INFECTIOUS DISEASE RISKS TO TRANSMIGRANT COMMUNITIES IN INDONESIA : A SURVEY IN LAMPUNG PROVINCE, SUMATRA

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ABSTRACT

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INTRODUCTION

Indonesia is rapidly expanding its program of transettlement of persons from the densely populated islands of Java, Bali and Lombok to agricultural development sites in newly opened areas of major outer islands, especially South Sumatra, Kalimantan, Sulawesi and Irian Jaya. The present five-year plan calls for the transmigration of nearly 3 million persons. Of particular concern to the Ministries of Health and Transmigration is the risk of infectious diseases to settlers in these new communities which are often situated in remote areas with poor communication and limited governmental services, including health care.

This study, carried out in August 1975, is the first of a series describing profiles of infectious diseases experience and associated risk factors in communities at major transettlement sites along the route of the trans-Sumatra highway which, when completed, will extend from Tanjung Karang at the southern tip of Sumatra to Padang on the west central coast.

We report herein the findings of intestinal and blood parasites and of seroreactivity to various arboviral, rickettsial, bacterial and parasite antigens among persons living in two recently established transmigration villages, and of indigenous people inhabiting a nearby, long-established village in the Lampung area of the southern tip of Sumatra. Small mammals and their ectoparasites were surveyed in an attempt to evaluate their potential as risk factors in the transmission of typhus.

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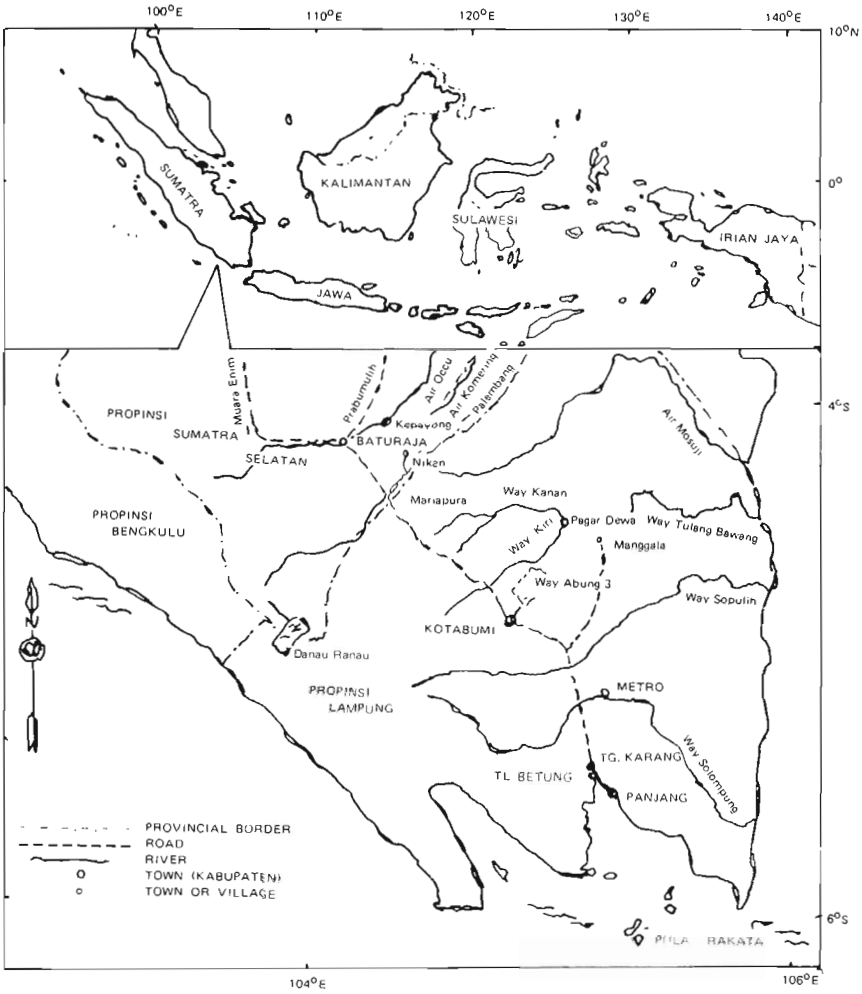
DESCRIPTION OF THE AREA

