building, the younger phases have no mature trees at all for shade. Without electricity for fans, the daily indoor temperatures hover relentlessly in the high nineties. At night kerosene lamps are generally used for lighting. The invariable response to questions about desirable improvements for houses and community is a desire for electricity--immediately for lights and fans and, no doubt, eventually for television.

The initial sameness of the houses is often decried by visitors. It is, however, eventually modified greatly by the settlers. They frequently add new rooms to houses, dig cool basements, and even add shops (Plate II). Even counting such additions, however, the number of children sometimes crowds the small house. In the register sample, the mean room density was 1.9 people per room (including kitchen), the median 2.0 and the 3rd quartile 2.7 (cf. Table 7). The mean rises to 2.8 if the kitchen is not included as living space. This is comparable to Selisek, where without kitchens the mean room density is 2.5 with a range from one to eight. It was found that 10 percent of households in Gedangsa had removed an internal wall, making one large sleeping-living room plus kitchen;

68 percent had the original three-room house unchanged; 17 percent had further subdivided the house into four rooms; and 5 percent had added up to five rooms. Even after such owner modifications, the construction of the house continues to differ substantially from houses in the previous experience of the settlers. For example, the houses all have tight plank flooring. This is a matter of concern for the nurse and development officer since dirt cannot fall through the floor boards when swept, in the accustomed manner, but accumulates in corners. Efforts must be made to familiarize the housewives with such basic but new technology as dustpans and rubbish bins--for them, an additional and unnecessary expense and nuisance.

In the older phases of the settlement, most settlers now have water piped into their houses. In the newer phases, standpipes are used, each serving eight to ten houses. There is a widespread and ingenious practice of attaching plastic hoses to the standpipe faucet and "piping" the water into homes. The hoses, sometimes eight or more to a stand pipe, are often carefully excavated and laid under the roads, but nevertheless many hoses are broken by traffic. Arguments frequently arise over access to the pipe. More seriously, there is no way to turn off leaky hoses and make-shift connections, and hundreds of gallons of wasted water flow into the road ditches. The water in Gedangsa comes from a pump house

on the Bernam River opposite the town of Behrang and is chlorinated in a plant at Selisek. During heavy rainfall and run off, when the Bernam River becomes too muddy for immediate consumption, water may be cut off to Gedangsa for periods of up to a week at a time. After any stored water is consumed, bathing and laundry inevitably revert to the streams. This failure of the protected water supply is mainly felt in the November-December rainy period. Safe drinking supplies for a day or two are usually stored by settlers, however, as few care to boil their drinking water.

Each house is provided with a pit latrine originally located about forty yards behind the house. An occasional latrine, with its missing doors and overgrown path, shows evidence of being disused. More serious is a general attitude that it is more convenient for children to defecate where they will. Mothers, concerned lest the children track filth into the house, sometimes follow their children and clean the area around the house with shovels. There is more of a health hazard in the older phases where the fruit trees have matured and there are sizable numbers of flies. The expectation, however, that people in the newer phases, lacking in vegetative cover, would be more likely to use the latrines was not borne up by the helminth study. The survey found no clear difference between the phases in helminth infection among children.

In Selisek the type of housing is diverse. The majority of houses are of wooden construction on piles and have three rooms with a corrugated iron roof. In Serigala Tengah, some substantial old hardwood houses have seven or eight rooms. One third of the houses had only one common room for all living and sleeping, and six of these had thatched roofs. The kitchen attached to houses varied in form from a thatch-covered shelf to a small cement-floored room. There were two houses with cement foundations which belonged to "outsiders" working at the water plant. All the houses were well shaded by fruit trees. The area underneath the houses is used for storing firewood and grain, and as working and playing room during the heat of the day, but it was not observed to shelter animals.

One third of the houses in Selisek and 32 percent of those in Serigala Tengah are listed in the public health records as having latrines or flush toilets. A field count in Serigala Tengah, however, found only 19 percent with any kind of latrine, including those which were merely private places over streams (Plate III). People would report themselves as "sharing" a latrine which was across the road and a hundred yards into a neighbor's orchard, but most people simply used their own surrounding orchard land or stream banks. These sluggish streams and nearby unprotected wells also serve as the major source of water and provide the main laundry sites, as only nine

percent (of 57 occupied) houses have piped water. The main water pipeline from the processing plant runs parallel to the road and often passes within ten feet of the wells, streams and latrines, but householders cannot afford the connection fee.

One would expect a high level of contamination of water supplies and houseyards in Selisek. In comparison, there should be a marked decrease in diseases transmitted by the fecal-oral route in Gedangsa, which has had a basic sanitation infrastructure since its initiation. This does indeed seem to be true of enteric diseases. In Selisek 14 percent of all clinic cases (677) in 1972 were enteric problems, and the three-year clinic sample had a rate of 233 per thousand (Table 9). If only a third of cases were brought to the clinic in 1972, as indicated by the register, a rough incidence rate in Gedangsa would be 140 enteric complaints per thousand compared with over 600 in Selisek. In addition to these enteric cases, however, there were 138 treatments given for unconfirmed worms in Gedangsa in 1972. Despite the sanitary infrastructure, the survey showed that helminthic infection continues to be widespread (Table 13).

The roughly bimodal age pattern suggests that the school may be implicated as a focus of helminth infection. Toddlers predictably have the heaviest rates of infection, but after they stop crawling and eating dirt the rate decreases. At five and six some, but not all, of the

Table 13
Helminthiasis of Children in the Gedangsa Sample

Age	Number surveyed	Percentage Positive				Percentage Negative
		Ascaris lumbricoides	Trichuris trichiura	Hookwork	All three kinds	For all three kinds
0	5	40	20	-	-	60
1	6	83	83	17	17	17
2	10	60	40	30	30	30
3	10	40	30	10	10	60
4	15	20	20	20	13	73
5	17	59	47	6	6	35
6	12	33	33	17	8	58
7	12	75	50	33	33	25
8	10	50	50	30	20	30
9	20	60	35	30	25	40
10	8	38	38	25	25	50
11	12	25	33	-	-	66
12	13	38	46	8	8	46
Total	150	47	39	18	15	46

children attend kindergarten for a few hours a day. At seven they start school. Differences in the rates for all helminth infections and combinations of infections between school age seven and pre-school age six are all highly significant ($p < .001$). There is considerable clustering of infected children within households. Of the 150 children studied, 21 percent lived in households in which all the children were infected with Ascaris (22 percent of households). They constituted 33 percent of all infected children. This pattern was similar though weaker for Trichuris, but was absent for hookworm, which is usually acquired in fields rather than house yards. A full 29 percent of households had no child who was infected. It would seem that some of the children live in heavily infected homes and others live in homes where behavior in using the latrines has protected them. It is possible that the school provides a focus where previously protected children may become infected.

When questioned about their children's helminth infections at the clinic, every mother seemed to understand and accept the government explanation of the source of infection and its prevention. The normality of the infection was accepted, however, and it was generally considered that making children use the latrines was too inconvenient--especially since free and effective medicine was readily available. Behavioral adjustment to the potential of new relationships to improve health is thus

not complete, and helminthic infection continues to be prevalent, although moderate in severity as measured by egg counts.

Similarly, personal hygiene has not changed to take advantage of the water supply. Bathing is frequent, but soap is seldom used and little attention is given to the thorough cleaning and, especially, drying of body orifices. Inadequate cleaning of ears, gums, and teeth, and such habits as sharing towels, bed clothes and sarongs, encourage continuing high rates of conjunctivitis, otitis, and skin infections such as scabies, ringworm, and fungal itches (Table 9, Appendix II). The register in Gedangsa recorded several toothaches and gum problems, none of which were treated. The dentist who comes to Selisek clinic one morning a week seems, in effect, to be inaccessible.

Public

The constructed parts of Gedangsa which are public provide the framework for the social organization and were built for its needs. Aspects which especially affect health include the potential for contagion and the opportunity for recreation.

People gather regularly in Gedangsa at the elementary school, the community hall (balai raya) the clinic, the latex collecting stations, the coffee shops, and the places of worship. They occasionally meet at the Felda office on pay day, the public bus, sports competitions,

and the monthly film. Except for the school, all of these gatherings are either sporadic or open-air and are probably inconsequential as centers for contagion. In Serigala Tengah they are mostly lacking. There is one small house annex which sells household goods such as batteries and matches. One of the two prayer houses and the community hall are seldom used. The Selisek elementary school, of course, plays the same role in gathering children together as does the one in Gedangsa. If respiratory infections are used as an indicator of potential for infections of the "crowd disease" variety, the risk is much less in Gedangsa despite the greater size and variety of gatherings (Table 9). Although respiratory cases dominated complaints at both clinics, the register indicated that only a quarter of complaints are being brought to the clinic, which would suggest an annual incidence of 340 per thousand in Gedangsa. About two-thirds of complaints are the common cold, and the remainder include bronchitis, asthma, pneumonia, and coughing with no other symptoms. There are four people being treated for tuberculosis in Gedangsa, and during the study one man hemorrhaged and died. All contracted the disease before settling in Gedangsa, however. The two new cases confirmed during the period of the study were in Selisek.

Recreational opportunities in Gedangsa are limited. There is a gasoline generator which provides the staff

houses with electricity for a few hours every night. A coffee shop with access to this supply has the only television accessible to settlers, and on certain evenings popular shows draw a crowd of teenagers. There is sometimes a badminton game at the community hall in the evening, and there is a football field where men often kick a ball around and occasionally play a game. The social groups, such as the mosque group and the Women's Institute, have already been mentioned. Occasionally there is a kenduri, or feast, for some special occasion such as a marriage. It is of importance only to a limited neighborhood and ethnic sub-group. The paucity of recreational opportunities is indicated by the popularity of the monthly movie. It draws crowds commonly of up to a thousand people despite the fact that it is usually an Indian film in Tamil or Hindi, incomprehensible to 95 percent of the population.

Selisek, of course, has even less recreational opportunity. Even social visiting is largely limited to immediate neighbors who are usually related. Its condition, however, is somewhat improved by proximity to towns.

BIOTIC COMPLEX

The difference between Selisek and Gedangsa in reported "fever" is marked. Although no other symptoms were listed, these fevers no doubt have many etiologies, and some come from enteric and respiratory infections.

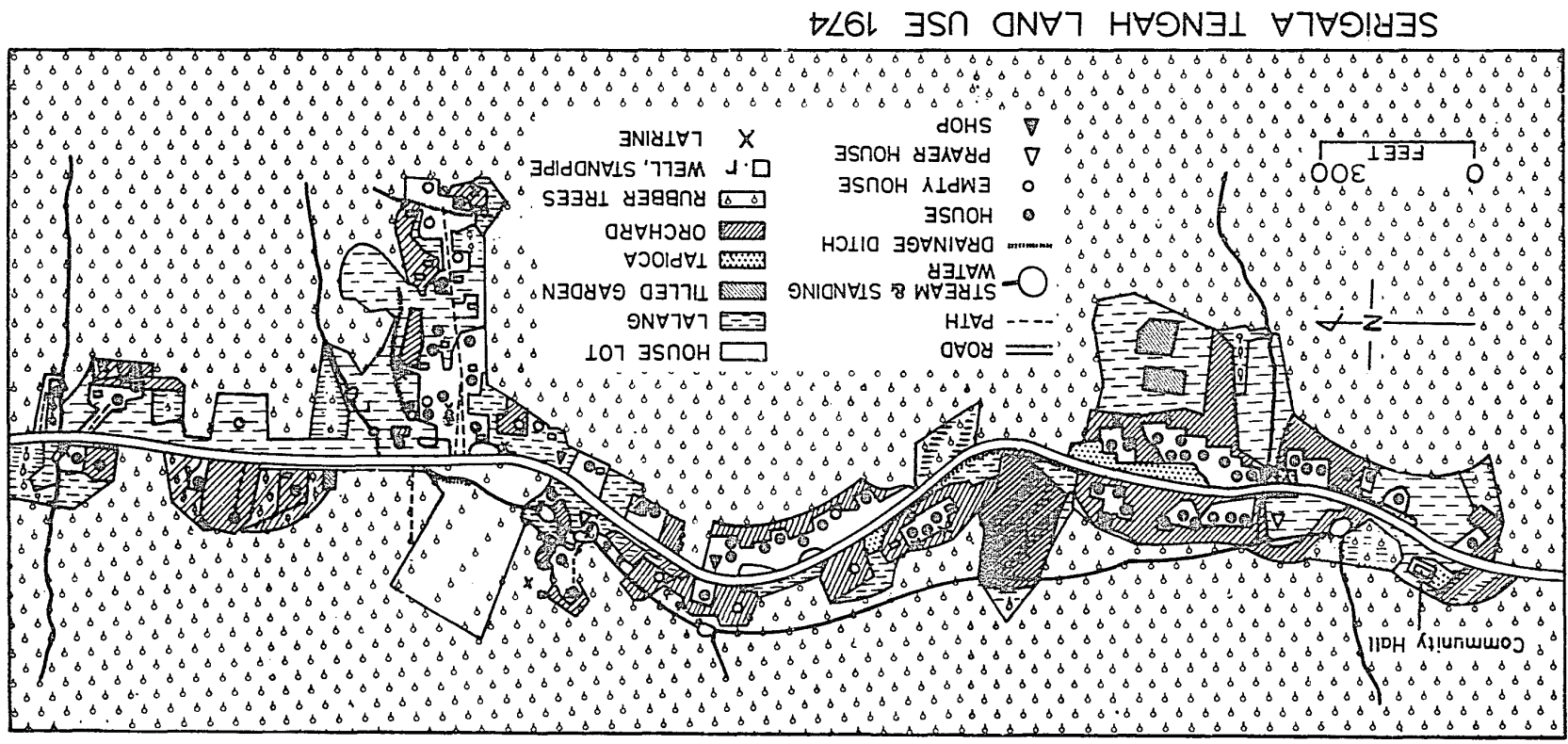
They are considered here, however, as indicators of diseases transmitted by mosquitoes, lice, mites, fleas, and other insects.

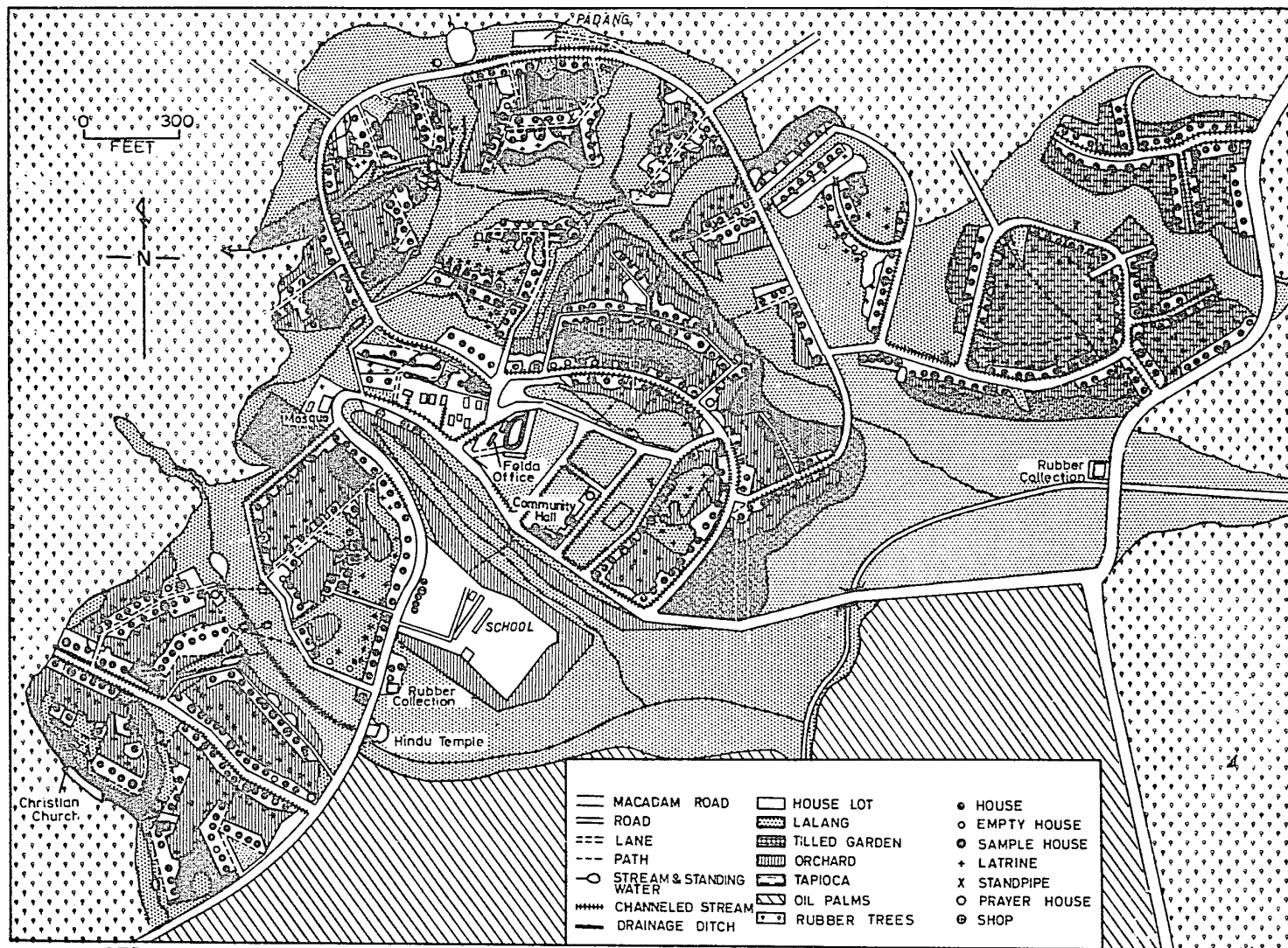
Mosquitoes

The houses in Selisek nestle among cool shade trees which unfortunately also shade mosquitoes, provide water catchment for their breeding, and shelter birds from which they may acquire viruses infective for men. Around the houses at the northern end of the village are numerous shallow uncovered wells among standing, stagnant water and sluggish streams. Here the shade trees and the sunshine of the house-clearings provide a variety of breeding sites. On the southern end the laundry pond lies amidst rubber trees, fed and drained by a slow-flowing stream. The people within their houses are within flight range of mosquitoes from all these sites (Fig. 8).

