A STUDY ON COMMUNITY PARTICIPATION IN MALARIA CONTROL :

I. FIRST YEAR PRE—CONTROL SURVEY OF MALARIA IN BERAKIT VILLAGE, RIAU PROVINCE, SUMATRA *

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ABSTRAK

Survai malariometrik dan sosiobudaya telah dilakukan di 5 RT, RK I dan 2 RT, RK II di Berakit, Propinsi Riau, Sumatra dalam bulan Mei/Juni 1982 dan Oktober/November 1982. Jumlah penduduk yang diperiksa adalah 586 orang dan penelitian sosial dilakukan dengan cara wawancara dengan 150 orang kepala keluarga desa Berakit. Dengan kuesioner dan observasi dapat dikumpulkan data-data mengenai keadaan ekonomi dan pendidikan, serta kegiatan masyarakat, dampak malaria terhadap kehidupan sehari-hari, parameter untuk pendidikan kesehatan dan fasilitasnya. Survai malariometrik dilakukan dengan pengambilan darah dengan cara menusuk jari tangan untuk dibuat sediaan darah tebal dan tipis yang kemudian dipulas dengan Giemsa. Pemeriksaan limpa dilakukan menurut cara Hackett (1944). Di samping itu darah juga diambil untuk pemeriksaan kadar hemoglobin yang diukur secara spektrofotometrik.

Hasil survai sosiologis menunjukkan bahwa penduduk desa Berakit sadar adanya penyakit malaria dan dalam batas-batas tertentu juga mengetahui sebab dan cara pencegahannya. Dari segi etnik, 49% dari penduduk desa ini berasal dari suku Melayu, 21% dari suku Bugis, 12% dari keturunan Cina, 9% dari suku Jawa, sisanya dari suku-suku lain di Indonesia. Keadaan pendidikan menunjukkan 68% dari penduduk tamat sekolah dasar, 2% sempat melanjutkan sekolah yang lebih tinggi dan sisanya masih buta huruf atau putus sekolah. Keadaan ekonomi menggambarkan bahwa penduduk desa ini hidup dari hasil pertanian kelapa di samping mata pencaharian tambahan lain. Di desa ini juga terdapat infrastruktur untuk kegiatan masyarakat dan komunikasi audiovisual melalui radio dan televisi yang dipunyai oleh penduduk desa ini. Fasilitas kesehatan di desa Berakit belum digunakan sebagaimana yang diharapkan tetapi penduduk menyadari akan kegunaan fasilitas tersebut.

Pada bulan Juni 1982 pemeriksaan limpa dilakukan pada 323 orang penduduk yang digolongkan menurut 3 golongan umur (1 tahun; 2 — 9 tahun; dan 14 tahun) di 5 RT, RK I dan 122 penduduk di 2 RT, RK II yang juga digolongkan menurut golongan umur yang sama seperti di atas.

Angka limpa di RK I adalah 27.3%, 52.5 % dan 38.5% dan di RK II 22.2%, 65.2 % dan 38.8% pada ketiga golongan umur. Bila dilihat angka limpa secara keseluruhan, maka tidak terdapat perbedaan yang nyata antara kedua RK ini, yaitu 43.3% dan 47.5%.

Pada bulan November 1982, dilakukan survai ulang pada 585 orang penduduk di RK I saja dan hasilnya menunjukkan angka limpa sebesar 23.3%,56.0% dan 40.1% pada ketiga golongan umur secara berturut-turut dan angka limpa secara keseluruhan adalah 44.4%. Ternyata tidak ada perbedaan yang bermakna antara angka-angka menurut golongan umur atau angka secara keseluruhan yang diperiksa pada bulan November dan pada bulan Juni 1982 di RK I.

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Pada bulan Juni 1982 angka parasit pada 323 orang penduduk yang diperiksa limpanya di RK I dan 122 orang penduduk di RK II, menunjukkan angka secara berturut-turut menurut ketiga golongan umur sebesar 54.5%, 33.3% dan 11.5% dan di RK II angkanya adalah 22.2%, 54.3% dan 23.9%. Ternyata terdapat perbedaan jelas pada angka parasit secara keseluruhan yaitu 21.1% di RK I dan 35.2% di RK II.