Villages surveyed were Waspada, Karya Tani, Ogan Baru and Pagar Dewa in Lampung Province. Waspada and Karya Tani are transmigrant settlements in the Way Abung III agricultural project. They were first occupied in early 1975. The Way Abung III transettlement site is a flat area of 6,000 HA alluvial savanna, located in the Lampung Utara Regency at 104°54'E and 4°44'S (Fig. 1). Ogan Baru is a village situated between the two transmigrant settlements and was first settled by indigenous persons from South Sumatra Province in 1966. Pagar Dewa is a long-established village, comprised, at the time of survey, solely of indigenous persons, but was scheduled to receive large numbers of transmigrants in 1977. Pagar Dewa is situated approximately 50 km north of Way Abung III, at the junction of the Way Kanan and Way Kiri rivers, in secondary forest. The inhabitants of Waspada, Karya Tani and Ogan Baru cultivated dry rice, cassava, corn, peanuts and fruit gardens; the inhabitants of Pagar Dewa cultivated wet rice, vegetable and fruit gardens and supplemented their income by fishing and tapping rubber. Particulars of the villages are summarized in Table 1.

Table 1. Description of villages surveyed, Lampung, August 1975.

Village	Longitude, Latitude, Elevation	Estimated total population	Residence history	Area description
Waspada	104°54'E; 4°44'S; 30 m	± 2,000	Transmigrants, since June 1975	Savanna, subsistence farming in small family plots.
Karya Tani	104°54'E; 4°44'S; 30 m		Transmigrants, since February 1975	Savanna, subsistence farming in small family plots.
Ogan Baru	104°54'E; 4°44'S; 30 m	120	Indigenous, since 1966 from Ogan Komering area	Savanna, secondary forest, subsistence farming in small family plots.
Pagar Dewa	105°08'E; 4°26'S; 75 m	± 1,200	Indigenous of Tulang Bawang Kingdom	Secondary forest, rubber small holdings, peridomiciliary garden and fishing.

Figure 1. Map, showing location of Way Abung III and Pagar Dewa in Lampung Province.



MATERIALS AND METHODS

Volunteers participating in the survey were asked to collect as family units in the evening at a central point in the village. Each registered individual was given a number, and the name, age and sex were recorded. Blood specimens were collected by venapuncture of from fingertips between the hours of 20:00 and 24:00. Thick and thin smears for detecting malaria parasites, and 20 ul measured volumes for filaria films, were made onto microscope slides and air-dried for 24 hours. Thin smears were fixed in methanol in the field and both thin and thick preparations were stained in dilute Giemsa (pH 7.0) for 1 hour. The malaria thick films were dehaemoglobinized while staining; the filaria films were laked in distilled water and fixed in methanol prior to staining.

Vacutainers were used for venapuncture. After blood had clotted, sera were aseptically separated by centrifugation and stored in sterile screw-capped vials on dry ice until transferred to -20° C freezers awaiting testing.

Stool and sputum cartons were distributed to persons at the time of blood collection with instructions to return faecal and sputum samples on the following morning. One to two grams of the collected stools were mixed thoroughly with 10 per cent formalin in 15 ml wide mouth screw-capped vials and examined later by direct smear and formalin ether concentration methods. Approximately one-half of the formalinized stool was examined by the latter method. At the time of collection of stools, a dacron swab of faecal material was obtained and placed within a tube of Carey and Blair transport medium for later isolation of enteric pathogenic bacteria on Salmonella-shigella and MacConkey's agar plates. Bacterial colonies with characteristics of Enterobacteriaceae were transferred to triple sugar iron slants and typed with specific antisera. Positive cultures were further subjected to standard biochemical confirmations. Sputum smears were stained with Ziehl Nielsen solution and examined for acid fast bacilli (AFB).