On the old phases of Gedangsa, houses also nestle comfortably among fruit trees (Fig. 9). There are ravine streams which have been channeled to minimize swamps, but the channels are old and occasionally choked with brush. A major change in the vector relationships, however, has been in the population's interaction with them. The stream on Gedangsa are used only for children's play and fishing (Plate I). On rare occasions, when the water supply has been shut off for several days and the stored water is exhausted, people may revert to them.

Figure 8
Serigala Tengah Landuse, 1974





GEDANGSA LAND USE 1974.

Figure 9

Generally, however, the standpipes remove people from the breeding sites while they are bathing and washing the laundry. In addition, the central location of the village puts most houses out of reach of forest mosquitoes. Many houses are removed from those of the ravines as well. Houses are sprayed twice a year with insecticide to control malaria. For protection from mosquitoes within their homes, 73 percent of the sample in Gedangsa reported that they used mosquito nets at night. An additional 3 percent had nets only for the children, 14 percent relied upon mosquito coils, and 10 percent admitted taking no protective measure. Comparable figures for Serigala Tengah are 62 percent, 4, 34, and zero--no one admitted to not protecting themselves from mosquito bites. Generally, people do not like to have banana trees near to their homes because they are aware that mosquitoes breed in the water which the trees trap. However, there were commonly cans and coconut shells trapping water in the vicinity of houses, as only a fifth of households in Gedangsa and none in Selisek had a rubbish pit.

The diverse mosquito fauna of the jungle includes many species which are vectors for zoonotic disease. People exposed to them can contract various diseases, especially some arbovirus diseases of monkeys. The niches of the rubber forest are formed by sloping and swampy terrain, stream banks and forest-edge exposures. While the variety of niches is more limited than in the

jungle, numerous species of Anopheles, Mansonia, Culex and Aedes still may breed. The animal life that they feed on is also more limited, consisting mostly of a few species of birds, rodents, and human beings. There is an abundance of stagnant and polluted water from kitchens and baths near the houses, since few have any drainage channels, but rapid evaporation and almost daily heavy rain prevent a large population of Culex fatigans from breeding. As of July, 1973, Aedes aegypti, the vector of hemorrhagic dengue fever in Southeast Asia, had not been found in Felda settlements, although it is widespread in Malaysian towns.

The contact of the population in Gedangsa with the jungle and its particular association of vectors and zoonotic diseases is very limited. Among the sample, 93 percent of household heads never hunt and 70 percent never fish. Only two and five percent, respectively, hunted or fished regularly. Fuel gathering also presents less hazard of exposure to forest mosquitoes than expected, as a full 41 percent use kerosene stoves, and one household used gas. Necessary fuel is usually collected from dead and pruned rubber trees during the work lull between tapping and collecting, a time when people are fully exposed to the rubber forest anyway. Orchards and gardens are commonly tended in the late afternoon, a period of the day when mosquito activity usually is heaviest. Exposure to the forest mosquitoes, however, is mostly

through rubber tapping. During mid-morning hours one-fifth of the population may be in the rubber forest, as it is common for wives to help tap after their children have gone to school (Table 22). A tapper is exposed to both night and day-biting mosquitoes since his day usually begins before dawn when the latex is flowing. The work is laborious. Each of hundreds of trees must have its half-spiral cut skillfully shaved open and its collection cup cleaned of old coagulated (scrap) rubber. After several hours of tapping there is a waiting period while the sap flows. This time is used for pruning trees, cutting grass, fertilizing and otherwise maintaining the lot. When the sun is well up, the tree acts to conserve its water and the flow of sap diminishes. Then all of the hundreds of cups must be emptied into collection cans and transported to collecting stations. The tappers usually return home by one or two o'clock to rest during the heat of the day.

Mites

A potential hazard lies in the intrusion of relatively large areas of lalang and scrub into the settlement in Gedangsa. There are extensive empty, undeveloped lots and road right-of-ways which contain only footpaths. The invasive coarse grass lalang (Imperata cylindrica) vigorously occupies all such areas and creates a habitat for field rats and the vector mites of scrub typhus (Fig. 9).

To determine whether there was any risk of scrub typhus, rat trapping was carried out over a period of a month in three ecological zones of the settlement area: grass lots (lalang) within the village, ravine swamps and other badly drained areas, and rubber lots on the fringe of the settlement. Fifteen rats were trapped, chloroformed in plastic bags to preserve all the parasites, and carried to the laboratory in Kuala Lumpur for identification. Both the trombiculid mite vectors of scrub typhus, Leptotrombidium deliense and Leptotrombidium fletcheri (= akamushi) were present within the settlement. Although the two house rats caught (R. diardi) did not harbor any vector mites, two of the four field rats (R. argentiventer) and all three R. exulans harbored considerable numbers of L. akamushi. Of the rats trapped within village lalang areas, a full 56 percent harbored L. akamushi, totalling 197 mites. The most active trapping area for rats was in the grass around the community hall in the undeveloped shop lots. People going to the community hall for meetings, children attending kindergarten there, people in transit to the Felda shop, and crowds assembling for the monthly movie walk daily along paths through these fields. The present levels of antibodies to scrub typhus among the population and its past experience are unknown, but if the pathogen should be introduced (by a migrating rat, perhaps) the potential exists for a scrub typhus outbreak among the general population. The hazard of

these associations in Gedangsa is the mirror image of those in Selisek. In the latter, a little lalang occurs along the road but it is most extensive in rubber lots and replantings where tappers are occupationally exposed. In the former, the rubber lots are well cut and maintained, but lalang is rampant along the paths and field with which the sedentary population regularly interacts.

Measures to control vector habitats include the spraying of houses with insecticide as already mentioned, and the spraying of lalang with herbicide as well as its burning and manual cutting. The chemical controls can themselves constitute a hazard. In May, 1972, before the time of this study, there was an epidemic of severe hives in Gedangsa. Thirteen teenagers, who suffered from incapacitating swelling and who required treatment for several months, were found to have been spraying sodium arsenate, a chemical widely used by estates in Malaysia for control of lalang. The herbicide has already been found at periodic levels well above minimum health standards in rivers in Johore. These peaks are believed to result from the rinsing of containers in the rivers and similar careless behavior.¹ During the period of study in Gedangsa several settlers dumped gallons of insecticide into a stream upriver from the settlement and effected a large fish kill. It was reported that a person bathing down river was at least temporarily blinded. Chemicals have been widely and loosely introduced without

adequate controls or educational campaigns, and there is little appreciation of their potency among the population.

Fevers

If fevers without respiratory or enteric symptoms are assumed to be indicators of vector-borne disease, the condition in Gedangsa is much healthier than in Selisek (Table 9, Appendix II). The register indicated that one third of fevers were taken to the clinic, which would suggest an annual incidence of unassociated fever of roughly 160 per thousand in Gedangsa. Over two thirds of fevers were suffered by children under fifteen. Of the 161 cases of fever brought to the Gedangsa clinic in one year, nine were confirmed to be malaria. When mapped, six of these cases were located in the circular Phase III area along the rim of the main ravine-wasteland area of the scheme. In Serigala Tengah, in contrast, half of the fever complaints in the register were among people over 35. Only one quarter were taken to the clinic, the others being treated by home remedies and the bomoh. This would suggest that the true number of fevers in Selisek probably exceeds 1,500 a year. Eleven malaria cases occurred in Serigala Tengah. Cases were not significantly clustered, but two households suffered two infections each (Fig. 10). All houses are within flight range of mosquitoes in the marshy area, rubber forest, or fruit trees.

Table 14

Ectoparasites from Rats Trapped in Gedangsa

Rat Species	<u>Lalang</u>		<u>Swamp</u>		<u>Rubber forest</u>		<u>No. rats harboring</u>		Total no. rats trapped
	No. rats	vector mites	No. rats	No. vector mites	No. rats	No. vector mites	L. deliense	L. akamushi	
R. diardi	2	-	-	-	-	-	-	-	2
R. jalorensis	-	-	4	1	1	2	2	-	5
R. argentiventer	4	97	-	-	-	-	-	2	4
R. whiteheadi	-	-	-	-	1	-	-	-	1
R. exulans	3	100	-	-	-	-	-	3	3
No. rats harboring vectors	5		1		1				
TOTAL TRAPPED	9	197	4	1	2	2	2	5	15

Note: Other trombiculid mites were harbored by 27 percent of rats, including 100 percent of those caught in rubber forest. Laelapidae mites (non-vectors) were harbored by 73 percent of rats, and lice by 40 percent.

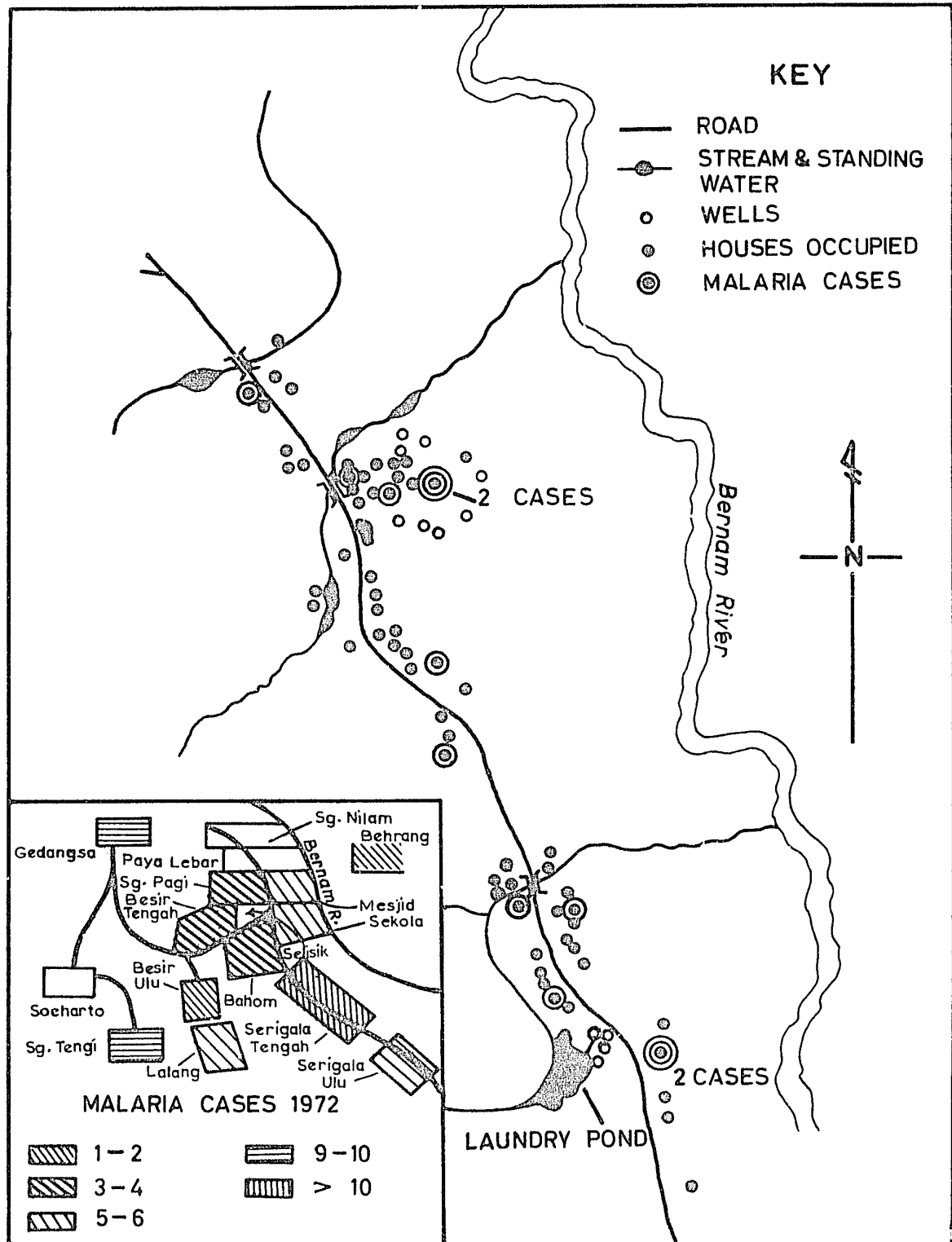


Figure 10
Malaria in Serigala Tengah. Inset shows incidence for villages of Selisek health district

Other hazards in the biotic complex include insect stings and snake bites. During the year, four people in Gedangsa were rushed to the hospital for snake bites which were possibly poisonous (suspected black cobras). Eight people sought clinic treatment for stings and bites by poisonous insects from bees to scorpions. One man, a tractor driver, was taken unconscious to the hospital after being stung by hundreds of wasps. Such encounters with snakes and insects seems to be less common in Selisek where the land is seldom now disturbed.

LOCATIONAL COMPLEX

The road from Tanjong Malim passes through Selisek, which has a footbridge across the Bernam River to Behrang, reaches Gedangsa, and then turns sharply and proceeds on through landscheme Soeharto to landscheme Sungai Tinggi (Fig. 5). These are important places for people in Gedangsa: in landscheme Soeharto is the nearest secondary school, in Selisek is the health sub-clinic, in Behrang is the closest market, and in Tanjong Malim are the nearest hospital, major market, cinemas, mechanics, and general shopping. Public transport is provided by a bus which makes a two-hour circuit through the three land schemes, Selisek, and Tanjong Malim. Selisek is only five miles from Gedangsa, but these are long miles which place Behrang beyond the range of children on bicycles and interrupt the almost continuous line of houses along the road which

encourages vendors to keep going. Perceptually, the distance isolates the settlers in the jungle away from the villagers. Many schemes are more remote than Gedangsa, but additional miles change the degree rather than the kind of conditions.

Table 15
Distances to Gedangsa

Gedangsa to:	Selisek	Tanjong Malim	Soeharto	Sungai Tenggi
Miles	5	14	6	13
Bus fare M\$.30	.60	.30	.65

Source: Field data.

As can be calculated from the table, for a family of five in Gedangsa to go shopping and see a movie in Tanjong Malim would cost M\$6, or nine percent of their support pay. The cost would be double for a family on Sungai Tenggi scheme--almost one fifth of their monthly income. Traveling is not undertaken lightly and the major reasons are for economic and educational purposes.

Economic and Service Contacts

Contacts with other places are essential for obtaining information, funds, and material. Among the most crucial relationships are those involving marketing.