Pada bulan November 1982 dilakukan survai ulang pada 586 orang di RK I. Angka parasitnya cenderung untuk menurun pada bulan November 1982 yang tampak jelas pada ketiga golongan umur ini di samping angka parasit secara keseluruhan, bila dibandingkan dengan angka parasit pada bulan Juni 1982 di RK I.

Tiga spesies parasit malaria ditemukan dengan *Plasmodium falciparum* yang terbanyak, yaitu 71,6%, sedangkan *P. vivax* 25,0 % dan *P. malariae* hanya 1.1 % dan infeksi campuran sebesar 2.3 %.

INTRODUCTION

With the adoption of the primary health care (PHC) approach to extend health services, including disease vector control programmes, to the entire population, community participation becomes an essential component of health delivery. In this context, the authors attempt to involve the community to play an essential role in the control of malaria on a study carried out in Berakit village, an endemic malaria area, Riau Province, Sumatra. The study was for a 3 year period. The objectives of the 1st year study were (1) to investigate the social and cultural situation and the community attitude in a rural malaria endemic area, and (2) to find out the prevalence of malaria by carrying out bio-medical studies of inhabitants in the area. The results of this pre-control surveillance are here presented.

The entomological studies were being carried out by personnel of the subdirectorates of Entomology and CDC, Jakarta. Results of these studies will be published separately. The present paper deals with the sociological and parasitological parts of the studies only.

SELECTION OF STUDY AREA

Berakit village, a malaria endemic area, is situated in the northern part of Pulau Bintan in the Regency of Riau islands, Riau Province. The village is 70 kms from the capital Tanjung Pinang. (Fig.1). The area of this village is 107.25 km^2. It consists of 3 RK (subvillages) and 15 RT (communes). According to the 1980 census, the population was 1,649 (850 males & 799 females) consisting of 375 families. About 45% of the people lives in RK 1 and 55% lives in RK 2 and RK 3 (Fig.2).

MATERIALS AND METHODS

Sociological data were collected through interviews and observations. A questionnaire was designed and used as a guideline for the interviews of about 150 heads of families, which were carried out by visits from house to house.

Malariometric surveys for base line data collection were carried out in 5 RTs of RK 1 and 2 RTs of RK 2 subvillages in Berakit village from May to June 1982 and only in 5 RTs of RK 1 from October to November 1982.

Spleen examinations were carried out in accordance with the method applied by Hackett (1944). Fig. 3 shows the spleen size classification. Blood examinations were carried out by the fingerprick method while thin and thick bloodsmears were prepared and stained with Giemsa. Blood samples were also collected at the same time for haemoglobin values and

measured according to the usual spectrophotometric method at the Dept. of Parasitology, School of Medicine, U.I., Jakarta.

RESULTS

Sociological surveys

Ethnic groups. The ethnic groups consist of 49% Malays, 21% Buginese, 12% Indonesians of Chinese origins, 9% Javanese and the rest are from Buton, Bawean, Flores etc. The majority of the inhabitants in RK 1 are Malays, in RK 2. Buginese, and mixed populations in RK 3. Besides the indigenous population, the new settlers of Berakit village have been there for 8—10 years or more. These outsiders are married to the indigenous people, and work in the coconut and rubber plantations. Many of the inhabitants have their relatives in Malaysia. A mosque and several prayer places in the village are available. Most of the prayer places are in RK 1, of which only one is used regularly.

Education facilities. The village has a public primary school and an Islamic one with a total of 165 students. A secondary Islamic school has been established 2 years ago totaling 30 students. For higher education, the students have to go to Tanjung Pinang and other big cities in Indonesia. For example, 4 students from RK 1 are continuing higher education in Tanjung Pinang and 3 in Jakarta. Only 1 student reached the University level, the son of the village head.

The education status in the village, at the time of survey, is as follows: 12% of the villagers have no schooling, more confined to the older age group; 68% have completed their primary school, 18% are dropouts from primary schools, and 2% has completed high school.

Health facilities : A sub-health centre was established in 1980. The health centre is visited daily during official working hours, during which 5—10 patients are examined by paramedics. On request a paramedic also visits 2—3 patients daily after working hours. For such services patients are charged Rp. 1,500 to Rp. 2,500.