Sera were examined for group A (alphavirus/and group B (flavivirus) arbovirus antibodies by a standard haemagglutination inhibition (HI) test. Sera were kaolin-treated and absorved with goose erythrocytes. The antigens used were Chikungunya (CHIK), Japanese B Encephalitis (JE), and Dengue type 2 (D2) viruses. Titers of 1:10 or greater were considered positive evidence of CHIK and JE antibodies. A titer of 1:40 or greater was considered positive for evidence of D2 antibodies.

The indirect haemagglutination (HA) test of Lewis and Kessel (1961), adapted to a microtitre system (Milgram, *et al.*, 1966) was used to test for antibodies against *Entamoeba histolytica* antigens prepared from axenic cultures of the HK9 strain (Thompson, *et al.*, 1968), and against *Toxoplasma gondii* antigens from mouse peritoneal exudates containing trophozoites of the RH-strain (Lunde and Jacobs, 1959). All sera were inactivated at 56° C for 30 minutes prior to testing and serial two-fold dilutions made. Sera with reciprocal antibody titres equal to or greater than 1:128 were considered positive for *E. histolytica* and titres of 1:256 or greater were considered positive for *T. gondii.*

The indirect fluorescent antibody test (IFA) was used for detecting antibodies to Kato, Karp and Gillium strains of *Rickettsia tsutsugamushi,* and to *Rickettsia typhi* antigens by standard indirect fluorescent techniques, using a titre of 1:40 or greater as evidence of prior infection.

The microscopic and macroscopic agglutination tests were used for identifying antibodies to *Leptospira* spp., and the microtitre adapted indirect hemagglutination test was used for identifying seropositivity to *Pseudomonas pseudomallei.* Titers of 1:80 and above were considered positive. Rats were trapped in homes, peridomiciliary gardens, fields of grass, scrub and forest, using about 100 traps baited with peanut butter for one night in each of the village areas surveyed. Rats collected were killed with chloroform, identified and examined for ecto and endoparasites.

RESULTS

Registration from the four villages surveyed in Lampung Utara Regency of Lampung Province totalled 273 persons, mostly representing complete family units.

Fecal samples were examined from 203 persons. Table 2 lists the prevalences of intestinal parasites by village. *Entamoeba coli* (22%) was the most common protozoan. The preva-

lence rates of other intestinal protozoans were. *Entamoeba histolytica* (4%). *Endolimax nana* (9%), *Iodamoeba butschlii* (10%) and *Giardia lamblia* (2%). *Ascaris lumbricoides* (59%) and *Trichuris trichiura* (60%) were the most frequently encountered helminths followed by hookworm (42%). *E. vermicularis* ova were found in 2% of stools examined. Intestinal parasites were similarly prevalent in males and females (Table 3). Parasite rates were high in all age groups, but hookworm infections increased significantly with age. A total of 164 sputum specimens were collected but none was found positive for acid fast bacilli with the direct smear.

Table 2. Prevalence rates (%) of intestinal parasites in inhabitants of Way Abung III and Pagar Dewa, Lampung 1975.

Parasite	Villages				Total
	Waspada	Karya Tani	Ogan Baru	Pagar Dewa	
E. Histolytica	38 *	6	13	0	4
E. Coli	18	19	43	45	22
E. nana	9	13	6	9	9
I. butschlii	10	10	0	18	10
G. lamblia	2	2	0	9	2
C. mesnili	0	0	0	9	< 1
A. lumbricoides	58	63	31	91	59
T. trichiura	66	40	56	82	60
Hookworm	38	29	100	64	42
E. vermicularis	2	2	13	0	3
Total examined	128	48	16	11	203

* Percentage expressed to the nearest whole number

Table 3. Prevalence rates (%) of intestinal parasites by age and sex of the inhabitants of Way Abung III and Pagar Dewa, Lampung Province 1975.