The planned commercial center in Gedangsa has not developed. It consists of a coffee shop, a bicycle repair shop, and the Felda store. The Felda store provides a wide range of household goods and dried foodstuffs, but no fresh produce. It keeps regular but restrictive hours which settlers sometimes find inconvenient. To supplement it, thirteen "illegal" (haram) shops have sprung up, some along the shoulder of the road and others of which are special rooms in settlers' houses. All are uncontrolled but all are very convenient, being scattered around the settlement and open whenever people are awake. These shops are kept by the parents and wives of settlers. Several of them sell fresh produce--fish and green vegetables--as well as dried food. Most of their supply comes from a single merchant's van which visits Gedangsa and the other schemes, but a few shopkeepers go to Tanjong Malim everyday by bus. The one vendor who comes to Gedangsa sells only icecream. Settlers sometimes go by motorcycle to Behrang or Tanjong Malim to shop, such trips accounting for more than one fifth of all trips (Table 16).

Price variations among shops within Gedangsa were erratic and insignificant. Although not under government control, shopkeepers were familiar with a list of basic prices put out by the district officer, and they found competition too active to deviate much from it. They were reluctant to sell vegetables because it was unprofitable, since during transportation without ice the vegetables

Table 16
 Purpose of Trips from Gedangsa and
 Serigala Tengah, Selisek

Purpose	Percentage	
	Gedangsa	Selisek
Shopping/recreation	33.6	38.1
buying	22.8	31.6
'Walking'	10.8	6.5
School	42.7	42.3
Visiting	15.4	3.8
Working	1.8	8.0
Health care	4.6	-
Accompanying relatives	0.7	0.4
Selling	-	6.4
Other	1.2	1.0
Total trips	2,075 ^a	1,926 ^b

^aNineteen weeks.

^bFour weeks.

Source: Field data

lost weight, reducing the narrow profit. Produce which was sold in Gedangsa, moreover, was very limited in variety, only two or three kinds of vegetables and one or two kinds of fish. No fruit was sold by any shop.

Price variation between Gedangsa and more accessible places results in a cost of living which is 13 percent higher than Tanjong Malim and 24 percent more than Behrang (Table 17). The increase in cost over shop outlets in Selisek was only eight percent, but most people in Selisek bought their food in Behrang. The higher income level of settlers should result in better nutrition, but only certain supplies are available for them to buy. Because of Gedangsa's location, available food is both limited in variety and high in price.

Despite the diseconomies of the distance to outside sources of food and the complementary agricultural potential of Gedangsa's four phases, there is no internal marketing or distributional system in Gedangsa. The settlers in Phase IV, not yet tapping, have planted their entire houselots in tapioca and achieved a large surplus which was not marketed. Fruit trees in the old phases are yielding abundantly, but Phase IV must obtain any fruit from outside. Chickens are sometimes raised, but with very low egg production and with major disease problems. Livestock is very limited, and it is usually consumed as meat (goat) only at very occasional feasts. The potential that exists is illustrated by the few Chinese settlers in

Table 17

Comparative Prices of Basic Provisions
Per Kati^a or Unit, January 1973

Item	Gedangsa Soeharto Sg. Tenggi Selisek Behrang Tg. Malim					
Coconut oil	.68	.68	.68	.60	.55	.60
Eggs	.15	.15	.15	.14	.14	.13
Sugar	.45	.45	.45	.45	.45	.45
Bilis fish	1.42	1.35	1.32	1.39	1.20	1.40
Dried fish	.60	.78	.66	.70	.45	.80
Chili	1.22	1.26	1.21	1.20	1.00	1.00
Milk	.65	.65	.65	.65	.60	.60
Onions, large	.58	.58	.52	.50	.45	.50
Onions, small	.55	.55	.45	.50	.38	.40
Bean sprouts	.25	.22	.23	.20	.20	.20
Green beans	.34	.31	.30	.30	.25	.20
Mustard leaves	.30	.32	.30	.30	.25	.30
Cucumber	.30	.30	.28	.25	.20	.30
Potatoes	.45	.44	.44	.40	.35	.35
Cabbage	.45	.44	.44	.40	.35	.35
Coconut	.20	.22	.22	.20	.20	.20
Taro	.25	.20	.22	.20	.20	.20
Cincahi fish	1.00	.92	.85	.70	.70	.70
Chicken	-	-	-	-	-	1.80
Beef	-	-	-	-	-	2.00
Total shopping list	9.84	9.82	9.30	9.08	7.92	8.68 without meat

^aOne kati equals 1.3 pounds.

Source: Field data.

Phase I who raise vegetables along a ravine stream and by the five settlers who still work at the fish pond there. The agricultural potential of Gedangsa's settlement land, as distinguished from its commercial cropland, is poorly developed. The pattern continues to be similar to that in Selisek, where Malays working in a poor but highly commercialized economy purchase most of their food. When weather prevents tapping in Selisek, the food situation rapidly deteriorates. Selisek's sometimes severe conditions are avoided by organization in Gedangsa which provides a vital buffer against the vagaries of the weather through basic subsidy payments.

Job opportunities are also important for the health of a place. These are decidedly limited in Gedangsa. Every settler is a rubber tapper and must be so employed, although the several widows sometimes hire laborers. Those who have started small shops are under pressure to relocate in the undeveloped central commercial area. It would be possible for a youth resident on the scheme to open a carpentry or hairdressing shop in that center, but very difficult to get training. The one major source of employment is as a field laborer on the adjacent oil palm land. Youths vie to labor as pollinators and women commonly work as weeders and prayers. Even at the level of a cluster of the three schemes, however, there is little diversification of the local economy, such as might be seen in cottage industries, small factories or artisan shops. The only

industry is the oil palm mill at Soeharto, which does employ a few Gedangsa youths. Gedangsa is too remote for its residents to commute to work in any town, and the knowledge of available jobs and job training elsewhere is very limited. The general paucity of employment opportunity is indicated by the absentee population, especially when it is remembered that the population is still very young (Fig. 7).

Even more than in the case of employment, people in Gedangsa are at a disadvantage for health care and other services. For emergencies the scheme Land-Rover can be used if it is available. Whether it or the bus is used, the travel is time-consuming. Minor health concerns, especially those of a preventive nature, are sensitive to the friction of distance, as can be observed in the statistics for dental treatment (Table 9). Once the threshold of the expense and inconvenience of leaving the scheme is reached, however, many prefer to go all the way to the hospital rather than to the nearest health assistant in Selisek.

In the matter of educational services, Gedangsa has not been adversely affected by its location since the establishment of a secondary school at Soeharto. It has its own elementary school, as does Selisek, but the journey to secondary school is the largest single component of mobility in either place (Table 16), and the presence of a school nearby is a major asset.

Table 18

Source of Food in Gedangsa, Serigala Tengah, and Selisek, 1973
Percentage of Households

	Gedangsa			Selisek		
	All homegrown	Purchased and homegrown	All purchased	All purchased	Purchased and homegrown	All homegrown
Eggs	43	5	52	40	29	31
Chickens	50	2	48	30	2	68
Meat	2	12	86	92	7	1
Tapioca	66	-	34	52	29	19
Onions	-	-	100	100	-	-
Cabbage	-	-	100	100	-	-
Greenbeans	-	-	100	98	2	-
Chili	16	3	81	98	2	-
Jackfruit	69	-	31	54	28	18
Pineapple	3	-	97	44	33	23
Bananas	88	-	12	7	23	70
Durian	2	-	98	40	10	50

SUPPLEMENTARY ACTIVITIES

	regularly	sometimes	never	never	sometimes	regularly
Hunting	12	17	93	84	14	2
Fishing	5	2	70	50	45	5

Source: Field data.

Social Contacts

Gedangsa's social contacts with other places reflect the origins of its settlers. Less than one tenth of its outmigrants visited Kuala Lumpur (Table 8), and less than seven percent of its visitors come from there (Table 19). Most of Gedangsa's contacts, of course, are in the vicinity, but those for visiting cover a broad area (Table 20). People in Selisek, too, have contacts outside the vicinity. These are of two main types: relatives who have gone to Kuala Lumpur, and relatives in nearby villages across the state line in Perak. While those in Selisek did little visiting, they had many visitors--especially when the durians were ripening.

The trips for shopping/recreation and for visiting summarized in Table 20 are very different in character. Trips are classified as "shopping/recreation" because the purpose of going to town to buy a few items and of going to talk in the coffee shops, walk around the streets and "eat the breeze" are indistinguishable. In Gedangsa, the travellers for these trips are almost entirely male. They are mostly settlers going to town once a week on their motorcycles. In Selisek the travellers are less distinct as a group because Behrang is an easy trip by bicycle. Children go daily to buy food. People in Gedangsa usually journey to visit relatives only once or twice a year, but then the whole family usually goes. The sex ratio for visiting trips is

Table 19
Origin of Visitors in Register
Gedangsa and Serigala Tengah, Selisek

Origin	<u>Percentage of Visitors</u>	
	Gedangsa	Selisek
Vicinity ^a	31	48
Kuala Lumpur	7	12
Total Selangor	90	65
Perak	3	26
Other states	7	9
Total no. of visitors	454 ^b	166 ^c

^aIncludes Gedangsa, Soeharto, Sungai Tenggi, Selisek, Behrang, Tanjong Malim.

^bNineteen weeks of register.

^cFour weeks of register.

Source: Field data.

almost even, all ages are involved, and the means of transportation is the public bus.

The separation of people in Gedangsa from their relatives has several effects. One is socio-psychological in that people feel isolated. They miss their relatives and old neighbors, suffer that they cannot easily visit them, and find that even during times of need, such as bearing and sickness, they must travel long distances or go without help. Some new settlers find this separation extreme and unbearable and they leave the scheme and return

Table 20

Destination of Trips from Gedangsa, Serigala Tengah,
and Selisek by Major Purposes

Destination	<u>Percentage of Trips for</u>					
	<u>Shopping/Recreation</u>		<u>Visiting</u>		<u>Total of all Trips</u>	
	Gedangsa	Selisek	Gedangsa	Selisek	Gedangsa	Selisek
Vicinity ^a	96	99.7	26	39	85	96
Kuala Lumpur	1	0.3	7	7	2	0.5
Other Selangor	-	-	52	7	10	0.5
Total Selangor	97	100	85	53	97	97
Perak	2	-	10	47	2	3
Other states	1	-	5	-	1	-

^aIncludes Gedangsa, Soeharto, Sungai Tenggi, Selisek, Behrang, Tanjong Malim.

^bNineteen weeks of register.

^cFour weeks of register.

Source: Field data.

to their villages. For most settlers in the new phases, the separation is a psychological hardship productive of much unhappiness.

A second effect results from the far-flung contacts that are made when visits do occur. Children who have been protected in Gedangsa may be susceptible to infections in the traditional villages visited. More importantly for the community, returning travellers have the potential of introducing infections from the area visited--endemic ones such as malaria, or epidemic ones such as cholera. Selisek's mobility pattern, which is one of frequent and intense local intercourse but little travelling to other places, does not expose the community to such wide contacts. The population of Gedangsa, furthermore, is a much larger aggregation of individuals with a geometrically greater potential to introduce disease agents from their scattered contacts.

Another hazard inherent in the mobility patterns of Gedangsa is exposed to motor vehicles. The theme of Selisek's mobility is intensive, local contact by most elements of the population, including children (besides school trips) and old people. Children ride their bicycles to the market, and teenagers take the bus to visit relatives in nearby villages. Except for migration to Kuala Lumpur and visitors from there, the range of contacts is mostly confined to the vicinity. Motorcycle and motor vehicle ownership in Selisek conformed with the general rural

pattern (Table 7), and exposure time is small (Table 21). In contrast, it is difficult to go anywhere from Gedangsa by bicycle. Men are most mobile. When other family members travel, it is usually altogether on long journeys to visit relatives. The isolation of Gedangsa together with the higher incomes encourages motorcycle ownership (Table 7), and exposure time to motor vehicles by the head of family is rather high (Table 21). Roads are winding, wet and dangerous, drivers inexperienced, safety regulations unenforced, and the general level of safety awareness among settlers is low. Furthermore, one adverse part of the organizational complex is that the imposition of both progressive and restrictive measures from above has fostered a "we"- "they" attitude between settlers and administration. Safety information and promotion, such as the wearing of motorcycle helmets and proper licensing, is therefore likely to be treated as a contest with authority rather than as a program of popular participation and benefit.

The register trip data was used to estimate the time people spend at risk to the various hazards of motor vehicles. In Gedangsa, travel by bus is by far the most important in this respect, while the more dangerous motorcycle accounted for 11 percent of exposure time. Mobility is limited. The 1,770 trips in the vicinity during those nineteen weeks average to 6.4 trips per person per year. When school trips are ignored, there is an average of only

Table 21

Exposure to Motor Vehicles: Minutes per Person per Week
Gedangsa and Serigala Tengah, Selisek

<u>VICINITY ONLY</u>												
<u>Gedangsa</u>												
Age	<u>Motorcycle</u>		<u>Bus</u>		<u>Car</u>		<u>Bicycle, other</u>		<u>Total of all Means</u>			<u>Percent of</u>
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total	Total
Under 6	1.1	0.7	6.3	6.9	-	0.2	0.1	-	7.6	.78	7.7	9.6
6-15	0.1	0.1	13.1	10.3	0.1	0.2	0.1	0.1	12.9	10.7	12.0	35.1
16-25	-	0.2	5.3	8.1	-	0.1	-	-	5.3	8.4	7.1	5.9
26-35	17.1	2.6	18.3	10.9	1.4	0.6	3.8	0.2	40.6	14.3	25.7	23.1
36-45	7.1	0.2	31.9	6.3	0.6	0.2	2.2	-	41.7	6.7	25.9	20.2
over 45	2.7	0.6	13.1	11.7	0.2	-	-	-	16.0	12.3	14.8	6.1
Average Per Person	3.2	0.6	13.9	9.2	0.3	0.2	0.7	0.1	18.1	10.1	14.1	97,510 Total Minutes ^a
% Total	11.3	2.1	49.3	32.5	1.0	0.8	2.6	0.3	64.3	35.7	100.0	

^a19 week register.

Table 21 (continued)

Exposure to Motor Vehicles: Minutes per Person per Week
Gedangsa and Serigala Tengah, Selisek

<u>Selisek: Serigala Tengah</u>												
Age	<u>Motorcycle</u>		<u>Bus</u>		<u>Car</u>		<u>Bicycle, other</u>		<u>Total of all Means</u>			<u>Percent of</u>
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total	Total
Under 6	-	-	0.8	-	-	-	0.4	0.4	1.3	0.4	0.8	0.5
6-15	-	-	22.1	12.5	-	-	5.7	0.9	27.8	13.4	21.2	33.5
16-25	-	-	16.5	13.7	-	0.2	13.6	5.8	30.0	19.7	23.6	20.5
26-35	5.0	1.0	5.0	5.0	1.6	-	31.7	2.5	43.4	8.5	21.6	8.0
36-45	9.1	0.6	4.3	9.0	2.2	-	27.9	4.8	43.4	14.4	24.8	15.0
over 45	-	-	15.0	13.7	-	-	39.5	4.3	54.5	18.0	34.5	22.5
Average Per Person	1.3	0.2	14.4	10.3	0.4	0.1	15.0	3.2	31.0	13.0	21.5	6,443 Total Minutes ^b
% Total	2.7	0.5	30.4	26.1	0.7	0.1	31.6	7.9	65.4	34.6	100.0	

^b4 week register.

Table 21 (continued)

Exposure to Motor Vehicles: Minutes per Person per Week
Gedangsa and Serigala Tengah, Selisek

<u>TOTAL EXPOSURE, ALL TRIPS</u>												
<u>Gedangsa</u>												
Age	<u>Motorcycle</u>		<u>Bus</u>		<u>Car</u>		<u>Bicycle, other</u>		<u>Total of all Means</u>		<u>Percent of</u>	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total	Total
Under 6	1.1	0.7	16.1	12.2	0.8	1.8	0.1	-	18.1	14.7	16.5	11.5
6-15	0.1	0.1	20.6	14.1	0.6	1.3	0.1	0.1	21.4	15.7	18.5	30.3
16-25	0.8	0.2	14.7	20.7	-	1.1	-	0.6	15.6	22.1	19.4	9.1
26-35	21.5	3.7	25.4	19.7	4.6	2.1	6.7	0.2	68.2	25.6	44.1	22.1
36-45	15.1	0.2	53.4	15.8	0.6	0.9	3.5	-	72.6	16.9	47.5	20.7
over 45	5.9	0.6	19.8	25.3	1.1	1.8	1.1	-	27.9	27.7	27.8	6.4
Average Per Person	5.0	0.8	24.7	16.0	1.1	1.5	1.3	0.2	32.1	18.4	25.2	174,510 Total Minutes ^a
% Total	9.9	1.5	49.0	31.7	2.1	2.9	2.6	0.3	63.5	36.5	100.0	

^a19 week register.