Traditional health facilities are run by 3 indigenous midwives and 5 traditional healers, who also receive malaria cases. Malaria patients are given traditional antimalaria drugs, herbs and sometimes spiritual healings.

Community activities : A package "A Course" organised by the Ministry of Education and Culture which is compulsory to all villagers. It consists of 3 groups. Group 1 is basic education for older people and illiterates, attended by 20 villagers for a 292 hours course work or "Program Kejar". Group 2 is the PKK (Family welfare program), attended by 10 villagers for 144 hours. Group 3 is the PKM (Skill training), attended by 20 villagers for 180 hours. These activities started in 1982. Important government matters through circulars are communicated by the village heads. The mosque or the prayer places are centres for organizing other activities, such as sports, social activities, etc.

Economic status of the villagers : The main occupation of the villagers derives from the coconut plantations. Supplementary earnings are from fishing during the rainy months from December to April. Income from coconuts are seasonal. During the coconut season, the cost of a climber plucking 1000 coconuts for 7 hours gets Rp. 4000, while a peeler gets Rp. 2000 a day. The market price of copra fluctuates, from Rp. 9000 to Rp. 14500 per quintal.

Fishing is carried out by 3 methods: hooks, nets and traps. In a good season, the fish hook method could yield 3 to 5 kg in 3 to 4 hours, 6 to 10 kg by fish nets

during one night, and 10 to 30 kg by 10 to 15 fish traps per night. Depending on the type of fish caught, the market price per kg varies from Rp. 3000 to Rp. 4000.

Audiovisual communication : The village has 100 radioes and 23 television sets. In addition to local broadcasting and TV programmes, they also tune to programmes from Malaysia and Singapore.

Respondents to questionnaires : A total of 130 respondents responded to the questionnaires posed on them regarding malaria. Cause of the disease, prevention, and results are presented in Table 1.

From the results received (Table 1) it appeared that most of the villagers knew and had experience with malaria. Some of them knew that malaria is caused by parasites and mosquito bites, and knowledge of their prevention was also quite good. There are some however, who still are ignorant of the disease and its cause.

The factors on social, economic and culture conditions in relation to malaria in this village are as follows :

1. *Lower income status* : Due to periods where price of copra was low, e.g. in September 1982, the price of 100 kg copra was only Rp. 9.000, the villagers found it hard to maintain their daily subsistence, so affecting their capability to provide expenditures for health maintenance.

2. *Concept of malaria and beliefs* : Some villagers believe that malaria would attack new arrivals to the village, while the indigenous inhabitants are considered immune to the disease. However, they believe that the cause of malaria is due to bad air, water, spirits, food, social contact, and super-natural forces. They believe that the fever would disappear if they do more physical activities. By doing strenuous activities, they perspire a lot, which instead will keep their bodies warm. They believe that mosquito bites do not cause disease, but only as a nuisance, especially for children.

3. *Natural and man-made mosquito habitat* : The dry season starts from May and ends in September, while the rainy season from September to April. November is a windy month. During the rainy months the villagers are out fishing, and are therefore exposed to mosquito bites. During November the wind blows from Berakit to Bukit Balau. Less mosquitoes in Berakit were encountered during this period.

The villagers move from the coastal region to the inland area to cultivate coconut plantations. To supply the young coconut trees with sufficient water, ditches were made between rows of trees for better irrigation. These man-made ditches serve as good breeding habitat for mosquitoes.

Two types of housing exists: one build on ground level, the other on stilts. The latter type of house is usually built by the ethnic Melayu group, while the newcomers prefer to build their houses on ground level. The houses are situated in the middle of the coconut plantations. The ventilation of these houses are generally good, but no mosquito-proof screens are used for windows. The distance from each house to the coconut plantations and scrub areas, breeding habitat of mosquitoes, ranges from 1 to 10 meters. The residents are likely to be exposed to mosquito bites.

4. *Prevention* : When a villager has an attack of fever, they take "mosquito pills" or resochin, one tablet for adults, and a half for children everyday to suppress the fever. They continue taking the pill until fever subsided.

To prevent from mosquito bites they used mosquito coils as repellent. Besides, they also burn rubbish or worn-out clothings to smoke off the mosquito in the

Table 1. Percentage of 130 respondents interviewed through questionnaires posed on them.