Parasite	Male	Female	Total	Age grouping in years					50
				0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	
E. histolytica	2 *	8	4	5	6	4	3	6	0
E. coli	19	25	22	11	21	22	21	24	43
E. nana	8	11	9	9	8	4	15	9	10
I. butchlii	9	11	10	5	10	17	3	21	5
G. lamblia	3	1	2	5	2	0	0	3	0
C. mesnili	1	0	< 1	0	2	0	0	0	0
A. lumbricoides	56	63	68	68	58	52	44	64	62
T. trichiura	60	60	64	64	58	61	59	52	71
Hookworm	48	34	25	25	42	43	53	39	62
E. vermicularis	4	1	9	9	0	4	3	0	0
Total examined	120	83	203	44	48	23	34	33	21

* Percentage expressed to nearest whole number

Blood films for malaria and filaria parasites were examined from 273 persons of the four villages. Table 4 gives the prevalence of malaria infections by residence, showing low rates in both transmigrant and indigenous populations surveyed. Spleens were examined in 60 children aged 0 – 9 years of all 4 villages and found to be enlarged in only 2 (3%) individuals.

Only 5 persons were found to be infected

with filaria parasites *(Brugia malayi)* and 4 of these 5 persons were indigenous inhabitants of the area.

Sera from 171 individuals of the three villages in Way Abung III were tested for IHA antibodies to *E. histolytica* and *T. gondii* (Table 5). Eighteen per cent of sera were positive for *E. histolytica* and 4 per cent were positive for *T. gondii.*

Table 4. Prevalence of malaria in Way Abung III and Pagar Dewa, Lampung Province, 1975.

Malaria species	Villages			
	Waspada	Karya Tani	Ogan Baru	Pagar Dewa
Plasmodium vivax	2 (1.4)	45 (5.4)	0	0
Plasmodium falciparum	0	1 (1.4)	0	1 (2.7)
Total examined	143 (1.4)	74 (6.7)	19	37 (2.7)

Percentage shown in parenthesis.

Table 5. Prevalence of seropositivity to amoebiasis ($\geqslant$ 1 : 128) and to toxoplasmosis ($\geqslant$ 1 : 256) in 3 villages of Lampung, using HI testing.

	Village			Total
	Waspada	Karya Tani	T. Ogan Baru	
Amoebiasis	20 (20)	9 (16)	1 (7)	30 (18)
Toxoplasmosis	5 (5)	1 (2)	0 (0)	6 (4)
Total examined	100	56	15	171

Percentage shown in parenthesis.

From the 203 stools examined for enteropathogenic bacteria, there was found 1 with *Shigella dysenteriae*, 2 with *Shigella sonnei*, 1 with *Shigella flexneri*, 2 with *Salmonella typhi*, and 2 with *Edwardsiella tarda.*

Among 171 sera tested for antibodies to *Leptospira* spp. and *P. pseudomallei*, there were only 6 (4%) and 4 (2%) specimens positive, respectively.

Results of testing sera for Group A (CHIK) and Group B (JE) antibodies revealed high rates of positivity to both virus groups in all ages tested (Tables 6 and 7). In the native village, Ogan Baru and the two transmigrant villages, Waspada and Karya Tani, seropositivity to Dengue 2 virus was also high, 73% and 89%, respectively.

Table 6. Age and sex stratified prevalence rates (%) of antibodies to Japanese encephalitis and Chikungunya viruses in sera collected from populations of the indigenous village of Ogan Baru in Way Abung III, Lampung, 1975.

Arbovirus	Male	Female	Seropositivity rates (%)						Total
			0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50	
Japanese encephalitis	90	100	Ø–	75	100	100	100	100	93.3
Chikungunya	60	100	Ø–	25	100	100	100	66.7	73.3
Total number examined	10	5	0	4	3	4	1	3	15

Table 7. Age and sex stratified prevalence rates (%) of antibodies to Japanese encephalitis and Chikungunya viruses in sera collected from populations of the 2 transmigration villages of Waspada and Karya Tani, Way Abung III, Lampung, 1975.