Table 21 (continued)

Exposure to Motor Vehicles: Minutes per Person per Week
Gedangsa and Serigala Tengah, Selisek

<u>Selisek</u>												
Age	<u>Motorcycle</u>		<u>Bus</u>		<u>Car</u>		<u>Bicycle, other</u>		<u>Total of all Means</u>			<u>Percent of</u>
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total	Total
Under 6	-	-	5.0	4.2	-	-	0.4	0.4	5.4	4.6	5.0	1.6
6-15	-	-	28.9	17.2	-	0.5	5.7	6.1	29.2	24.4	27.0	24.4
16-25	-	-	37.9	37.3	-	0.1	13.6	5.8	51.4	43.3	46.3	23.0
26-35	25.0	1.0	46.7	25.0	1.7	-	31.7	25.0	105.0	28.5	57.2	12.2
36-45	22.0	0.6	25.7	15.0	5.7	-	32.1	9.6	85.5	25.2	46.8	16.2
over 45	-	2.6	33.9	39.8	-	4.3	39.5	4.2	73.4	51.0	61.1	22.7
Average Per Person	3.9	0.6	26.5	23.7	0.7	1.0	15.4	5.3	46.5	30.5	37.8	11,292 Total Minutes ^b
% Total	4.7	0.8	31.9	34.1	0.8	1.4	18.5	7.7	55.9	44.1	100.0	

^b4 week register.

Source: Field data.

2.4 trips per female and 6.2 trips per male per year. Like all averages, these figures mask the fact that over a quarter of the population never left the scheme at all during the study, even though it included the major religious and social festival ending the Moslem month of fasting. Exposure time, especially to buses, leaps when the more distant visiting trips are included. This increased exposure to motor vehicles made possible by higher incomes and necessitated by Gedangsa's location is reflected in the higher accident rate, one of the few health conditions that deteriorated (Table 9, Table 10). Despite the fact that accidents are greatly under-recorded because many cases are brought directly to the hospital, and others, involving drivers without licenses, are suppressed, there were 15 motorcycle accidents recorded in Gedangsa in 1972. One settler was killed while traveling by motorcycle to visit his home village, an event that went unrecorded in the clinic record.

BEHAVIOR, EXPOSURE, AND MORBIDITY

The population of Gedangsa is a selected one, the old, the sick, and unmarried adults having been excluded from entry. For children now of an age to enter secondary school, it is the only major environment--for some, indeed, the only one--they have ever known. Few people have more than a very occasional contact with another place.

The health of the people is directly protected and promoted by the provision of sanitary facilities, piped and chlorinated water, nursing, midwife and family planning services, and the spraying of insecticides. Several forms of more indirect protective behavior are also operating. Most houses in the centrally-located settlement, for instance, are beyond the reach of jungle mosquitoes. The monthly payment system serves to establish a basic minimum support which buffers the population from large economic fluctuations and helps prevent any associated severe fluctuations in nutrition. The large rubber lots and high productivity have undoubtedly succeeded in raising the economic level of the population and, with it, their food buying power.

Yet the location of the scheme has served to raise the cost of living. Despite the complementarity of the phases of settlement, little food is produced within the scheme and less is exchanged or distributed. The Fel-da shop provides basic canned and dried foods, but no fresh vegetables, fruit or fish. These are particularly deficient on the newer phases of the scheme, but in general are available only from house shops serving as outlets for Tanjong Malim produce.

Behavioral changes that would maximize the advantages for health of the provided utilities are slow in occurring. Such unchanged behavior, for example, as indifference to children's habits of defecation, the multiple sharing of a

towel for bathing, and inattention to drying and cleaning ears has meant that helminthic, skin, eye, and ear infections continue to be high.

The population's exposure to the various potential health hazards is dependent upon its behavior which, in turn, is differentiated by age-sex roles. The three major exposure differences involved are those to home, school, and rubber forest. The home, of course, is of overwhelming importance to all, but especially so to small children and the women who look after them. Two groups must therefore be differentiated among the "sit at home" people, the under sixteens and the adults. Most small children spend the morning or afternoon in school, but even some eight year olds have "finished with schooling." Their play areas include the house lot and cool shelter under the house, orchard land between houses, and the ravine swamps and streams of the settlement. Some women spend the morning doing laundry at the stand pipe and cooking for the midday meal--food which will be saved, unrefrigerated, for evening. Especially if there is a teenage daughter or a grandmother around to watch the children, the women frequently assist in the tapping. In the late afternoon coffee shops are full and neighbors visit. When it rains, the tappers too must join the "sit at home" population because very wet trees cannot be tapped as the latex becomes too diluted to be collected. On such days, the orchards and houselots may receive attention. Some wives

and teenagers go to work on the adjacent oil palm land as laborers where they are exposed in the field to grass and its associated rats, mites, and snakes, as well as to mosquitoes and various chemical hazards. The main variation on this daily schedule occurs on Sunday. Then most of the population is at home and there are occasional trips to Tanjong Malim.

Some of these differences in exposure to health insults are reflected in the morbidity recorded in the register (Fig. 11). Respiratory complaints and fevers may reflect the susceptibility of children and their assemblage in school. Accidents are highest for tappers and include wounds from tools and snake bites as well as motorcycle falls. The rates for "organs," which involve eye, ear, mouth, and urino-genital problems, reflect the age of the tappers and housewives. The high rate for female "other" is mostly comprised of teenage toothaches.

The pervasive friendliness and the general appearance of ornamental plants and of swept, pounded lots around decorated and modified houses--which are characteristic of the overwhelming majority of households in Gedangsa--evince the basic pride and self-respect of the people. Besides the lack of electricity and the need to repay the costs of development, most discontent is caused by locational remoteness. Trips are necessary for marketing and recreation and visiting, but most of the people,

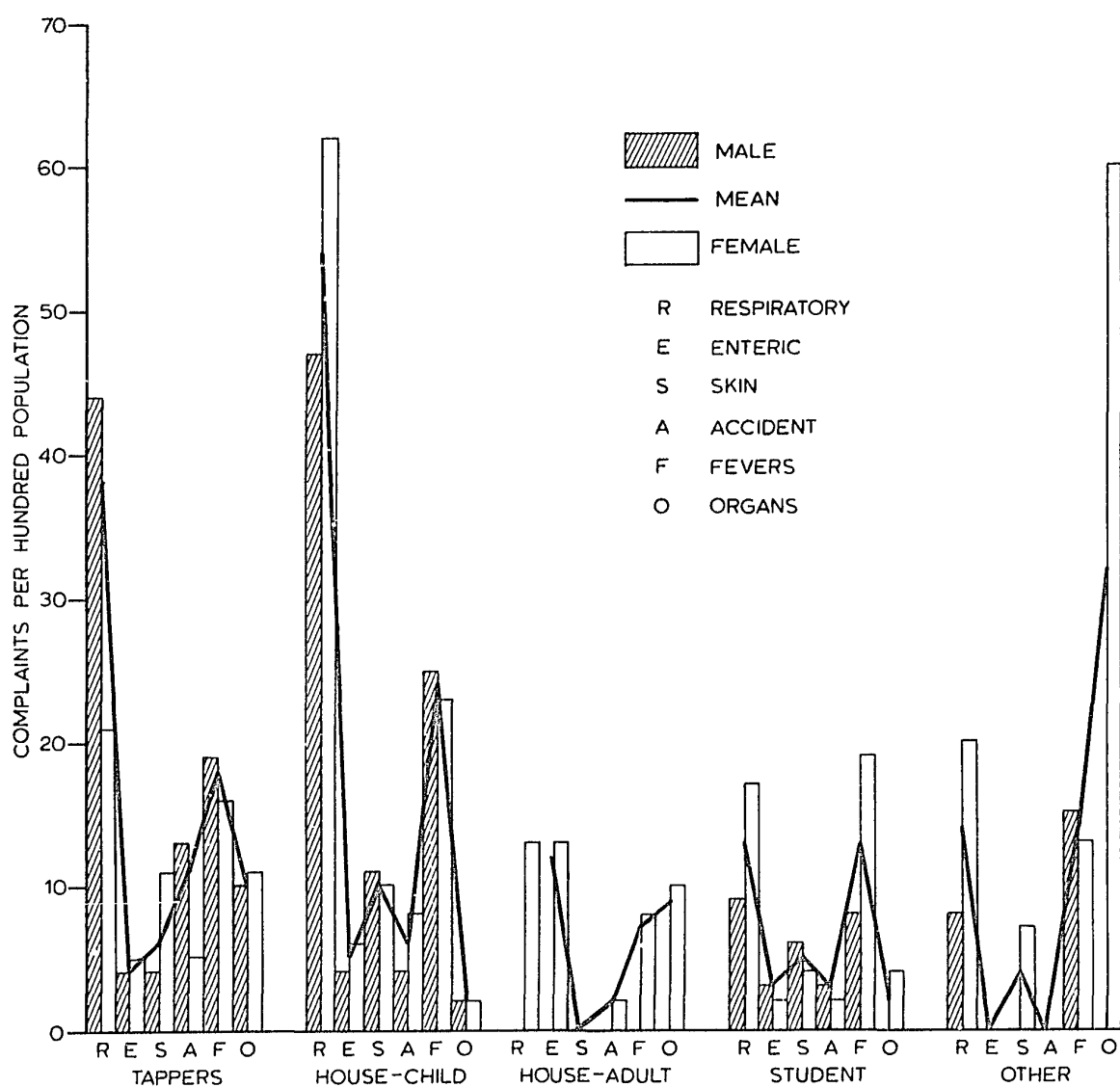


Figure 11

Gedangsa health complaints recorded in the register by occupational role. Rates are calculated per hundred persons in each occupation for a nineteen-week period

especially women and teenagers, are immobile. Employment opportunities within the scheme or in the vicinity are limited. Teenagers are especially frustrated and the out-migration, which is still small in the young settlement, will probably grow.

Table 22
Exposure Time for Activity Pattern, Gedangsa

<u>Percent of Population Present</u> (By Hours)												
	1	2	3	4	5	6	7	8	9	10	11	12
Home	99.7	100.	99.5	99.1	92.3	67.7	56.4	55.3	54.2	53.7	48.8	54.2
School	-	-	-	-	0.5	12.6	21.1	21.4	22.2	23.0	29.6	29.9
Forest	-	-	0.5	00.8	5.5	15.6	18.6	19.2	19.2	18.0	17.5	11.8
Field	-	-	-	-	1.1	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Other ^a	0.3	-	-	-	-	0.5	0.5	0.8	1.1	1.1	0.8	0.8
	13	14	15	16	17	18	19	20	21	22	23	24
Home	76.4	86.3	89.0	84.7	90.4	99.7	99.7	99.7	99.7	99.7	99.7	99.7
School	12.9	11.5	10.4	10.4	8.8	-	-	-	-	-	-	-
Forest	6.8	1.1	-	4.7	0.8	-	-	-	-	-	-	-
Field	3.3	0.8	0.5	-	-	-	-	-	-	-	-	-
Other ^a	0.5	0.3	0.3	0.3	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3

^aPolice office, Felda office, on the road.

Source: Field data.

REFERENCES

¹Government of Malaysia and State of Johore (1972),
Johor Tenggara, 3: Water Resources, pg. 8.

CHAPTER V
THE DIVERSITY IN FELDA: COMPARATIVE
LOCATION THROUGH TIME

Felda is a highly centralized administration operating from Kuala Lumpur. In the central office land is chosen, development coordinated, villages laid out, and personnel assigned. The plan for each scheme is concerned with certain standard things: road access, elementary school, midwife clinic, offices, settlement layout of the universal housetype, water supply, the crop, and various settler organizations. The staff of the schemes have the same basic qualifications and, for most jobs, the same training. Despite this standardization and centralization, however, the effect of place is such that each landscheme is obviously and emphatically unique.

This uniqueness is compounded of many elements. There are highly individualistic elements of manager's training and settlers' personalities. More fundamentally, there are differences between rubber schemes and oil palm schemes. The nature of labor needs for oil palm has inspired a system of block management in which each settler owns his allotted acreage, but shares in a block of twenty lots the maintenance and harvesting requirements and the resultant income. Such a system encourages different political organization, responsibility, disputation, and kind of interaction with Felda administrators than is fostered

by the individual labors of rubber tapping. Also, there is not much a settler can do with oil palm fruit bunches except bring them to the nearest oil palm mill. In contrast, the rubber tapping settler has a ready outlet in any small town shop for his easily transported produce. This has encouraged him to sell his scrap rubber illegally off the scheme. His reasoning is not that Felda pays low for his scrap, as usually he takes a loss in selling it to town merchants, but rather that he repays his debt to Felda as a proportion of his income, and income not recorded is not reduced for debt payments. With varying degrees of seriousness, such illegal selling of rubber scrap has had the effect of requiring staff to perform police functions and of promoting an antagonistic relationship that is less common on oil palm schemes. A further major difference between the two types of schemes follows from the depressed price of rubber for the last five years: oil palm schemes have been much more prosperous than rubber ones, a painful difference which the present rising price of rubber is doing much to alleviate.

Another element causing differentiation of schemes is simply time. According to plan, a few hundred families move into the prepared housing and live on the basic subsistence pay of M\$69 a month. These families maintain the crop for two or three years until maturity, by which time they should be involved in the school and know their neighbors, and the scheme through their labor should be

verdant with fruit trees and vegetables. After a few more years of real income, with home and field skills upgraded by Felda staff, a materially comfortable and healthy community will more than justify the heavy initial development expense, which shall have been largely repaid in any case. This plan is not without fruition. Viable communities have been created, material comfort far beyond that found in any traditional rural village does exist, and education and skills have been improved. Such achievements, however, are not a norm, and time alone does not explain the great variety of states achieved.

TYPES OF SCHEMES

Schemes are also characterized by varying degrees of accessibility, some being accessible by a hard top road and located near a large town, and others at the end of a twenty mile dirt track into the jungle. Situation needs to be considered not only in terms of accessibility to Kuala Lumpur or other cities but also in terms of accessibility to more local considerations: relatives, commercial and employment opportunities, entertainment, and food sources. Much of the highly diverse character of Felda schemes is attributable to their situation and relative stage of development, or comparative location through time. In the discussion which follows, Felda schemes are considered in terms of a nine-cell typology classified according to accessibility and time. As both

dimensions are continuums, categories are somewhat arbitrary. The designation of a particular scheme to a category is occasionally ambiguous. Nevertheless, the typology is useful in conceptualizing the more than twenty schemes studied and numerous others visited, and is suggestive of some patterns in their diversity (Fig. 12).

TIME	Highly Accessible	Accessible	Remote
NEW	Bukit Kuantan	Ayer Tawar I Sungai Panching North Sungai Panching South Sungai Tenggi	Bukit Kepayang Jengka IV
	Bukit Goh	Kampong Sertik Sungai Sayong Belara Sungai Kelamah	Sungai Kemahal
	Pasir Raja Pasak Kemendore	Kampong Awah Jerangau Chalok Soeharto Gedangsa	Ulu Jempol

Accessible Schemes

Accessible schemes correspond most closely to the idealized norm. As they are developed, the road becomes hard-surfaced and bus service and marketing connections are established. The distance of the scheme from urban amenities and higher-order services is not beyond the range of an occasional trip, but is too inconvenient for ready access to daily higher schooling or employment.