Questionnaires	% of respondents
Information on malaria	95
Experience with malaria	78
Causes of malaria :	
1. God's will	18
2. Evil spirit	5
3. No idea	77
Cause by parasite	78
Cause by mosquito	87
Cause by food & drinking water	69
Prevention :	
1. From mosquito bites	92
2. Take pills if fever occured	95

evening. Mosquito nets were used only for children.

5. *Impact of malaria in relation to livelihood* : When a villager is healthy, he could get 1000 coconuts in a 7-hour day work, and besides fish in the river. During periods he suffers from malaria, his capacity of labour is greatly reduced, and only get 200 to 300 coconuts a day. At the same time his fishing trips are also affected, deminishing his daily income due to his contraction of the disease.

Malario-metric surveys.

Spleen rates : In June 1982 spleen examinations were carried out in 323 people of the 3 age-groups in five communes (RT 1—5) of RK 1 and 122 people in two communes (RT 1—2) of RK 2, results of which are presented in Table 2. In RK 1 the highest positive cases of 52.5% were shown in age-group 2 to 9 years, followed by 38.5% in those above 14 years, and 27.3% in under 1 year. In RK 2, the spleen positive cases, in the above order, were 65.2%, 38.8% and 22.2% respectively. The overall positive rates in RK 1 was 43.3% as compared to 47.5% which showed no marked difference between the two areas.

In November 1982, a resurvey was carried out in 585 respondents in the same communes of RK 1. The highest positive cases of 56.0% were found in the 2 to 9 years group, followed by 40.1% in those above 14 years, and 2.3% in the under 1 year , with an overall positive rate of 44.4%. There was no marked difference of positive rates between the initial and resurvey in the communes of RK 1, the overall positive rates, being 43.3% and 44.4% respectively. No resurvey was carried out in communes of RK 2.

Parasite rates : Examination of parasite rates in the same 323 respondents of RK 1 and 122 in RK 2 that were examined for spleen positive rates, were conducted in June 1982; results are shown in Table 3. In RK 1 the highest parasite rate of 54.5% was found in the under 1 year , followed by 33.3% in those of 2 to 9 years and 11.5% in the above 14 years. For RK 1, the parasite rates, in the same order, were 22.2%, 54.3% and 23.9% respectively. There was a marked difference in the overall parasite rates between these two areas, being 21.1% in RK 1 as compared to 35.2% in RK 2.

In November 1982 during a resurvey

Table 2 : Examination of spleen rates by age-group in 5 RTs of RK 1 and 2 RTs of RK 2 subvillages of Berakit village, Riau Province, Indonesia, from May/June and October/November 1982.

Months	Spleen rates															
	May / June 1982								October / November 1982							
Age-group	1		2 — 9		14		Total		1		2 — 9		14		Total	
a. No. exam. b. % pos.	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
RK 1																
RT — 1	2	0	18	27.8	37	24.3	57	24.6	5	0	39	23.1	80	25.0	124	23.4
RT — 2	3	66.7	16	59.3	15	33.3	75	44.0	12	16.7	60	63.3	108	40.7	180	46.7
RT — 3	3	0	21	52.4	30	46.7	54	46.3	4	0	29	51.7	63	31.7	96	36.5
RT — 4	1	0	20	45.0	26	53.8	47	53.2	5	60	23	52.2	48	58.3	76	56.6
RT — 5	2	50	34	64.7	54	40.7	90	50.0	4	50	42	81.0	63	52.4	109	63.3
Total	11	27.3	120	52.5	192	38.5	323	43.3	30	23.3	193	56.0	362	40.1	585	44.4
RK 2																
RT — 1	4	50	27	77.8	39	35.9	70	52.9	No examination							
RT — 2	5	0	19	47.8	28	42.9	52	40.4								
Total	9	22.2	46	65.2	67	38.8	122	47.5								

Table 3 : Examination of malaria parasite rates by age-group in 5 RTs of RK 1 and 2 RTs of RK 2 subvillages of Berakit village, Riau Province, Indonesia for periods of May/June and October/November 1982.