Arbovirus	Male	Female	Seropositivity rates (%)						Total
			0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50	
Japanese encephalitis	95.7	98.8	95	95.5	100	94.4	100	100	97.1
Chikungunya	71.7	78.8	80	75	66.7	72.2	89.7	61.5	75
Total number examined	82	75	20	41	27	32	28	9	157

Evidence of scrub and murine typhus infections was found in inhabitants of each of the 3 villages tested. Differences in rates of seropositivity are noted when examined by locality (Table 8) and by age and sex (Table 9). The prevalence of antibodies to the agent of murine typhus is considerably greater than the prevalence of antibodies to scrub typhus in the newly immigrated inhabitants of Waspada and Karya Tani but the reverse is found among

Table 8. The prevalence rates (%) of antibodies to scrub and murine typhus antigens in sera collected from populations of 3 villages in Way Abung III, Lampung, 1975.

Antibody tested	Villages surveyed			Total
	Waspada	Karya Tani	Ogan Baru	
Scrub typhus	6.6	5.7	20	7.6
Murine typhus	40.7	37.7	13.3	37.1
Total number examined	91	53	15	159

inhabitants of the more established village of Ogan Baru. Evidence of scrub typhus was more prevalent in males than female in the transmigrant villages (Waspada and Karya Tani), but murine typhus rates showed no significant differences by sex. Prevalences of scrub typhus antibodies were highest in persons over 30 years of age.

Table 9. Age and sex stratified prevalence rates (%) of antibodies to scrub and murine typhus antigens in sera collected from populations of 3 villages in Way Abung III, Lampung, 1975.

Antibodies tested	Male	Female	Seropositivity rates (%)					
			0 – 9	10 – 19	20 – 29	30 – 39	40 – 49	50
Scrub typhus	8.9	5.8	0	2.4	0	12.8	13.8	12.5
Murine typhus	35.6	39.6	0	35.7	28.1	35.9	48.3	43.8
Total number examined	90	69	1	42	32	39	29	16

The most common rats collected were the house rat *(Rattus rattus diardii)* and the garden rat *(R. exulans)* (Table 10). Approximately 40% of rats collected were found infested with chigger species. The most widely distributed vector of scrub typhus, *Leptotrombidium (L.) deliense*, was found on nearly 80 % of rats, while *Leptotrombidium (L.) akamushi [L. (L.) fletcheri]* was recovered from only 2 animals.

Table 10. Rodents collected during Lampung Survey, August, 1975.

Mammal species	Name of Villages					Total number
	Waspada	Ogan Baru	Karya Tani	Kota Bumi	Pagar Dewa	
Rattus r. diardii	28	13	3	–	9	53
R. exulans	2	7	4	–	2	15
R. tiomanicus	–	4	5	–	–	9
R. surifer	–	1	3	–	–	4
R. sabanus	–	–	3	–	–	3
R. niviventer	–	2	–	–	–	2
Total number per village	30	27	18	0	11	86

DISCUSSION

The Lampung Province of South Sumatra is one of the most important developing transmigrant settlement areas in Indonesia, with a movement of tens of thousands of persons annually. The protection of the health of these settlers is a government priority and knowledge of infectious diseases risks to these persons is urgently needed. The present study was therefore undertaken to establish cross-sectional prevalences of infection with various agents among inhabitants of the area, both indigenous and newly-arrived.

The high rates of infection with intestinal protozoa and soil-transmitted helminths in this study are in agreement with surveys in other areas of Sumatra (Cross, *et al.*, 1975a, Carney, *et al.*, 1974; Carney, *et al.*, 1975), and in rural areas of Java (Clarke, *et al.*, 1973a, 1973b), the original place of the majority of the transmigrants. High prevalences of ascariasis, trichuriasis and hookworm infection are common throughout Indonesia, except in unusual circumstances in Central Sulawesi and Nusa Tenggara Timur where prevalences of ascariasis and trichuriasis may be quite low (Stafford, *et al.*, 1980; Purnomo, *et al.*, 1980). The apparent absence of *Strongyloides stercoralis* and the low rates of enterobiasis in the present survey undoubtedly reflect our methods of examination which are known to be insensitive in detecting these parasites.