Figure 12

General Field Survey: Location of
Schemes Studies

<u>Scheme</u>	<u>State</u>
1. Gedangsa	Selangor
2. Soeharto	Selangor
3. Sungai Tenggi	Selangor
4. Kampong Serik	Pahang
5. Sungai Kemahal	Pahang
6. Bukit Kepayang	Pahang
7. Kampong Away	Pahang
8. Jengka IV	Pahang
9. Ulu Jempol	Pahang
10. Sungai Panching South	Pahang
11. Sungai Panching North	Pahang
12. Bukit Goh	Pahang
13. Bukit Kuantan	Pahang
14. Jerangau	Trengganu
15. Belara	Trengganu
16. Chalok	Trengganu
17. Pasak	Johore
18. Ayer Tawar I	Johore
19. Pasir Raja	Johore
20. Sungai Sayong	Johore
21. Sungai Kelamah	Negri Sembilan
22. Kemendore	Malacca

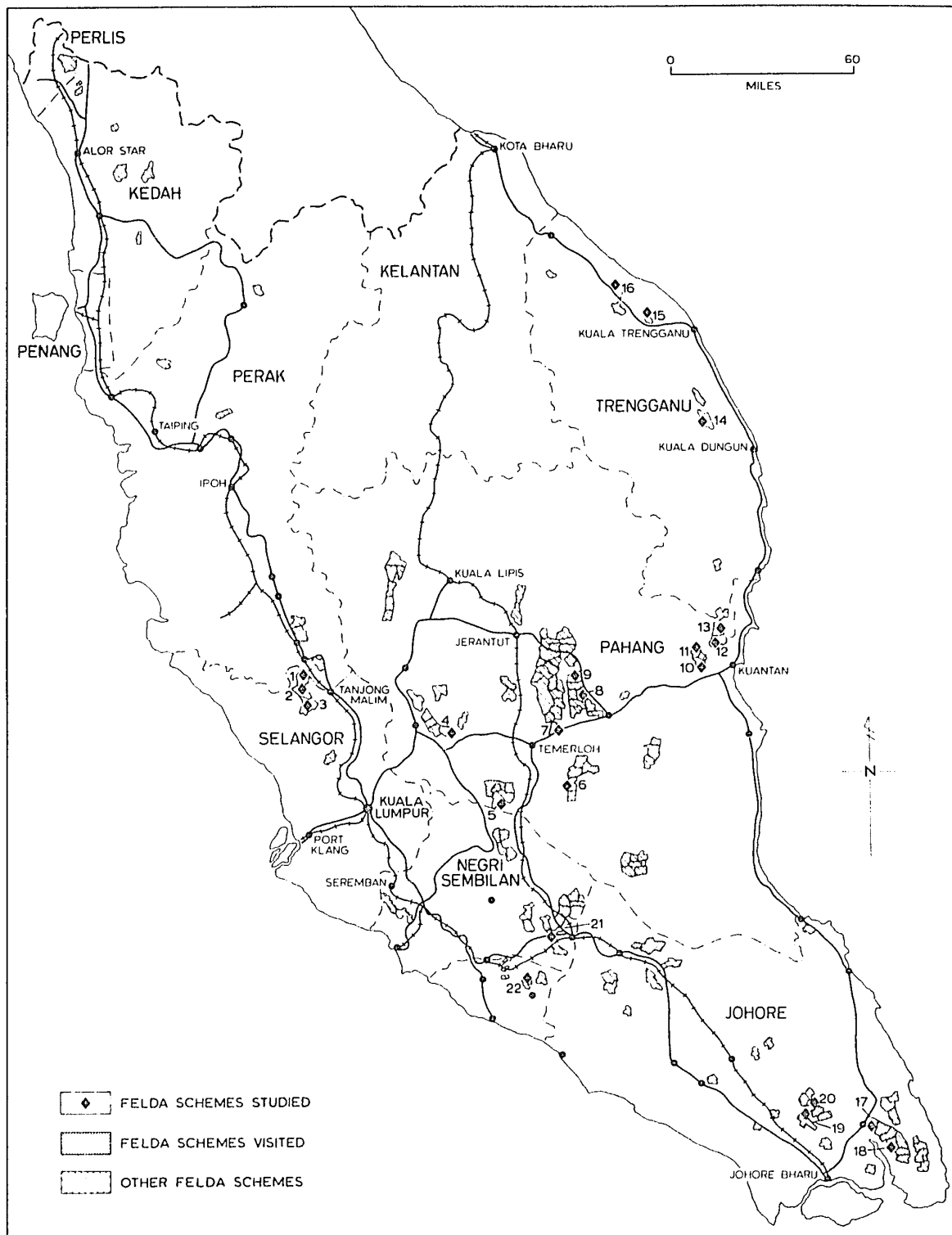


Figure 12
General Field Survey: Location of Schemes Studied

When the schemes are mature, therefore, they are subject to outmigration.

New: Access is usually over five to ten miles of dirt road from a minor macadam road. Hospitals and other services are ten to twenty miles away, and settlers find travel difficult and expensive. Trucks and even taxis do enter the scheme, but there is as yet no bus service. Without electricity, even for staff, there is little entertainment aside from the monthly movie. There is little travel to town even though a quarter of the settlers may have motorcycles. Since crops are not yet harvestable, settlers are living on the basic M\$69 monthly maintenance payment and have little surplus for casual spending. The Felda shop provides canned food at prices up to 25 percent less than in the few illegal house shops, but the house shops serve as the outlets for fresh produce. This is commonly brought in by a single van from the nearest market town--at prices from five to ten percent higher. Some vegetables, such as tapioca and chillies, are grown, but fruit trees are not yet mature and no animal husbandry is yet established. There are usually extensive areas of swamp and lalang within the settlement. Malaria may infect 50 percent of households or more.

Most of the settlers are newly married and families are still small--an optimal situation for instituting population control. A full 14 percent of settlers on

Sungai Panching South, for example, have no children, 34 percent have one or two, and 43 percent have three to five. Settlers are poor, the cost of living is high, and women desire work. Since the chief obstacles to family planning are fear, rumor, and ignorance, positive response to the educational efforts of the midwife and settler development officer comes quickly. The Women's Institute and settlers' association are active, and staff tend to be fairly enthusiastic.

Conditions are hard, but difficulties are recognizably temporary. There are few abandoned houses, the main reason for return to the villages being for childbirth.

Established: Within a few years of achieving production, conditions change and the settlement becomes well established. The rawness and bare earth disappear, fruit trees mature, and cows and goats may browse along the roadside. Lalang and swampland are now under control, but there is a general absence of intensive land uses or surplus production for sale off the scheme. These schemes usually have a macadam road and a minimum bus service, but where they are lacking, over half the settlers may have motorcycles. Although a single merchant's van remains the source of most fresh produce, the improved accessibility and incomes of the settlers allows the procuring of other provisions as well. In Sertik, for example, settlers go by motorcycle to the main road and stop the truck from

Kuala Lumpur to the Karak market for their fish supply. Monthly income is commonly over M\$200 and, on oil palm schemes, often over M\$300. Extra employment on rubber schemes, however, must be sought on surrounding estates.

Families tend to be larger and more established. On Sungai Sayong, fully 69 percent of settlers have six or more children. The presence of several phases on established schemes, however, usually assures a variety of demographic characteristics and stages. Except in Trengganu, it was common for 50 percent of women at risk to accept family planning. In that culturally distinctive state, men especially felt that oral contraceptives were "not fitting" and wished for other methods. Settler associations are generally active, but political discontent is not uncommon, especially on rubber schemes.

Mature: As accessible schemes become older, they tend to develop into viable communities. These have macadam roads and bus service as well as motorcycles and occasionally even settler cars, so there is no real problem of transportation to major services. The trip continues to be expensive, inconvenient and time-consuming, however, and chronic or less serious health complaints may not receive needed attention. Commercial pathways have been well established and these schemes are regularly serviced by merchant vans and occasionally by vendors. Prices continue to be five to ten percent higher than in the nearest market.

Gedangsa, which is a mature accessible scheme, is untypical in one important respect, the almost total undevelopment of its commercial area. The commercial area on most of these schemes has a dozen or more active shops. In Jerangau there is a separate covered market area for fish and meat where chickens raised on the scheme find an outlet. In Soeharto there is an additional outdoor market every pay day in which settlers sell not only food but clothes and handicrafts.

The population on these older schemes tends to be older itself, not only because of natural ageing through time on the scheme but also because of the older age preference for settler selection that prevailed in early years. Many settlers are now in their late forties and tend not to be active in associations or responsive to advice from newly-graduated staff. There is less demand for family planning, usually between 20 and 30 percent of women being acceptors. A common reason for acceptance is difficulty in labor and with childbirth. Rather than women returning to their villages to give birth, these older schemes have become themselves the home villages to which daughters return. The health concerns of the health assistants and scheme managers include those of an older population: loss of work due to chronic respiratory, kidney, and stomach conditions. There seems to be a special problem on some schemes with mental illness. On at least one scheme, it was not uncommon for two or more

people in a month to "run amok," locking their houses, refusing to feed their children, and threatening their neighbors with parangs (Malay machetes).

Gedangsa differed from other mature accessible schemes in the rejuvenation effected in its associations and interactions through the new phases. Many of the early schemes did not have such an opportunity to expand and have not experienced the influx of later settlers.

Remote Schemes

Remote schemes are the growing edge of Felda. As the jungle is pushed back, new schemes must be located in ever more remote situations. Most remote schemes are new, and a dozen are now awaiting their first settlers. Before the settlers move in, the ground cover and crop saplings have been planted and the houses, water system, school, and other infrastructure is constructed. The ultimate hardship of this scheme development is borne by contract laborers. They live for a few years in earth and wood shacks in the midst of desolation, surrounded by miles of felled and smouldering trees, shadeless sun and trackless earth (Plate IV).

New: Conditions are only a little better for first settlers. When it has been planted with ground cover and oil palms, the ravaged earth is already green again, but the settlement earth remains bare and the drinking water muddy. It may be twenty miles or more of dirt road to the

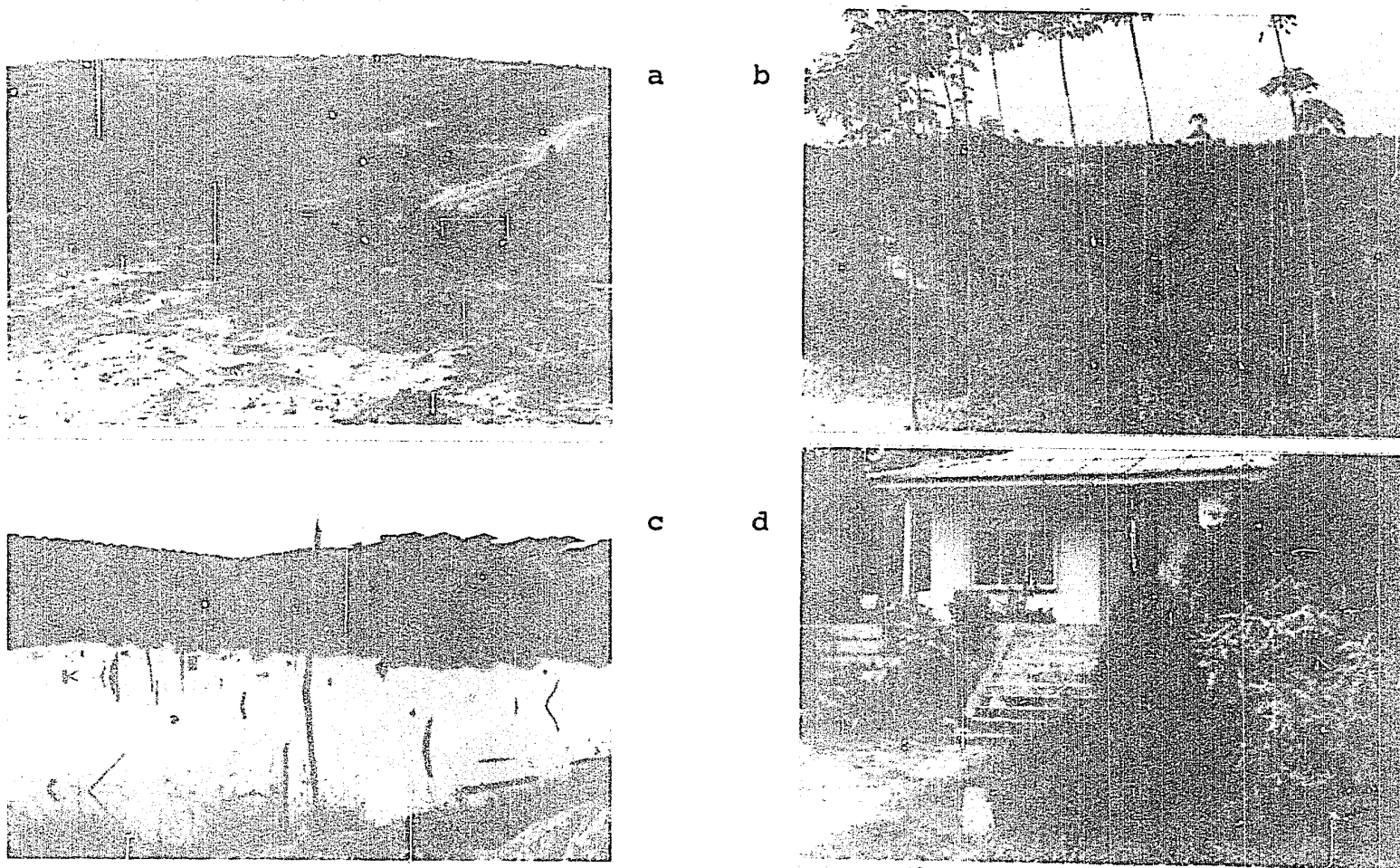


Plate IV

(a) Contract laborer residence in felled jungle; (b) Rubber saplings and ground cover on newly planted scheme. Houses under construction are also visible; (c) Swamp within new and malarious Felda scheme; (d) Cement house in highly accessible scheme in Johore.

nearest potholed macadam road, a journey of two hours to the nearest town. No buses, trucks, or taxis will venture in, so transportation depends entirely on the settlers' motorcycles and bicycles and the scheme Land-Rover. The journey to the hospital is arduous for sick people and they occasionally die on the way. During the rainy season the road may be flooded and the scheme isolated. People are almost entirely dependent upon the Felda store, whose canned and dried foods offer a nutritiously adequate but unfamiliar and unpopular diet. The contractors plant kangkong, a kind of water cress, in the swamps, and this is usually available as a free vegetable. Occasionally catfish are caught in the swamps. Under staff supervision, settlers plant fast food crops such as tapioca and maize, but the fruit tree saplings will take years to yield. There are no fresh vegetables, fruit, or fish otherwise available. The nurse on one scheme is worried about the nutrition of the small children. Midwives are commonly concerned about anemia.

New remote schemes seem to be especially plagued with malaria. There may be over one hundred cases a month in a population of less than two hundred households. House spraying, seasonal changes, and chemo-prophylaxis of the population eventually reduced the incidence. On some schemes, such as Bukit Kepayang, the strain of malaria is chloroquine resistant, leading to spontaneous relapses. Cerebral and other serious forms of malaria have occurred.

The phenomenon is mysterious enough to have earned the area a reputation for hostile spirits. The staff has suffered seriously from malaria and from other fevers which they attribute to the jungle mosquitoes, and they have unfailingly been glad to be transferred to other schemes away from the sickness.

The population on these schemes is composed mostly of young couples with small children. The schemes being located in areas previously sparsely populated, the settlers come from all over the country, speak different dialects, and have different provincial loyalties and customs. The settlers, knowing few people, hearing incomprehensible dialects, and unable to visit relatives and home villages suffer psychological stress as well as physical hardship. Twenty or thirty families on such schemes may simply abandon their houses, slash their fruit trees and depart in the night.

One modification in these conditions occurs when a scheme is located near a complex of Felda schemes. For Jengka IV, the fact that one nearby scheme has a clinic, and that together several schemes have a bus service and a market truck, has served to reduce its remoteness. Yet, settlers still have 42 miles and over two hours to travel to the hospital. Fresh food costs 22 percent more than in town, and food needs to be sent by helicopter during the last floods. Almost every household has suffered from malaria, and many houses have been abandoned.

Established: As the remote scheme becomes older, its condition improves somewhat. A scheme such as Sungai Kemahal is fifty miles from a hospital. There is no bus service, only a quarter of settlers have motorcycles, and the manager must send the Land-Rover out with people every day, a problem to everyone. There are twenty-nine abandoned houses and continuous problems with people returning to their villages for very long visits when there is work to be done on the scheme. Yet the women's and settler's associations have taken hold. Concern with health and economics has encouraged almost 50 percent of women to accept family planning. Commercial areas have been established and are developing and a produce van has found its way to the scheme's house shops. Malaria has been brought down to bearable levels. The commercial crop has matured and income has risen from the subsistence M\$69 allowance to a low production level of M\$150. The crops of houselots have also matured, providing tapioca and maize for consumption. Papaya, a popular plant because it yields fruit in three years, is so abundant that fruit is traded with the vegetable van for sale in the market town. Integrated housing and work teams there have established cross-state and cross-dialect familiarity and ameliorated settler feelings of isolation.