Months	Spleen rates															
	May / June 1982								October / November 1982							
Age-group	1		2 — 9		14		Total		1		2 — 9		14		Total	
a. No. exam. b. % pos.	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
RK 1																
RT — 1	2	50	18	16.7	37	10.8	57	14.0	5	0	38	7.9	79	3.8	122	4.9
RT — 2	3	33.3	27	33.3	45	11.1	75	20.0	15	20	59	36.2	109	19.2	183	18.6
RT — 3	3	100	21	28.6	30	10	54	22.2	5	0	29	10.3	63	6.3	97	7.2
RT — 4	1	0	20	30.0	26	19.2	47	23.4	4	25	23	30.4	48	2.1	75	12.0
RT — 5	2	50	34	47.1	54	9.3	90	24.4	4	25	43	41.9	62	12.9	109	24.8
Total	11	54.5	120	33.3	192	11.5	323	21.1	33	15.2	192	27.1	361	7.2	586	14.2
RK 2																
RT - 1	4	25	27	33.3	39	7.7	70	18.6	No examination							
RT — 2	5	20	19	84.2	28	46.4	52	57.7								
Total	9	22.2	46	54.3	67	23.9	122	35.2								

of 556 people in RK 1, the parasite rates among the 3 age-groups, as in the above order, were 15.2%, 27.1% and 7.2% with an overall of 14.2%. There was a significant decline of the parasite rates in all the 3 age-groups in RK 1 as compared to the June examination. Resurvey was not carried out in communes of RK 2.

Three species of malaria parasites were identified. *Plasmodium falciparum* was the predominant parasite with 71.6% infections, *P. vivax* 25%, *P. malariae* 1.1% and 2.3% mixed infection of *P. vivax* and *P. falciparum*.

CONCLUSION

The results of biomedical surveys showed that the prevalence rate of malaria among the inhabitants of Berakit village was very high with the combined overall rate for RK 1 and RK 2 as high as 23.5% (range : 22.2 — 54.5%) for all the 3 age-groups, while the spleen rate was 45.1% (22.2 — 65.2%). This high rate of infection confirmed Berakit village is a hyperendemic malaria area. The high parasite rate (30.6%) and spleen rate (24.3%) of infection among infants and children of 2 to 9 years (38.2%; 57.9%) reveals a high turn-over in the disease transmission in the village.

The sociological surveys show the affected inhabitants' awareness of the disease and to a certain extent of the cause of the disease including prevention, despite the overall poor education of the villagers. Although health facilities provided there are not being used as it should be, the villagers are aware of the usefulness of such facilities, evidenced by the fact that paramedics in charge of the sub-health centre are being called upon to attend their ill. The economical status reveals that the villager's income from main and supplementary occupations varied according to seasonal yieldings of natural resources, i.e. coconut and fishing, and their income fluctuate according to the market price. Unless crops fail, the villagers are more or less self-supporting.

Infra-structure in the village promotes community activities. The number of radios and TV sets owned by the villagers is quite high. This provide them better coverage of information from the government. Because of the very strategic geographical region, they also have access to a more geographical coverage of information from outside Indonesia, i.e. Malaysia and Singapore. Based on these findings, it is concluded that community participation can be implemented for this village to control malaria disease which is hyperendemic there.

The results obtained in this 1st year pre-control surveillance will lead to the control implementation in Berakit village during the 2nd and 3rd year of the study. In this period the approach will be :

1. To study on the effectiveness of the changing attitude of the community's participation in the control of malaria through the "learning module" in villages with low education levels.

2. To study on the effectiveness of community participation in the control of malaria by prophylaxis.

SUMMARY

Malario-metric and sociological surveys were carried out in 5 RTs of RK 1 and 2 RTs of RK 2 subvillages in Berakit village, Riau Province, Sumatra during May/June 1982 and October/November 1982. A total of 586 people were sampled for malaria, and social studies were done by interviewing through heads of 150 families in these subvillages. Sociological data on the economic and education status, community activities, impact of malaria in relation to livelihood, including parameters for health education and facilities were obtained through