We do not know the species of hookworm found in the present study, but *Necator americanus* is the predominant species in Indonesia and this probably accounts for the relative infrequency of severe hookworm anaemia. As elsewhere in Indonesia, the prevalence of hookworm infection increased with age in our study population.

Falciparum malaria is the most severe infectious disease threat to transmigrants from Java and Bali settling in the more malarious outer islands, and serious outbreaks have occurred in the past in new migrants in South Sumatra and in other islands. Although infections were present in both new arrivals and indigenous persons, parasite and spleen rates were low in all communities. The low rates of malaria infections and splenic enlargement indicate a low level of malaria transmission in the community.

Filariasis is focally widespread throughout the Indonesian archipelago, and *Brugia malayi* infection is endemic in open swamp and swamp forest ecotypes in Sumatra. Foci of malayan filariasis have been reported in the past from the Lampung area (Lie, K.J. Winoto, R.M.P., 1960) and our finding of infection among indigenous persons living in riverine, forested ecotypes is in accordance with these reports. The absence of filariasis in the recent Javanese transmigrants was expected for the following reasons : (1) *B. malayi* filariasis was in the past found in Java in three very limited rural foci only, and has now practically disappeared from this island, while Bancroftian filariasis is apparently limited on Java to the cities of Jakarta and Semarang; (2) the settlement sites in Lampung are in open rolling country which do not on casual inspection appear favorable for the breeding of *Mansonia* spp. vectors. Further, the settlers had been in Sumatra for periods of less than 9 months at the time of examination, and even with heavy filarial exposure the incidence of patent infection would be expected to be quite low.

The indirect haemagglutination (IHA) test for *E. histolytica* has been used to examine populations from most major island groupings in Indonesia; the test shows prevalence rates of 33% and 18% in West Java and Central Java, respectively (Clarke, *et al.*, 1973a, 1973b) and 13% in North Sumatra (Cross, *et al.*, 1975a). Likewise IHA testing for antibodies to *Toxoplasma gondii*, widely applied in seroepidemiologic surveys in Indonesia (Clarke, *et al.*, 1973b; Clarke, *et al.*, 1975; Cross, *et al.*, 1975b; Partono and Cross, 1975, Srisasi Gandahusada, 1978; Srisasi Gandahusada and Endardjo, 1980), shows variable positivity rates ranging from 2% to 20% using a titre of 1:256 or greater as an indicator. Our finding of seropositivity rates of 18% for *E. histolytica* and 6% for *T. gondii* are similar to those reported from North Sumatra (Cross, *et al.*, 1975a).

Infections with enteropathogenic bacteria are endemic throughout Indonesia, with not infrequent outbreaks of cholera and typhoid. The current pandemic of cholera (El Tor) has its origin in Southwest Sumatra and at present there are approximately 50,000 reported cases a year in Indonesia (WHO, 1978). *Salmonella typhi* is the most frequently isolated bacterial pathogen in stools of hospitalized patients with enteric disease in Jakarta (Sanborn, *et al.*, 1975). *Salmonella* spp. other than *S. typhi*, and *Shigella* spp. are also frequently isolated pathogens in hospitalized persons (Sanborn, *et al.*, 1975; Sanborn, *et al.*, 1977; Sunoto, *et al.*, 1978). Outbreaks of shigellosis are however unusual in Indonesia. Although two per cent of the population examined in the present study had infection with *Shigella* spp., relative isolation of family units in these settlements would not favor explosive spread.

Leptospirosis is usually water-borne, and cultural and occupational factors support the transmission of the organism in riverine, rice-growing areas typifying much of Indonesia. *Leptospira* spp. have been recovered widely from rodents and domestic animals in the archipelago (Van Peenen, Light and Sulianti, 1972). An outbreak of jaundice in the Palembang area of South Sumatra was associated with a high prevalence of antibodies to *Leptospira* spp. among the affected (Fresh, *et al.*, 1971). A seropositivity rate of 4.6 % in healthy controls from the same are is similar to our present findings in transmigrants. There was no serologic evidence of melioidosis as a health problem in the populations examined. The four HI titers of 1:20 are considered to be non-specific. This is similar to results found elsewhere in Indonesia (Gundelfinger, *et al.*, 1977).