Mature: With advancing age a remote scheme can become a viable community, but for many it will be difficult. One of the few remote schemes which have already matured is Ulu Jempol in Pahang. There, the exigencies of remoteness are memories of a collective experience which serve to emphasize the advance in standard of living. People willingly recall the bad old days when they had to travel over forty miles to the nearest large town for everything, and every family had malaria, and there were no friends or relatives or entertainment. Now it is still almost three hours' journey to the hospital, but there is a bus service, over a third of settlers have motorcycles, and there is a truck which brings fresh produce daily to the schemes--although prices are 18 percent higher than the market town. This improvement in accessibility has been promoted by the development of other Felda schemes in the area. One, only six miles away, contains a clinic. A small town five miles away has grown to provide for many necessary services. Crops of maize and bananas are plentiful enough now to trade with the vegetable merchant, although nothing is sold internally on the scheme. The average settler income from the oil palm crop alone has reached almost M\$300. Community health in Ulu Jempol still suffers somewhat from provincial loyalties. Much of the housing and also the work was originally segregated, but groups have their own block leaders now, and these are better incomes have helped reduce outward frictions. Felda development of the area

has created a labor shortage. Competition between the intense labor needs of nursery maintenance and the contractors' needs for forest clearance, together with the development of a major Felda sawmill nearby, have operated to raise wages and guarantee jobs for any teenager or wife interested. As the families on Ulu Jempol are older, almost every member of the family can be employed while living at home.

Highly Accessible Schemes

Being situated ten to twenty miles from a major town ameliorates many hardships and speeds up the development process. New problems are also created, however.

New: Highly accessible new schemes share many of the difficult conditions of other new schemes. The early settlers suffer from boredom, as they know no one and there is little social life or visiting among the different groups. Up to half of the households may be stricken with malaria. The settlers are fully occupied with planting their houselots to tapioca and other fast food crops while they maintain their immature tree crop. Many cases of illness go untreated because of the difficulties of transportation and communication. Despite such typical difficulties, however, differences from the patterns of less accessible new schemes soon emerge. Settlers have been on Bukit Kuantan for only a few months

but there is already a daily produce truck, electricity for the staff, bus service several times a week, and a clinic in a Felda scheme only three miles away.

Established: Bukit Goh is almost a model of the opportunities and difficulties of the highly accessible scheme. It is fourteen miles by good road to the city of Kuantan. There is a clinic and an oil palm mill on the scheme. The women's, settlers', and youth organizations are all active. They are engaged in several cooperative projects, including the planting of fruit, tapioca, and sugar cane for sale to Kuantan on land that would elsewhere be wasteland of lalang and ravines. There is a bloom of house-shops whose proprietors go regularly to Kuantan for supplies, and there is a developing commercial area. Social ties from sports, education and work activities seem to be overcoming provincial frictions. The oil palm mill and surrounding contractor development have created a labor shortage economically beneficial to the settlers. Over 40 percent of the women, eager to work, practice family planning.

The negative effects of the high accessibility are less immediately apparent. As contacts are established in Kuantan, settlers leave the "tediousness" of oil palm cultivation and join shops or find jobs in Kuantan. There is a high turnover of settlers: the problem of high accessibility is not one of escape to villages, but of

attraction to town. Rather than being isolated from town and deprived of recreation, settlers visit it frequently and spend considerable sums of money on gasoline, movies, and gambling.

Mature: When mature, highly accessible schemes are prosperous ones. The food supply is good, as produce trucks come daily and settlers frequently go to the town market. Prices on the scheme are only two to three percent higher than in the market. There is little wasteland, the settlement area being rather intensively cultivated for cash crops. Schemes in Johore near Kota Tinggi and Johore Baru sell some fruit and large amounts of tapioca to factories for the manufacture of plastics and monosodium glutamate. The monthly incomes from the oil palm crops alone are commonly M\$300 or more. Outside family labor, as at the palm oil mill, and extra projects, sometimes double that income. The prosperity is apparent in the construction going on throughout such schemes as Pasir Raja and Taib Andak as settlers rebuild their houses with brick (Plate IV). Three quarters or more of the settlers may have motorcycles, and cars are no longer uncommon.

POPULATION MOVEMENTS AND COMMUNITY HEALTH

For older Felda schemes, and for new ones today in such heavily populated areas as Malacca or southern Johore, settlers on a scheme are almost entirely of local origin. Schemes in the previously sparsely

populated Felda development areas, however--mainly but not exclusively those in Pahang--draw their settlers from all over the country (Fig. 13). This extensive pattern of connectivity has different implications from that of local origin.

Transportable Diseases

A major but little considered aspect of the internal migrations stemming from Felda land development is the potential for disease transmission promoted. Not only do the settlers migrate from their villages to a scheme in another district and another state, but they also make return visits to former villages and receive visitors on the scheme. Fifty settlers with their families thus represent hundreds of contacts. Both ends of the migration pathways are hazardous. Many of the Felda schemes being opened up in Pahang are in remote jungle areas where there has been no sizeable human population. Settlers may bring infections endemic in their home villages into the new area where they could spread through numerous available vectors among the susceptible population. On the other end, susceptible immigrant settlers may enter the biocenose of an infectious disease which is endemic in the scheme area. Migration is briefly considered below in relation to only two diseases, malaria and filariasis.

Falciparum malaria occurs throughout the Malay peninsula. As discussed in Chapter I, it is transmitted by various local vectors, but Anopheles maculatus is

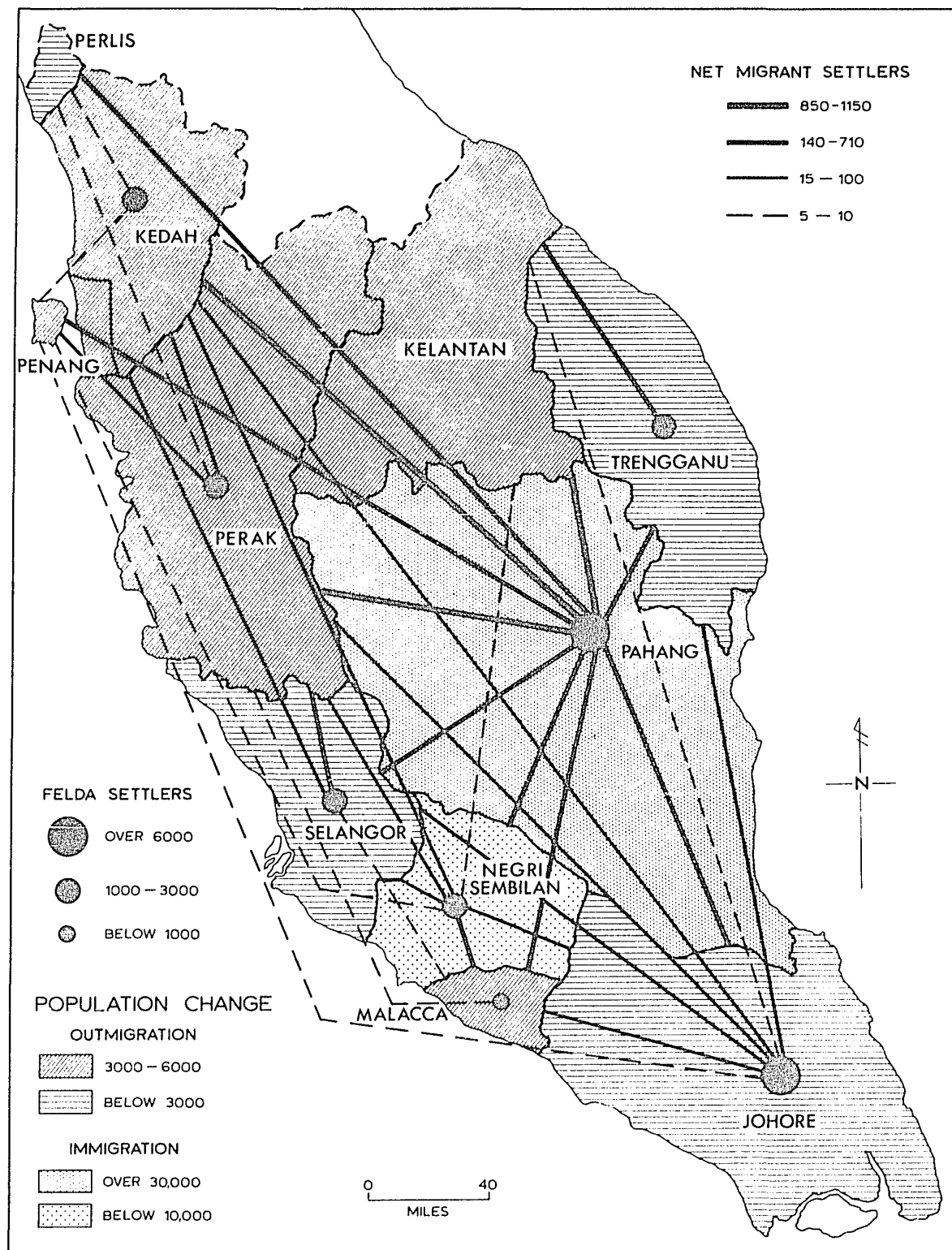
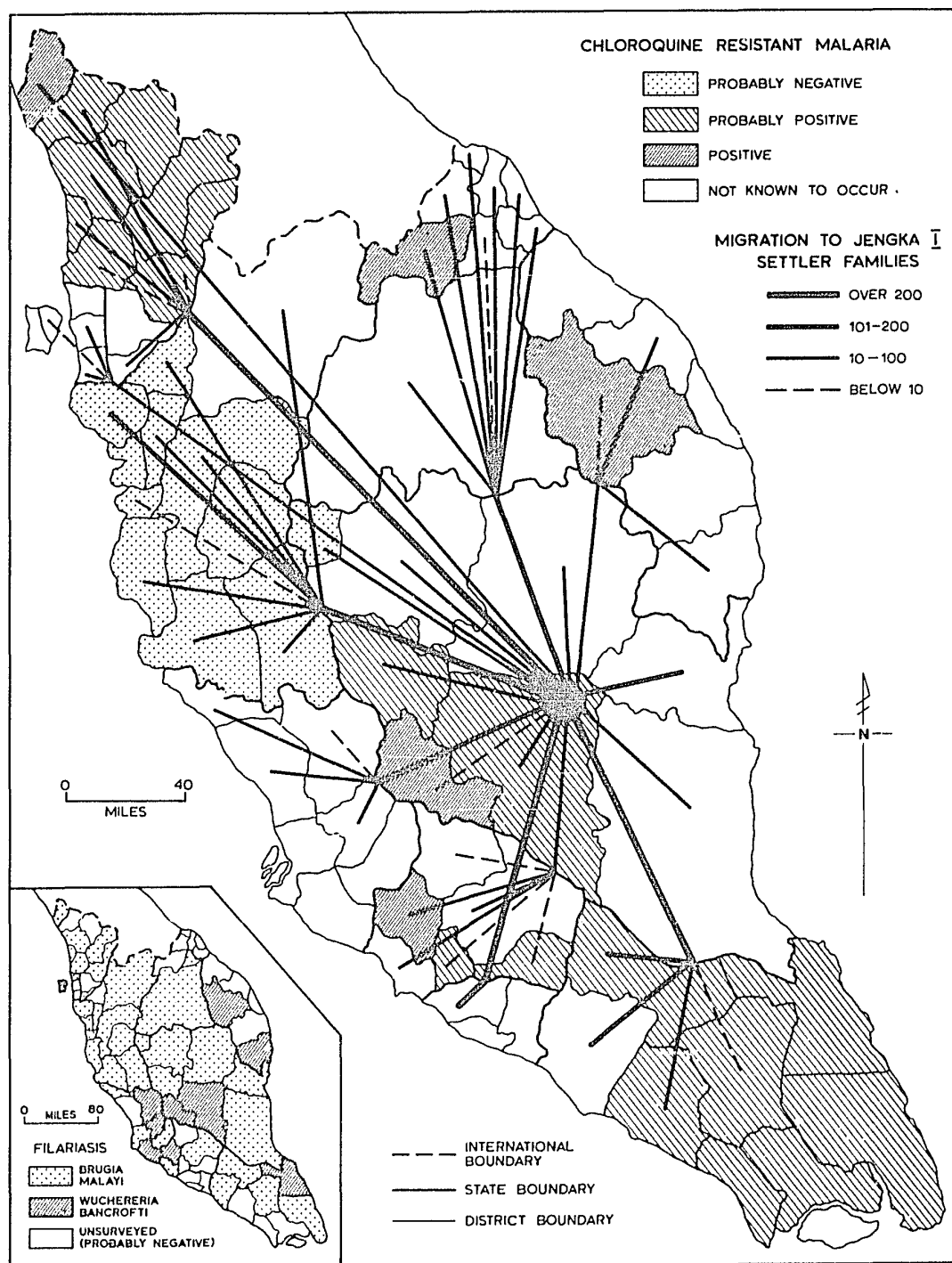


Figure 13
Migration for Felda settlement to 1973

responsible for most epidemics. Malaysia has a major national program for "eradication." Over large areas houses are sprayed every six months with insecticide and there is active case-seeking and chemical prophylaxis of the population. One development in recent years has been a strain, or strains, of chloroquine-resistant falciparum first identified in northern Malaysia near the border with Thailand, where it has become common. It was also soon found to occur in Johore, and from these extremities seems to have been spreading inward. It is characterized by a relapse after treatment and "cure" with the universally-used chloroquine. In surveys near the Sungai Kelamah scheme in Negri Sembilan, for example, 14 percent of patients were again positive for malaria twenty days after treatment, while in Pahang in the vicinity of schemes Sertik and Kepayang relapse rates have been over 50 percent after four weeks and 21 percent at one week. It was noted in Chapter I that the first resistant cases found in the area were on Felda scheme Sertik and were believed to have been imported from Perlis. Figure 14 shows the current (November 1973) distribution of chloroquine-resistant malaria by district in Peninsular Malaysia. In general terms, the West coast is clear, the northern borderland and southern tip infected, and new areas of infection have appeared in central Pahang.

Filariasis is a mosquito-borne nematode infection of the lymphatic system which, in its extreme form, leads to



MIGRATION TO JENGKA I 1966-1968

Figure 14

Migration for settlement of Jengka I scheme and the prevalence for Chloroquine-resistant malaria and of filariasis. Migrations from districts are gathered at state borders

the condition known as elephantiasis. The pattern of filarial endemicity is one of small nidi of high infectivity, reaching infection rates as high as 45 percent at the village or even sub-district level in Peninsular Malaysia. The main centers of infection are along the lower Perak and Bernam Rivers in the state of Perak, and the lower Pahang and Rompin Rivers in Pahang--an area scheduled for development schemes. The data is thus rather inappropriate for plotting at the national scale by district since, at that scale, most of the country is positive. Migration is, however, very important because of differences in types of parasites and vectors. The two major filaria involved are Brugia melayi and Wuchereria bancrofti. B. melayi occurs in the common Asiatic form of periodic nightly presence in the blood in the open swamp country and coastal ricefields in Malaysia, where it is transmitted by several species of Anopheles as well as Mansonia. It also occurs in a nocturnal, subperiodic form among the human population in swamp forest and riverine villages where it is commonly a zoonotic infection of leaf monkeys, civets, and village cats. Periodic W. bancrofti, the cause of filariasis important in many urbanizing areas of Africa and India in Malaysia has only a few urban foci as an imported, rare strain transmitted by Culex fatigans. It also occurs, however, as a rural and jungle strain transmitted by several species of Anopheles. Such developments as the movement of population from coastal areas endemic for one

type to riverine jungle areas endemic for another type, the acquisition by new, susceptible settlers of cats from local riverine villages, and the increased breeding of C. fatigans in areas endemic for rural strains of W. bancrofti with the consequently increased opportunity of its adaptation as a vector, thus raise possibilities for hazardous alteration and complication of the pattern of filariasis in Malaysia.

The migrations of settlers need to be considered against this mosaic of infections which they may carry with them and those which they may become exposed to in the new situation. Figure 14 shows the migration streams of settlers to one scheme, Jengka I, in Pahang. More than twenty schemes are being developed in that previously rather unpopulated area. Major streams of migration are from the chloroquine-resistant south and northwest and also the "clear" Perak area which is, however, highly endemic for filariasis. The streams are two-way and amplified many times by visiting. The net migration by states for Felda settlement illustrates the wide range of Felda-induced migration that must be considered (Fig. 13). The schemes in Johore, with their local sources of population, are apparently unimportant at the national scale, but those in Pahang have probably already played a dynamic role in disease diffusion. There are presently 67 schemes in Pahang at various stages of development, but there is no attempt at monitoring or preventing the

epidemiological hazards of population movement to the area, such as blood screening tests for the incoming population.