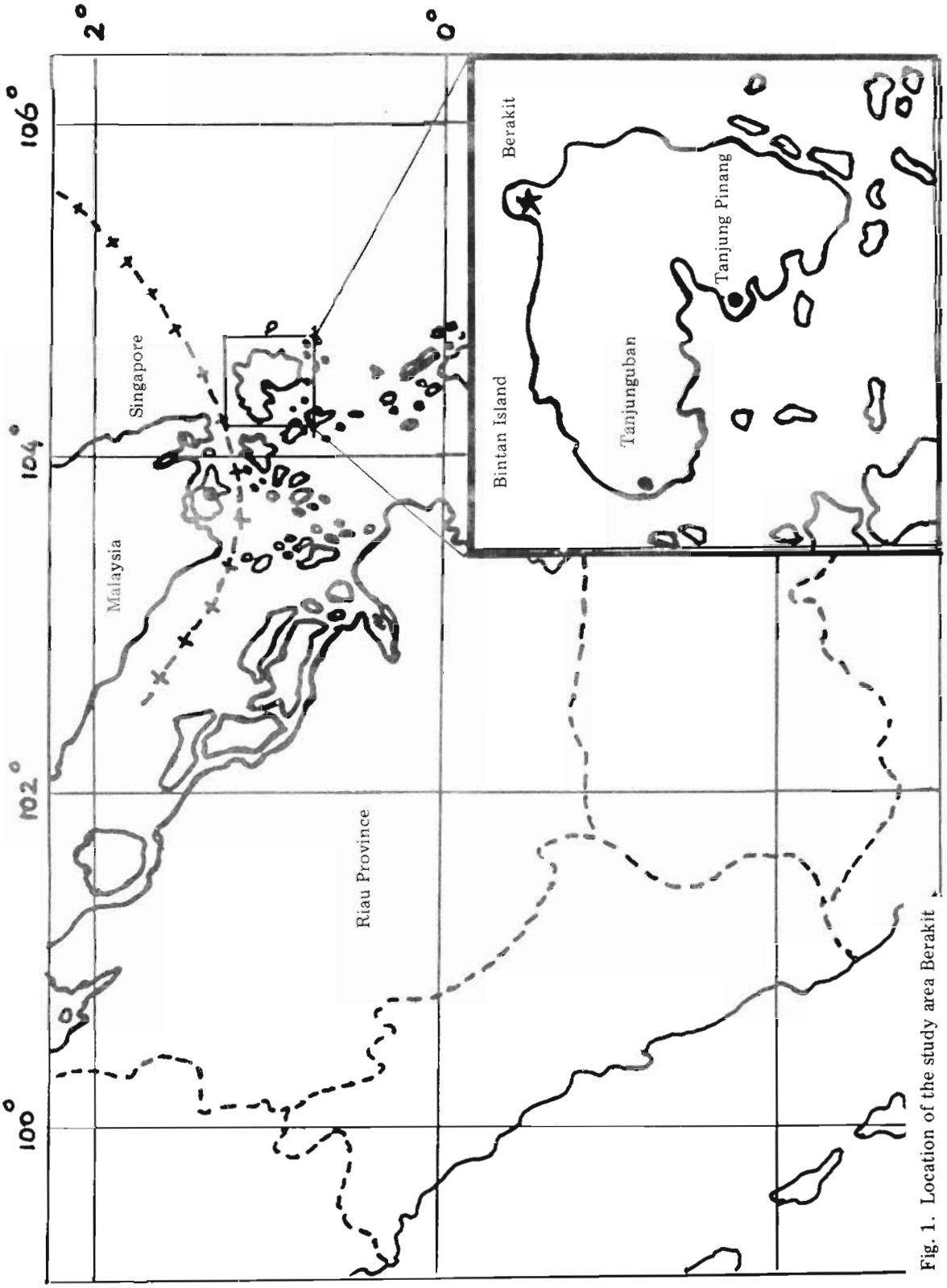

Fig. 1. Location of the study area Berakit

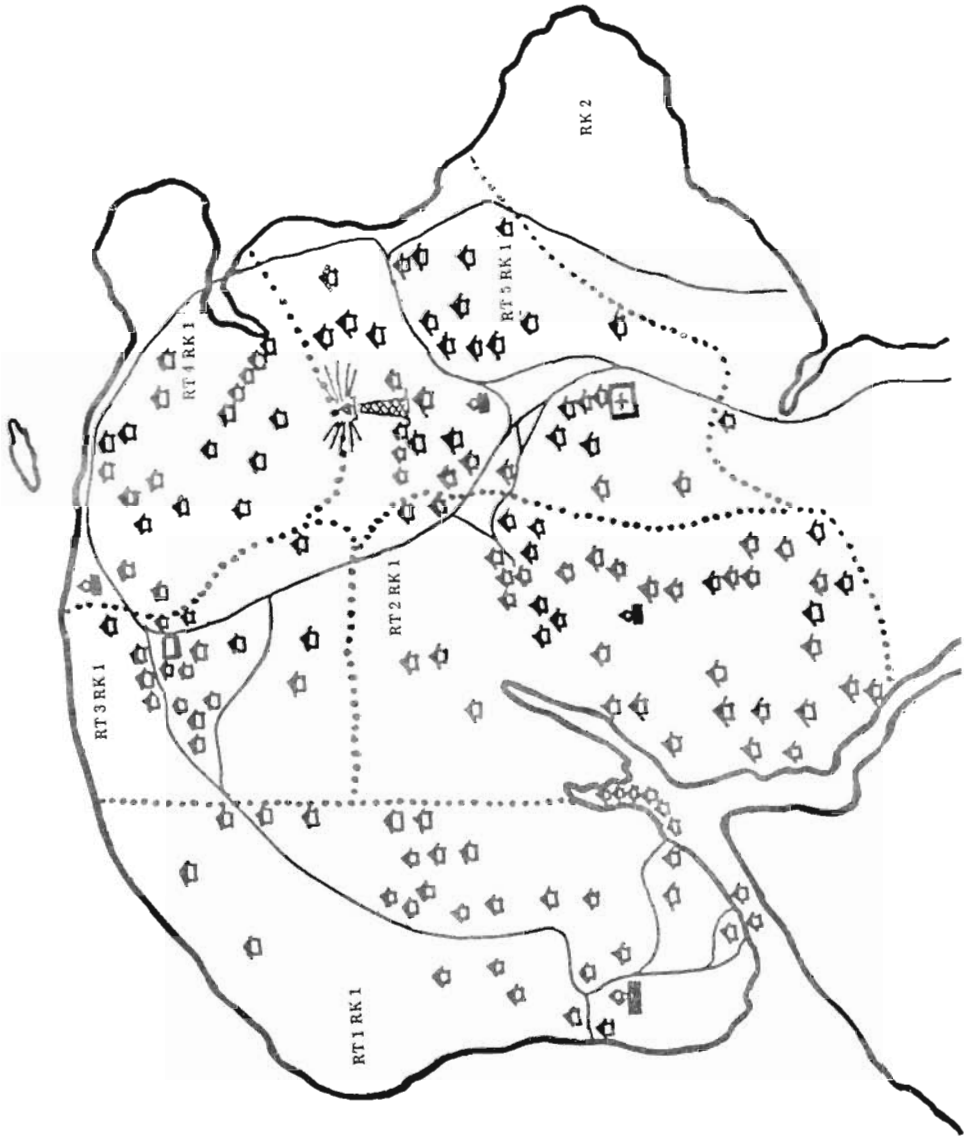

Fig. 2. Berakit village

questionnaires provided to the villagers in addition to observations made. Malariometric survey was carried out of blood obtained by fingerprick method made into thin and thick blood smears and stained with Giemsa. Spleen examination was done in accordance with the method applied by Hackett (1944). Blood samples were also taken for hemoglobin values according to usual spectrophoto metric method.

The results of the sociological survey revealed that the inhabitants in the village were aware of the malaria disease and to a certain extent on the cause and prevention of the disease. The ethnic composition composed of 49% Malays, 21% Buginese, 12% Indonesian of Chinese origins, 9% Javanese and the rest from other parts of Indonesia. The education status comprised of 68% of the population completed their primary shools, 2% completed their higher grade school and the remaining either have no schooling or drop out from schools. The economic status revealed that the villagers' income derived from the main and supplementary occupations which vary to the seasonal yielding of their agricultural resources. An infrastructure is existing in the village for community activities, and audiovisual communication is through radios and televisions owned by the villagers, mostly through Government channels. The health facility provided in the village is not being used more often as it should have been, but the villagers are aware of the usefulness of such facility.

In June 1982 spleen examination was carried out in 323 people among 3 age-groups ($<$ 1 year; 2—9; and $>$ 14) in 5 subvillages (RT 1—5) of RK 1 and 122 people in two subvillages (RT 1—2) of RK 2 of similar age-groups. The positive rates for the villages in RK 1 of the 3 age-groups were 27.3%, 52.5% and 38.5%, and that of RK 2 were 22.2%, 65.2% and 38.8%.