Arboviruses are widely distributed in Indonesia, with clear differences between the Oriental and Australian biogeographical regions (Kanamitsu, *et al.*, 1979). In general, antibodies reacting to dengue viruses occur in high prevalence in populations throughout the archipelago; Japanese B encephalitis virus-specific antibody is highly prevalent in the Oriental region and absent in the Australian region and intervening biogeographical transitional zone (except Lombok). Chikungunya virus-specific antibody is variably prevalent in the Oriental region and the transitional zone and rare in New Guinea. Further, in most areas with sero-reactivity to Chikungunya, antibody patterns suggest that the disease last occurred about 30 years ago.

The high prevalence of flavivirus (dengue and Japanese B encephalitis viruses) seropositivity in all age groups of transmigrants examined is similar to findings in urban and rural Java and to indigenous populations examined in Sumatra (NAMRU-2, unpublished data).

Antibody rates to alphaviruses (Chikungunya antigen) were less than those to the flaviviruses, but the prevalence was high relative to other sites surveyed in Indonesia (Kanamitsu, *et al.*, 1979; Tesh, *et al.*, 1974; Gundelfinger, *et al.*, 1977; Van Peenen, *et al.*, 1975). Further, we found high rates throughout all age groups suggesting continuing alphavirus transmission, similar only to Kanamitsu's findings in East Kalimantan (1979).

Data on scrub typhus are scanty in Indonesia. An epidemic of scrub typhus occurred during 1954 and 1955 in a South Sumatra oilfield (Dumoulin, *et al.*, 1957). The seasonal incidence reached its peak in the rainy season, corresponding with the rise of *L. (L.) deliensis* population. The prevalence of the IFA to scrub and murine typhus in the different geographic zones of Indonesia has not been reported, but our finding of 40% seropositive for murine typhus in Waspada and Karya Tani is in accordance with the finding in Senaling, a Malaysian village where two cases of murine typhus were reported (Brown, *et al.*, 1977). Clinical illness with scrub and murine typhus is not recognized by local health authorities, the reason being

that cases are probably misdiagnosed in Way Abung III.

SUMMARY

A biomedical survey was conducted in Lampung Province August 1975 in Way Abung III, a resettlement area, and in Pagar Dewa, an indigenous village situated in an area also scheduled for resettlement. Low prevalences of malaria and malayan filariasis were found, 1% (3/273) and 2% (5/273), respectively. The frequencies of intestinal parasites, helminths and protozoa, were similar to those found in other areas of Indonesia. The most common intestinal helminths were *Ascaris lumbricoides* (59%). *Trichuris trichiura* (60%) and hookworm (42%). *Entamoeba coli* was the most common protozoa (22%), followed by *Iodamoeba butschlii* (10%), *Endolimax nana* (9%), and *Entamoeba histolytica* (4%). Serological testing for *E. histolytica* and *Toxoplasma gondii* antibodies by the indirect haemagglutination test gave a positive frequency of 18% and 4 %, respectively. *Leptospira* spp. and *Pseudomonas pseudomallei* were found in prevalences of 4% and 2%, respectively. *Shigella* and *Salmonella* spp. were isolated from the faeces of 3% (6/203) individuals. Using the IFA test the prevalence of scrub typhus and murine typhus antibodies was 12% and 59%, respectively. Chikungunya, JE and Dengue 2 antibodies were found in 75 %, 97 % and 88 % of persons examined.

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CORRECTION / RALAT

1. Bulletin Health Studies In Indonesia/Bulletin Penelitian Kesehatan Vol. IX No. 1 1981. Page/ Halaman 15.

Notations : as printed under **Abstract** should be printed as a Note

Catatan : yang dicetak di bawah **Abstract** seharusnya sebagai catatan.