Social Conditions

The mixing of people from different states of Malaysia has had several effects upon community health. Differences in food preference have probably hindered development efforts to improve diets. Social stress and conflict have resulted from differences in custom and attitudes toward the law. Dialect differences exacerbate feelings of isolation among new settlers and retard the social cohesion of the settlement. General educability seems in some respects inverse to accessibility to relatives. Isolated settlers learn to look to their peers for advice, while apparently on schemes near to relatives the conservative influences of elders and traditional villagers continue to be important.

On mature, accessible schemes there tends to be a lack of employment and training opportunity. On new schemes in development areas, in contrast, there is often an acute labor shortage. The kind of labor required has little future or training utility in it, but in the present it offers attractive economic rewards. Both of these labor situations have implications for health. The former depresses the economy, gives rise to adolescent frustration and dissatisfaction, and results in outmigration which will increase as the many children on the schemes grow up. Children of settlers now often go to new Felda schemes,

but land development is finite. The lack of secondary employment opportunities in such schemes as Gedangsa makes them mere delaying actions against rural economic and social pressures. Shortage of labor, on the other hand, encourages every able-bodied person to work. This means that twelve-year-olds leave school to earn the immediate dollar a day, and that women laboring in the fields leave their small children attended by only older siblings kept out of school for the purpose. Such children are fed haphazardly with what is most convenient, often cold rice and cakes, and their nutrition and development is a cause of concern to most scheme nurses, midwives and development officers. The separation of the settlers from their relatives and families means that there are no grandparents and aunts to assist the working families.

CHANGES IN PLAN

As the Felda schemes and development areas have become increasingly remote and the problems of establishing viable communities more severe, changes in the development plan have become necessary. Three empirical solutions are being developed.

The first effort to cope with problems of settler welfare and scheme inaccessibility was the development of a Felda store system. In five years it has grown to ninety stores. Its employees and field managers are mostly settlers' sons trained by Felda in Kuala Lumpur,

and shares in its stocks are sold to settlers. Supplied directly from Kuala Lumpur under a standard pricing system, the costs of its dry foodstuffs and household goods are frequently 10 to 20 percent cheaper than supplies otherwise available on schemes. Good management assures adequate stocking of provisions so that, even though many schemes are cut off by floods for a few weeks during the rainy season, emergency situations are rare and usually limited to those areas not normally subject to flooding. The system of shops as a whole is profitable, but those on new schemes suffer heavy losses for the first few years and are regarded by the shop administrators as "welfare." One serious deficiency is the failure to supply fresh provisions of fish, vegetables and fruit. The major difficulty is the lack of electricity and, hence, of refrigeration. Little has been done, however, to provide an outlet or incentive to scheme projects for local supply of food.

A more recent effort has been developed in concert with the national Ministry of Health. A program of rural community nurses (jururawat desa) is being developed which trains midwives for additional duties to aid in minor complaints, basic maternal and child health care, and health education. Over 400 midwife clinics are planned to be converted by 1976, with the assistance of the World Bank, to serve all Felda schemes and to begin to serve

rural villages. The provision of such basic health services on every scheme will do much to reduce the remoteness.

The third and by far the most ambitious effort being made is a program to develop town centers. The Jengka Triangle area in Pahang most notably is developing a town center to provide services for its more than twenty schemes. With a major sawmill, a doctor, a cinema, and a bus system it is already providing services to surrounding schemes. The once remote mature scheme of Ulu Jempol, for example, finds the nearness (six miles) of a doctor a dramatic improvement. Other town centers will be built near new remote scheme Bukit Kepayang, established remote scheme Sungai Kemahal, and in the new development area in southeast Johore beyond Ayer Tawar I (Fig. 12). The new development project Pahang Tenggara (Southeast Pahang) from the beginning is being designed on the town-center concept, with settlers commuting miles out to their lots while living in communities with most urban amenities. If a feasible means of transportation can be devised, the merging of rural scheme and town may resolve the locational disadvantages of land development--and intensify some of those of behavioral adjustment.

CHAPTER VI

AS HEALTH ENVIRONMENTS

Health was originally here defined as adaptability, fitness, the ability to rally to a challenge. A place was considered to be a system, and medical geography was defined as the study of the health of places. It was suggested that one way to maintain the system relationships and yet work with comprehensible phenomena was to study a place in terms of some major complexes of regular associations among its parts which were particularly important for health. The Felda schemes were consequently studied in terms of organizational, constructed, biotic, and locational complexes.

SOME COMMENTS ON APPROACH

In methodology, this study proceeded from an holistic approach at the micro (scheme) level to attempt an holistic integration at the macro (national) level. The diversity and variation, however, were too great, and a meta (scheme type) level proved to be the most effective for integrating the complexes of analysis, drawing conclusions about the state of health on Felda schemes, and understanding changes brought about by land development.

Conceptualization in terms of complexes as developed in this study has some advantages over thinking in terms of micro-environments or health environments, and may be a more appropriate approach to the disease nidi of human

settlements, which are culturally maintained. Since the complexes are regular but loose associations and are not defined in an exclusive sense, parts can be shared and one complex can pervade another. The organizational complex does not have a concrete, physical existence. The cybernetic organization and informational flows of a place would be difficult to consider as a micro-environment, yet its particular associations pervade the whole system as ideas, stimulation, and behavioral determinants. As already noted, the biotic parts of a place which are important to health cannot be limited to those in a specific micro-environment, such as a rubber forest, but occur throughout, and the biotic complex often overlaps with the constructed one. Grouping parts in flexible complexes which must be abstracted from reality according to criteria of disease causation and maintenance and defined in terms of relevant parts and relationships fulfills the same conceptual functions for analysis as do micro-environments. Such complexes, furthermore, do not encourage any illusion of a concrete existence, of being definitively closed, or unrelated to or isolated from other "environments." The approach was conceptually useful for organizing and comprehending Gedangsa.

There is a general inadequacy in present efforts of social scientists to measure psycho-social stress. This is expressed in the frustrations of those involved in the major efforts of resettlement associated with dam

development in Africa over incorporating in their plans viable indices of psycho-social stress for comparing and evaluating the health of the villages and people moved. In this study, the usual indicators, such as crime, divorce, suicide, and absenteeism, were considered. An additional indicator specifically appropriate for the study was the abandonment of houses and the fleeing of the scheme by settlers. Subjectively, the researcher could appreciate the intensity of complaints, the enthusiasm or dejection of the spirit. Little, however, is known of the normal range of behavior or of the culture-particular expressions and pathologies of stress among Malays. Given the pace of urbanization and value re-orientation among the population, there is a clear need for systematic and comprehensive basic research before effective preventive or therapeutic services can be developed.

Most diseases and health hazards were considered in this study in terms of the potential for their occurrence. Nutrition was approached by ascertaining food availability, scrub typhus in terms of the population's exposure to the vector mites, the dispersal of filariasis and chloroquine-resistant malaria in terms of migration patterns. The major deficiency in making assessment is the lack of rigorous laboratory and clinical data on actual conditions. Several in-depth studies, focusing attention on new, remote schemes, are needed to gather specific, hard data for the design and implementation of a health program.

(1) A detailed dietary study is needed to assess the degree to which such deprivation of fresh produce, fruit and fish as may exist is harmful to the young children. Attention should particularly be directed to the possible nutritional effects of inadequate supervision and feeding of young children in labor-shortage areas where most adults are working. Besides study of dietary intake patterns within the framework of available food, blood samples should be studied for clinical assessment of nutritional status.

(2) A longitudinal study of blood samples taken at the time of arrival of new settlers, after a year of residence under the initially harsh conditions, when commercial production is achieved, and after a measure of prosperity has been established would be useful for several assessments of epidemiological importance. Besides the above nutritional considerations, the types and development of malaria and filariasis, and the infectious history of scrub typhus and of several arboviruses under the new settlement conditions, could be assessed. The stages and particular exposures appropriate for intervention could then be determined and acted upon.

(3) While a considerable body of literature exists on relations between the major "community" groups of Malaysia--Malays, Chinese and Indians--important inter-ethnic conflicts on Felda schemes occur between Malays of different ethnic (Javanese, Bugis) and provincial (Kelantan, Perak) origin. There is a need for study on the causes of

frictions among them, on the values, prejudices, and customs which differentiate them. Differences in food preferences, for example, could frustrate efforts at vegetable production and nutritional education. More understanding of inter-group differences could help in the development of institutions to promote meeting and mixing, institutions which are not well-developed in Malay culture. There has been little need for such institutions in the past, but they would do much to alleviate the isolation of settlers on new schemes.

The experience of settlers in developing a Felda scheme together should advance the cause of national identification over provincial loyalties. Many potential situations for friction exist on schemes, however, such as problems of leadership and discipline among block-labor groups on oil palm schemes. Some managers have found sport competitions against other villages and towns to be useful in building scheme identification and unity. Other groups could be developed for inter-scheme competition in such areas as music, dancing, drama--with identification of group performances always in terms of the Felda scheme, rather than such ethnic labels as Javanese angklung orchestras or Kelantanese dance.

The organizational resources of the schemes should be engaged in the implementation of several other applied programs. Settler development programs could work more closely with the elementary schools in teaching skills and

attitudes toward vegetable cultivation and personal hygiene. A pilot safety program should be initiated on at least one scheme for raising consciousness about safety, including such matters as the potency of chemicals, industrial safety in production and in the oil palm mills, and especially vehicular hazards and preventive behavior. The size, organization and isolation of Felda schemes, together with the real and rising hazards of accidents from the way of life they are promoting, makes them ideal sites for efforts to develop safety programs that would benefit the nation.

The conditions that have been created on Felda schemes can be considered in terms of alterations that favor or endanger health. Other aspects at least as serious are the alterations that did not occur: the failure to achieve potential.

ALTERATIONS THROUGH DEVELOPMENT.

Auspicious Alterations

The most auspicious alterations on the land development schemes are those of community organization and informational contact, of public health infrastructure, and of economic improvement. These all take time to develop, but by maturity most schemes enjoy reasonable prosperity and suffer fewer enteric infections or fevers. In Gedangsa, almost every category of health complaint decreased in incidence. The house to house, almost daily

contact, and the provision of trained and familiar personnel, has provided the means, and economic conditions and opportunity the motivation, for a rather successful family planning program. The program itself is a positive effort to check population growth on the schemes. Together with the provision for indivisibility of holdings, it is essential for establishing and maintaining high standards of living. The mixing of settlers from all parts of the country causes internal frictions, but their building of a community under government sponsorship should promote national identification.

Endangering Alterations

The most directly menacing alterations are those which facilitate the breeding of vectors of malaria, the dissemination of various strains of malaria including chloroquine-resistant ones, and the exposure of susceptible people. Settlers going to new schemes can almost expect to contract malaria. Control programs placed reliance wholly on spraying houses with insecticide and treating malarial cases with chloroquine. On any one scheme conditions may change enough with development to control the infection before significant levels of resistance develop. In Felda development areas, however, as one scheme passes to an established stage, two others are opened for settlement, continuing the process of selection for mosquito and plasmodia resistance. Other methods of

control do not come cheaply in either labor or capital, and are little used. Swampy land within and near the settlement is usually poorly drained, and clear-felling techniques remove all vegetative cover and shade from streams. There are no blood-screening tests of settlers moving into an area who might be carrying exogenous strains, and no tests or controls on their carrying local strains back to their home villages--villages possibly under maintenance after eradication efforts. Neither is presumptive treatment given to migrants, which might help in control. Instead, the influx of population and the increase in malaria in previously backwater areas of small population overtakes local medical services, exhausts medical supplies, and results in the lack of hospitalization and the very under-dosage which promotes resistance to chloroquine. As Felda development continues to resettle increasing numbers of rural population from all parts of Peninsular Malaysia, the foci of malarial infection being established and the migration and visiting networks which connect them to other rural places endanger rural health and national efforts at control and eradication of malaria.

A lesser hazard of vector disease in Felda schemes is scrub typhus. This disease and the potential for contracting it is widespread throughout Malaysia. Through good maintenance of rubber tree lots it is probably reduced on Felda schemes. The endangering alterations are those

which establish extensive areas of lalang within the settlement area where the sedentary population may be exposed. This results from suspended development, which leaves lots designated for some future commercial or administrative use empty, and from the siting of settlements on land thoroughly transected by ravines, which are wasteland. Highly accessible schemes suggest a preventive solution in their intensive land use. Ravines and lots on such schemes are cultivated for projects to sell pineapple, tapioca and sugar cane to town. More remote schemes have no ready external markets, but there is scope for much more internal use. Areas designated for future development could well be farmed in the interim. Otherwise, control of lalang within the settlement area should be by manual cutting only, as chemicals themselves constitute a hazard, and burning merely promotes the migration of rats and facilitates the introduction of the rickettsia pathogen.

The more insidious alterations are those which result from remote location: deterioration of marketing connections, emergency and other health services, recreation and entertainment, job opportunity and information. On remote and on new schemes, the deterioration may be severe and conditions acute. The nutritional situation of new remote schemes is especially of concern. No fruit, few fresh vegetables, and only dried fish may be available for a few years. During settler selection

preference would have been given to large numbers of children, and numerous small children must experience the early years of deprivation. On older and more accessible schemes the nutritional situation is probably improved over traditional rural villages, as settlers do have purchasing power, but the production of poultry, vegetables, and fish is seldom consequential. The lack of transportation and the distances involved become serious matters in times of emergency. Hours of travel by bicycle to see a movie and the major effort to visit relatives are psychological hardships which result in considerable personal and social stress. High priority should be placed upon providing a hard top road and rudimentary transportation before the crop becomes commercially productive. Land development is certainly taxing road building capacities to their present limit; but the road does not increase in length or in cost if it is built first, when it would greatly ameliorate the harsh initial conditions, rather than years later when it is commercially desirable to remove the crop. Probably this would cost less before inflation.

Inevitably amidst such rapid changes there is some institutional lag. The most substantial and serious lag is in the diversification of the economy to provide secondary employment, a lag which can only retard future community development. Other institutional lags result from rapid social changes. Most women on schemes of all

types are eager to work, and many are doing so as field laborers. This is a change from traditional patterns. The nuclear families which are the unit of Felda development, moreover, seldom have access to grandparents, aunts, or elderly people who previously assisted with child raising. On some schemes in new and labor-short areas, the condition of small children left without proper supervision or adequate nutrition may be of serious proportions. Most attention is presently being given to developing kindergartens, but day care centers are clearly needed. Besides improving supervision and nutrition, such centers could provide training in hygienic practices and promote skills and disciplines for which rural children are often at a disadvantage upon entering school.

Finally, the modernization that is expressed in Felda production also finds expression in the risk of accidents. The distances involved in contact with other places and the economic levels achieved encourage the proliferation of motorcycles, while road and traffic conditions, safety provisions and regulation enforcement remain poor. Felda settlers live fully in the Twentieth Century, but attitudes of the settlers and administration toward preventive behavior and safety measures remain archaic. Such proved measures as use of helmets and safety belts, defensive driving, preventive maintenance of machines, and sound

road construction techniques barely exist. Educational campaigns have not yet even begun.

Failure to Achieve Potential

Despite the existence of the above hazards, the health conditions on established and mature schemes are a genuine improvement over those that prevail in traditional rural villages. Rather than the deterioration of health conditions, the most serious concern with Felda development is the failure to fulfill the inherent potential for improved health.

Many diseases and deficiencies arise from individual behavior. On Felda schemes, helminthiasis, conjunctivitis, otitis, scabies, and fungal infections of the skin continue to be widespread and little diminished. The agricultural potential of the settlement land, in sharp contrast to the commercial cropland, is undeveloped. Programs that do exist and efforts that have been made are beset with problems of social organization, such as cooperatives, and animal disease, such as has frequently devastated poultry. The considerable capacity in the organizational complex to provide information and effective implementation that is evident in the family planning program has been inadequately involved with these concerns.