There was no marked difference in the overall positive rates between these two areas (RK 1 and RK2), the rates being 43.3% and 47.5% respectively. In November 1982, a resurvey of 585 people in the same villages of RK 2 showed the positive rates among the 3 age-groups were 23.3%, 56.0% and 40.1% with an overall of 44.4%. There was no marked difference in the positive rates either among the various age-groups or the overall positive rates examined in November and June 1982 in subvillages of RK 1.

In June 1982 the parasite rates in the same 323 people examined for spleen positive in RK 1, and 122 people in RK 2 showed the parasite rates among the 3 age-groups in RK 1 were 54.5%, 33.3% and 11.5% and that of RK 2 were 22.2%, 54.3% and 23.9% respectively. There were marked differences in the overall parasite rates between these two areas, the rates being 21.1% in RK 1 and 35.2 in RK 2. In November 1982 a re survey was carried out in 586 people of subrillages in RK 1, the parasite rates among the 3 age-groups were 15.2%, 27.1% and 7.2% with an overall positive rate of 14.2%. A trend of decline in the positive rates were observed among the 3 age-groups of respondents as well as in the overall positive rate between November and June 1982 in RK 1.

Three species of malaria parasites were identified. *Plasmodoium falciparum* was the predominant species with 71,6% infection, *P. vivax* 25% *P. malariae* 1.1% and 2.3% mixed infection.

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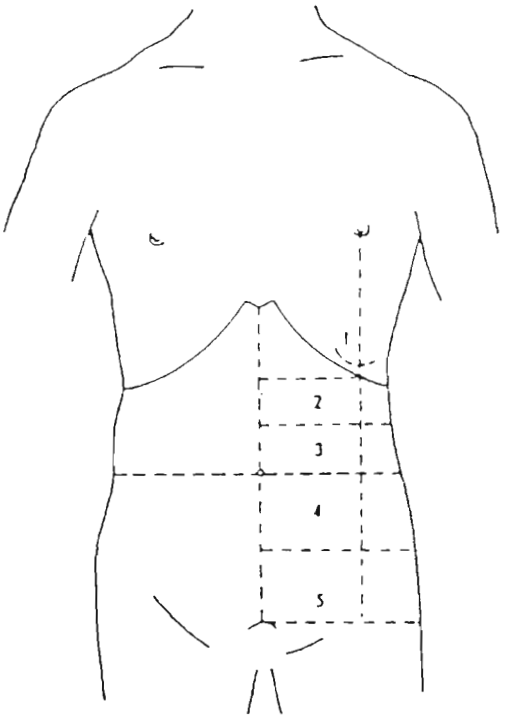
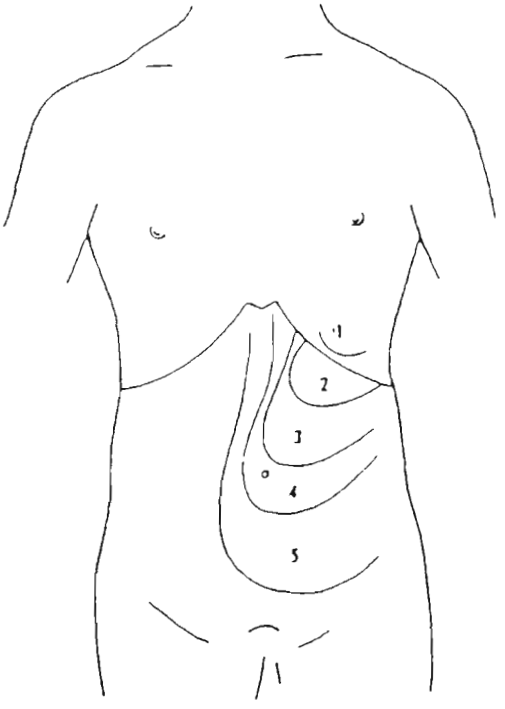


Topograpihical reference lines for the five classes of enlarged spleens



Projection on the surface of the abdomen of the five classes of enlarged spleens

Fig. 3. Classification of spleen sizes according to Hackett's method. (WHO. 1963. Terminology of malaria).

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