ABSTRACT

Untuk mengetahui penyakit-penyakit apa yang mengancam kesehatan para transmigran diselenggarakan beberapa survai morbiditas di beberapa daerah transmigrasi yang terletak di sekitar jalan raya trans – Sumatera. Penelitian ini adalah merupakan hasil salah satu survai di Propinsi Lampung.

Dari penghuni kampung-kampung Waspada, Karya Tani, Ogan Baru dan Pagar Dewa diambil darah, faeces dan dahaknya untuk diperiksa. Juga diselidiki nyamuk dan tikus serta ectoparasit yang terdapat pada tikus-tikus yang tertangkap. Seluruhnya diperiksa 273 orang. Dari 203 sampel tinja, prevalensi Entamoeba histolytia adalah 4%, E. coli 22%, Endolimax nana 9%, Jodamoeba butschlii 10%, Gardia lamblia 2%, Ascaris lumbricoides 59%, Trichuris trichiura 60%, dan cacing tambang 42%. Kecuali untuk cacing tambang, umur tidak mempunyai pengaruh atas prevalensi rate

Bakteria enteropathogen terdapat pada 1 orang dengan Shigella dysenteriae, 2 orang dengan Shigella sonnei, 1 orang dengan Shigella flexneri, 2 orang dengan Salmonella typhi dan 2 orang dengan Edwardnella tarda.

Dari 164 sampel dahak tidak ada satu yang positif akan basil tahan asam. Enam puluh anak-anak antara 0 9 tahun diperiksa limpanya dan hanya pada 2 anak (3%) terdapat limpa yang teraba. Dari 273 orang hanya 5 orang (1,8%) mengandung microfilaria dan prevalensi malaria tertinggi terdapat di Karya Tani (6,7%), kebanyakan Plasmodium vivax. Serologis 18% dari 171 orang mempunyai IHA antibody terhadap E. histolytica dan 4% terhadap Toxoplasma gondii; agglutinasi tes terhadap Leptospira spp adalah 4% terhadap Pseudomonas Pseudomallei 2% positif.

Dengan HI tes terhadap arbovirus Grup A (Chikungunya) dan Grup B (Japanese Encephalitis) menunjukkan 73,3 – 75% dan 93,3 – 97,1% positif masing-masing. Semua golongan umur menunjukkan angka positif yang tinggi. Dengan IFA tes prevalensi antibody positif untuk scrubtyphus dan murine typhus adalah masing-masing 7,6% dan 37,1%. Scrubtyphus serologis positif terdapat paling banyak pada umur 30 tahun ke atas. Tikus yang paling banyak tertangkap adalah Rattus rattus diardii dan R. exulans dan pada 80% tikus-tikus yang tertangkap (seluruhnya 86 ekor) dijumpai Leptotrombidium deliense.

2. Bulletin Health Studies In Indonesia/Bulletin Penelitian Kesehatan Vol. IX No. 2 1981 Page/Halaman 24.

Dalam judul : *LAPORAN PENDAHULUAN MENGENAI PENDARAHAN PERIRENAL DAN* **METROPATI** *PADA GERBIL (MERIONES UNGUICULATUS) DISEBABKAN MIKOTOKSIN PENICILIUM VIRIDICATUM.*

Harap diralat menjadi : *LAPORAN PENDAHULUAN MENGENAI PERDARAHAN PERIRENAL DAN* **NEFROPATI** *PADA GERBIL (MERIONES UNGUICULATUS) DISEBABKAN MIKOTOKSIN PENICILIUM VIRIDICATUM.*

The title : *LAPORAN PENDAHULUAN MENGENAI PENDARAHAN PERIRENAL DAN* **METROPATI** *PADA GERBIL (MERIONES UNGUICULATUS) DISEBABKAN MIKOTOKSIN PENICILIUM VIRIDICATUM.*

Should read : *LAPORAN PENDAHULUAN MENGENAI PENDARAHAN PERIRENAL DAN* **NEFROPATI** *PADA GERBIL (MERIONES UNGUICULATUS) DISEBABKAN MIKOTOKSIN PENICILIUM VIRIDICATUM.*