In one health survey conducted on the Sungai Tekam scheme, Chappell and Janowitz found the following conditions: 84 percent of the population was infected

with helminths, including 38 percent of infants under one year; 68 percent of children aged three to six had dental decay; only 27 percent of adults felt their diet was better than before becoming Felda settlers, anemia was common in women and children, and goiter affected 58 percent of the women; the incidence of skin disease was high; and, there was evidence of past or present ear infections among a quarter of the adult population. They recommended that anti-helminthics be provided, iodized salt be introduced, protein be provided through fish ponds and poultry production, and a health education program be carried out concentrating on nutrition, personal hygiene and parasites. They queried, "what measurable effect can a program of education, public health measures and medical care have on the health of a community?"¹ Little can be added to this basic message, except that the dietary situation would also be improved by improving accessibility, and the health education campaign should also include accident prevention.

TOWARD HEALTHIER PLACES

There are attempts at several levels of the system to make the land development program more adaptable, and hence healthier. Efforts are being made through agricultural research to develop new crops and diversify the agricultural economy, improving stability in the face of uncontrollable fluctuations in the international

markets. This diversification will improve the adaptability of the land development program as a whole, but will not greatly benefit the individual schemes since they are dependent upon monoculture. Many of the disadvantages of location which became evident in this study may be overcome by the new town center approach to development. Future schemes will be gathered around a central urban complex, from which thousands of settlers will travel out to their land. The town will be of a scale to offer essential medical, entertainment, and marketing services and secondary employment in small factories and mills. These changes will not, however, affect most presently existing schemes. For them, the establishment of a division of Felda for settler development, the proliferation of Felda shops, and the imminent program of providing community nurses, are major improvements and adaptive institutional responses.

Stress, it has been noted, is necessary for increasing health. Those schemes which are accessible, near to relatives, and which fit well into local settlement and livelihood patterns--such as those in Trengganu--are real communities and perhaps are the most comfortable schemes to live on. These are, however, low in productivity and little improved in economic status, and the settlers are little changed in food habits or family size. On some of the new remote schemes, on the other hand, the stress of isolation and disease is overwhelming, and those who

stay are too occupied with their family's basic living to organize the community or develop its potential. On most schemes, the people encounter new forms of organization, perhaps new crops and skills, and new economic opportunities and social stresses. Attitudes toward family planning, entrepreneurship, production standards and discipline, supra-ethnic identification, and use of government health services, are among the adaptive response to these stresses. Some schemes have achieved high levels of self-discipline and self-governance, along with modern, productive agricultural techniques and prosperity. The development of the block system of cooperative labor used on oil palm schemes has proved a major social advance, and a successful social adaptation. It may, in the future, be established at an earlier stage on oil palm schemes and be extended to rubber ones.

In a few years the development debts of many schemes will have been paid off and special problems will be posed by the independence of the settlers. At that time, it will be the success of Fel'da in establishing healthy communities socially, mentally, and physically, as well as economically, that will determine the future importance of land development to the economy and body politic of Malaysia. As an ambitious ecological experiment, land development continues to face potential hazards from vectors, migration, locational disadvantages and international markets. Its most serious shortcomings, however, are in the behavioral

changes needed to make the new environment habitable and to fulfill the potentials it offers. The Felda system as a whole is characterized by many kinds of challenges. Presently, it is also characterized by active, dynamic adaptations of institutions and behavior that can only be described as healthy.

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APPENDIX I

SAMPLE AND SURVEYS

For the detailed study, it was desired to interview people in two ways: on a broad, representative and weekly basis, and on an occasional, open and in-depth basis.

For the representative interviews, a sample of households was drawn for a register and a few households within it were further selected for case study. Since there were no multiple residences, a household was defined as all those people sleeping and eating in the house and considered by the occupants to belong there. Other people in the house were classified as visitors. The register was maintained by the writer and an assistant in the Malay language on the basis of weekly recall. Both the field assistant for Gedangsa and the shorter term one for Selisek had grown up in their settlements and knew most of the people and events. The data collected by the field assistants were collated and reviewed once a week, and the writer routinely accompanied them on their rounds of interviews in order to check the standardness of vocabulary and techniques and attitudes of the interviewer, as well as the attitude of the respondents toward cooperation.

The sampling frame for the settlement consisted of an updated list of all settlers on the scheme (517) to which was added an enumeration of staff households (police, teachers, field supervisors) (41) which were

House number 33

Date 23rd Jan. 1973

VISITORS:

Sex	Umur	Dari	Selama	Relation
L	30	Bauir	1 hari	anak saudara
P	27	Bauir	1 hari	anak saudara
L	30	k.L	1 hari	anak saudara
L	19	k.L	1 hari	anak saudara

SAKIT:

Nama	Symptoms	Selama	Kerja	Rawatan
Aisah	pening/sakit perut	3 bulan		clini
Siti Baizurah	sakit gigi	1 week	-	-
Rozanah	sakit perut	2 hari	-	-

JALAN2

Nama	Ke	Dengan	Selama	Tujuan
Abd. Manaf	Tg. Malim	motorikal	1 hari	beli barang

Figure 15

Sample of Register Page for Weekly Interview

Table 23

Example of a Household Summary of
Individual Register Cards*

House No. 55 / Phase I

CENSUS CARD

No.		Sex	Age	Occupation	Location	Origin
41	Mohammad Yusuf bin Haji Sulaiman	M	45	settler	Gedangsa	Kuala Kubu Baru
42	Siti Haliyah binti Haji Moid	F	35	wife	Gedangsa	Kuala Kubu Baru
43	Latif	M	18	unemployed	Gedangsa	Kuala Kubu Baru
44	Mohd. Radzi	M	15	unemployed	Gedangsa	Kuala Kubu Baru
45	Mohd. Rasidi	M	12	standard 6	Gedangsa	Kuala Kubu Baru
46	Siti Rubaiyah	F	9	standard 9	Gedangsa	Gedangsa
47	Mohd Rosli	M	6	home	Gedangsa	Gedangsa
48	Siti Norliza	F	4	home	Gedangsa	Gedangsa
49	Siti Junaida	F	2mos.	home	Gedangsa	Gedangsa

VISITORS CARD

Date	Sex	Age	Relation	From	Duration	Purpose
2/1	F	70	mother	Kuala Kubu Baru	1 day	visit

Table 23 (continued)

Example of a Household Summary of
Individual Register Cards*

MORBIDITY CARD					
Name	Date	Complaint	Duration	Treatment	Comment
Mohd. Yusuf	5/12	high fever	3 days	clinic pills	unable to work
	12/12	fever and cough	1 week	shop medicine	--
Siti Halijah	--	--	--	--	--
Latif	--	--	--	--	--
Mohd Radzi	--	--	--	--	--
Mohd. Rasidi	--	--	--	--	--
Mohd. Rosli	5/12	fever	2 days	none	--
Siti Norliza	--	--	--	--	--
Siti Junaida	--	--	--	--	--
MOBILITY CARD					
Name	Date	Destination	Means	Duration	Purpose
Mohd. Yusuf	26/12	Tg. Malim	bus	1 day	shopping
	23/1	Behrang	bus	1	shopping
	13/3	Kuala Lumpur	bus	3	accompany child to interview
Siti Halijah	26/12	Tg. Malim	bus	1	shopping
	13/2	Kuala Kubu Baru	bus	4	visit grand-mother
Latif	--	---	---	---	visit grand-mother
Mohd. Radzi	23/1	KKB	bus	2 weeks	visit grand-mother

Table 23 (continued)

Example of a Household Summary of
Individual Register Cards*

MOBILITY CARD					
Name	Date	Destination	Means	Duration	Purpose
Mohd. Radzi	13/3	Kuala Lumpur	bis	3 days	interview for job as laborer
Mohd. Rasidi
Siti Rubaiyah	21/11	Kuala Kubu Baru	bus	1 day	to move
Mohd. Rosli	13/2	Kuala Kubu Baru	bus	4	visit grand- mother
Siti Norliza	13/2	Kuala Kubu Baru	bis	4	visit grand- mother
Siti Junaidah	13/2	Kuala Kubu Baru	bus	4	visit grand- mother

*Each category for each individual was a separate card.

considered to be an integral part of the settlement. These households were stratified by the four phases of the scheme's development and a fifth stratum of staff. A random sample of sixty households was drawn, one of the households subsequently dropping out ($f = .11$). Household data were thus collected on the basis of a stratified random sample, but the data collected for the mobility and morbidity of individuals was on the basis of household clusters. Since the population of the several phases of settlement were in different stages of their life cycles, the homogeneity of the strata accounted for a large reduction in variability. Each household cluster, on the other hand, represented the full heterogeneity in age and role of the population. A sample taken of the Gedangsa clinic records was the same as the register sample, that is, on the basis of stratified random households and individuals clustered within them. The sample of Selisek clinic records, however, was a simple one-in-ten systematic sample of record cards.

Following Kish the standard error of variables representative of each type of data is summarized.¹

The register sample in Selisek is of another order. The village is actually an administrative unit combining twelve minor villages spread out over several miles. It would not have been feasible to maintain the register among a random sample of households, so one of the twelve

villages of Selisek, Serigala Tengah, was chosen and a register maintained of the total population. Although this village was typical of the thirteen, the register data cannot be considered statistically representative of the entire Selisek study area.

The household sample in Gedangsa also served for the helminth survey. It utilized the thiomersal-iodine-formaldehyde (TIF) direct smear technique previously used by the Institute for Medical Research's survey in Selisek. It has been shown to be a reliable field technique, its detection of even light cases being sufficient for epidemiological purposes.² Three slides were studied for each fecal specimen. Although the total percentage positive for eggs of each helminth specie was fairly constant for all three slides (only two percent variance except for Trichuris, which varied by over 25 percent), the efficiency of any single slide count was only around two-thirds for Trichuris and hookworm eggs, and 80 percent for eggs of Ascaris (efficiency being expressed as a percentage of infections detected). The identifications and counts were executed by a single, senior laboratory technician who had also done the counts for the Selisek helminth survey of the Rural Health Division with which the results were compared.

Table 24
Standard Error of Key Variables

	Phase I	Phase II	Phase III	Phase IV	Staff	Total
No. households	12	11	19	13	4	59
No. individuals	98	74	121	61	21	375
<u>Unequal Stratified Random Cluster Sample</u>						
Variable	Std. Error		95% Confidence		Mean Value	
Population age	0.969		± 2 yrs.		17.3 yrs.	
Trips to town as percent of all trips	0.061		± 12%		37%	
Trips for visit as percent of all trips	0.012		± 2.3%		15.4%	
Register respiratory complaints as percent of all register complaints	0.027		± 6.7%		42.1%	
Respiratory complaints as percent of all Gedangsa sample clinic complaints	0.027		± 5.3%		23.1%	
<u>Stratified Random Sample</u>						
Percentage of households buying all their eggs	0.061		± 12.2%		51.7%	

Table 24 (continued)
Standard Error of Key Variables

<u>Simple Random Sample</u>			
Variable	Std. Error	95% Confidence	Mean Value
Respiratory complaints as percent of all clinic complaints at Selisek	0.015	± 2.9%	24.7%

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APPENDIX II

HEALTH COMPLAINTS

Complaint	Selisek All ^a	Selisek Sample ^b	Gedangsa All ^c	Gedangsa Sample ^d	Selisek Register ^e	Gedangsa Register ^f	G.R. Selisek Period ^g
Cold, rhinitis							
pharyngitis	1113	98	194	102			
Cough	213	178	81	13			
Pleuisy, bronchitis	40	2	8	2			
Pneumonia	3	1	5	-			
Tuberculosis	10	-	-	-			
Asthma, breathlessness	124	13	3	-			
TOTAL RESPIRATORY	1503	298	291	117	48	113	33
Abdominal pain	145	49	15	1			
Gastroenteritis	218	2	24	22			
Diarrhea	1	77	-	-			
Epigastric pain	254	64	38	9			
Flatulence	-	6	-	-			
Constipation	36	5	5	2			
Hepatitis	2	-	2	-			
Vomiting	22	28	64	14			
TOTAL ENTERIC	678	231	148	48	5	18	4
TOTAL WORMS	92	21	138	82			
Numbness	81	22	17	3			
Diabetes	-	-	-	1			
Weakness	65	19	8	2			
Anemia	41	13	8	1			
No appetite	13	2	8	2			
TOTAL DEFICIENCY	200	56	41	99	9	2	-

APPENDIX II (continued)

HEALTH COMPLAINTS

Complaint	Selisek All ^a	Selisek Sample ^b	Gedangsa All ^c	Gedangsa Sample ^d	Selisek Register ^e	Gedangsa Register ^f	G.R. Selisek Period ^g
Cellulitis	8	3	-	-			
Ringworm	39	8	9	1			
Eczema	144	18	6	10			
Scabies	41	5	15	8			
Fungus itch	201	49	87	17			
Sores	154	36	85	36			
Boils	5	1	-	-			
Abscess	26	3	19	4			
TOTAL SKIN	618	123	222	76	2	22	7
Heart	11	-	1	-			
Chest pain	33	4	6	3			
Hypertension	62	1	7	-			
TOTAL CARDIO-VASCULAR	106	5	14	3			
Nephritis	31	10	14	4			
Menses, etc.	38	14	10	2			
TOTAL URINO-GENITAL	69	24	24	6	1	2	2
Burn	22	5	11	1			
Wound	97	23	37	11			
Fall	-	19	58	23			
Abrasion	6	1	1	-			
Sprain	5	2	-	-			
Poison	3	-	-	-			

APPENDIX II (continued)

HEALTH COMPLAINTS

Complaint	Selisek All ^a	Selisek Sample ^b	Gedangsa All ^c	Gedangsa Sample ^d	Selisek Register ^e	Gedangsa Register ^f	G.R. Selisek Period ^g
Snake bite	6	1	1	-			
Insect sting	22	5	8	2			
TOTAL ACCIDENT	161	55	117	38			
Headache	111	27	26	6			
Joint/Muscle ache	106	28	22	3			
Tonsillitis	24	4	21	10			
Pyrexia of unknown origin	132	116	92	28			
Malaria	76	8	7	3			
Measles	-	-	-	1			
Chickenpox	13	-	1	-			
Mumps	28	1	1	-			
TOTAL FEVERS and acute aches	490	184	170	51	21	62	19
Rheumatism	1	-	3	-			
Backache	115	21	16	5			
Pain in specific member	101	16	5	-			
Arthritis	33	-	5	3			
TOTAL CHRONIC ACHES	250	37	30	8	-	-	-
Conjunctivitis	89	18	43	10			
Otitis	81	16	29	16			
TOTAL OTITIS- CONJUNCTIVITIS	170	34	72	26	17	25	11

APPENDIX II (continued)

HEALTH COMPLAINTS

Complaint	Selisek All ^a	Selisek Sample ^b	Gedangsa All ^c	Gedangsa Sample ^d	Selisek Register ^e	Gedangsa Register ^f	G.R. Selisek Period ^g
Gum condition	28	11	12	4			
Caries	38	9	10	1			
Stomatitis	32	15	-	-			
TOTAL MOUTH	98	35	22	5	-	-	-
Swelling	51	17	17	8			
Allergy	1	4	16	5			
Urticaria	47	8	14	3			
Rash	69	12	13	4			
TOTAL REACTION	168	41	60	20	1	9	9
Ulcer	7	3	1	-			
Growth	6	2	-	1			
Emotional upset	1	-	-	1			
Dressing/injection	14	9	25	6			
Circumcision	-	9	25	6			
Vision problem	12	4	8	-			
Sore eye	26	14	3	-			
TOTAL OTHER	66	33	38	9	-	3	-
TOTAL	4669	1171	1387	498	105	273	89

APPENDIX II (continued)

HEALTH COMPLAINTS

- ^aAll patients at the Selisek clinic from February 1972 to February 1973.
- ^bA one in ten systematic sample of Selisek record cards, counting all cases from February 1970 to February 1973.
- ^cAll patients at the Gedangsa clinic and those who went to Selisek clinic added, from February 1972 to February 1973.
- ^dThe Gedangsa sample of one in ten households, counting all clinic visits from February 1970 to February 1973.
- ^eThe register kept in Serigala Tengah during March, four weeks in 1973.
- ^fThe register kept in Gedangsa from November through April, nineteen weeks 1972-73.
- ^gThe cases from the Gedangsa register during March, the four weeks coinciding with the Serigala Tengah register.

Note: Nosology was constrained by the symptoms and categories used in the clinic records. "Sores," for example, might include multiple leg ulcers, yaws, or injuries from bicycle falls not noted as falls. The complaints listed are absolute numbers for different time periods, in the case of the register, and for different population sizes, in the case of the clinic records. Adjusted rates are presented in Table 9.

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