

INTERIM REPORT

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Report of the work done on USAID funded research project,
entitled
"The relationship between the control of Ascaris infection
and child nutritional status"

(From February 1984 to March 1985)

by

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Rec'd in SCI: JAN 06 1986

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1. Introduction

A research project had been drawn in December 1982 by USAID consultants and DMR counterparts on the "Relationship between the Control of Ascaris Infection and Child Nutritional Status" (USAID & DMR, 1982). The hypotheses to be tested at that time were:

(i) There is a relationship between Ascaris infection and poor nutritional status in children, (ii) There will be an effect on child nutritional status following chemotherapeutic intervention and (iii) There will be an effect on the prevalence and intensity of infection consistent with predictions based on a model for chemotherapeutic intervention. However, the DMR scientists involved in the project reviewed the third hypothesis and found it too fastidious for implementation in real situation. Instead, in consultation with Dr D. Crompton who visited DMR as USAID consultant in May, 1984, the hypothesis was replaced by a more pragmatic approach, viz there will be an effect on the prevalence and intensity of Ascaris infection following some rational chemotherapeutic interventions, (Crompton, 1984).

With these hypothesis or objectives in perspective, criteria for selection of study area were formulated, promising townships were visited, a suitable area was finally chosen, baseline periodic and surveys were conducted.

2. Exploratory surveys for area selection

2.1 Criteria for selection:

- 2.1.1 From an endemic area of ascariasis where crop production, topography and other factors are as similar as possible, in one of the townships of Rangoon Division.
- 2.1.2 The area should comprise 15 to 20 villages with a 2-12 year old population of about 1200.
- 2.1.3 Accessible throughout the year, but communication should not be too good (i.e. along the main highway) or too bad (i.e. in far flung area).
- 2.1.4 Population should be relatively stable.
- 2.1.5 Main occupation should be farmers.
- 2.1.6 There should be no major diseases. (other than ascariasis) affecting the nutritional status of children (e.g. Malaria, Hookworm).
- 2.1.7 There should be no developmental projects involving the area in the near future.
- 2.1.8 Co-operation of the local population and health services should be obtained.

2.2 Visit to townships in Rangoon Division

Visits were made jointly in the Rangoon Division by the staff members of the three collaboratory divisions of the project, viz the Epidemiology, Parasitology and Nutrition Divisions.

The objectives of the visits have two aims, to select a suitable area for the research project and to train the newly recruited project staff in collecting demographic informations and stool specimens, also undertake anthropometric measurements in the community. Usually, a meeting was arranged with the Township Medical officer, other health staff and relevant personnel of the area. Then, preliminary enquiries were done on the presence or absence of promising study area, fulfilling the laid down criteria.

The various area of the townships visited in the Rangoon Division in February and March 1984 included the following:

- 2.2.1 Theypekan village tract, Syriam townships
(Area 1 in Fig. 1).
- 2.2.2 Lauklay chaung village tract, Taikkyi township
(Area 2 in Fig. 1).
- 2.2.3 Thayetchaung, Thakwa and Poketa village tracts,
Taikkyi township (Area 3 in Fig. 1).
- 2.2.4 Minywa and Shwehlaykyi village tracts, Hmawbi
township (Area 4 in Fig. 1).
- 2.2.5 Hlawkar and Kyaungkon village tract, Insein
township (Area 5 in Fig. 1).

Reconnaissance of some of the villages was done during visits and exploratory surveys were carried out in each area whenever required.

2.3 Research activities and findings

In order to fulfil the selection criteria, household visits were undertaken to have accurate population census especially with regard to 2-12 year old children, occupational and travelling status of the household members, occurrence of illness such as malaria and anuria. Stool specimens were collected to detect the presence of Ascaris, hookworm and other intestinal parasitic eggs. In addition, responsible personnel in villages were asked about the area accessibility, security, and likelihood of any developmental project that would disturb or change the ecology of the area in the near future.

Many of the area visited were not suitable for execution of the study. For instance, 30 to 70% of the households of villages in area 1 are scattered in the paddy fields about 1-2 miles around the villages, thereby making the performance of research procedures (e.g. collection of stools, deworming) difficult although other criterion are fulfilled. In area 3, many of the villages can be flooded during the rainy season and population movement is relatively heavy since the principal villages are situated along the highway and tarry road.

Nevertheless, area 2 seems to fulfil all criteria laid down for the selection of the study area. The area is semi-isolated, situated in the vast plain of paddy fields, and consists of a number of villages that may provide the required sample population. Preliminary stool examinations of 94 specimens indicated that 90% of the children harboured Ascaris lumbricoides. There were only few infections, of T. trichura and A. duodenale, constituting 6.0% and 1.0% respectively. Thus, the area 2 in figure 1 was tentatively selected.

2.4 Further preparatory survey in area 2

Area 2 was revisited again in July 1984. This time, all the households in all the villages were visited to obtain accurate population census, population movement and necessary organizational work for implementation of the project in the very near future. Table 1 shows the population census and activity by village in the area 2. The study area consisted of 19 villages, 1228 (2-12) years old children. The villages were randomly divided into study and control villages while Dr D. Crompton was present in May 1984. There is a strong reason to believe that area 2 can be an appropriate site for the research project and thereby the area was finally selected.

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3. Implementation of the research project

3.1 Organization:

For smooth running of the entire project support has been solicited from different level of organization including political, educational and health institutions. Administrative support was obtained from the Rangoon Divisions People's Council and the Taikkyi township People's Council.

Similarly, meetings were also held with the health personnel of the Rangoon Health Division and Taikkyi Hospital for proper running of the managerial work at the township and village levels. In this respect, directives had been issued by the Township People's Council to the Village People Council member for proper cooperation to every success of the entire project from beginning to end.

3.2 Commencement of baseline and periodic surveys

The baseline study began on 8 August 1984. Study methods and research activities were carried out according to the study protocol. Unexpectedly, 4 villages with the code numbers of 14a, 17a, 18a and 19a (as indicated in Figure 2) were inundated due to the Flood in the Irrawaddy River about two miles away, when surveys were been carried out in other villages.

These 4 inundated villages were immediately substituted by the neighbouring villages of similar ecology, with the code number 14, 17, 18, 19, 20 and 21 as shown in figure 2 in order to similar (2-12) years old children.

The periodic surveys were launched in November 1984 and February 1985.

4. Préliminary findings from the project area

4.1 Villages and population

The study area consists of 21 villages, 8 study and 13 control villages. The (2-12) year children population now become 1356, due to increase in the number of villages and slight extension of the age group from 1 year 9 months to 12 year 3 months in order to express nutritional status by decimal year (Table 2).

4.2 Comparability of study and control villages with references to social conditions

90% of the head of households in both the study and control villages are farmers. The majority (about 70%) of them have monastery education or just able to read or write. The average number of household size is about 4.5 in the villages. In addition,

85% or more of the houses have latrines in both the study and control villages. But all are insanitary. (see table 3 to 6).

4.3 Participation rates

There are three main research activities in the field viz, collection of stool samples, administration of anthelmintic and conducting of anthropometric measurements. The participation rates in these activities were high, over 90% in most of the cases (see table 7).

4.4 Prevalence rates of Ascaris infection and reinfection

Prevalence rates of Ascaris infection were high in the three communities where stool specimens were taken from all ages during the baseline surveys. The rates were over 70% as seen in table 8. The prevalence rates in the (2-12) year old children were even highest. This is seen both in the study and control villages (table 9). Although chemotherapy was given at intervals of 3 month, the prevalence rates of reinfection were still high (table 9).

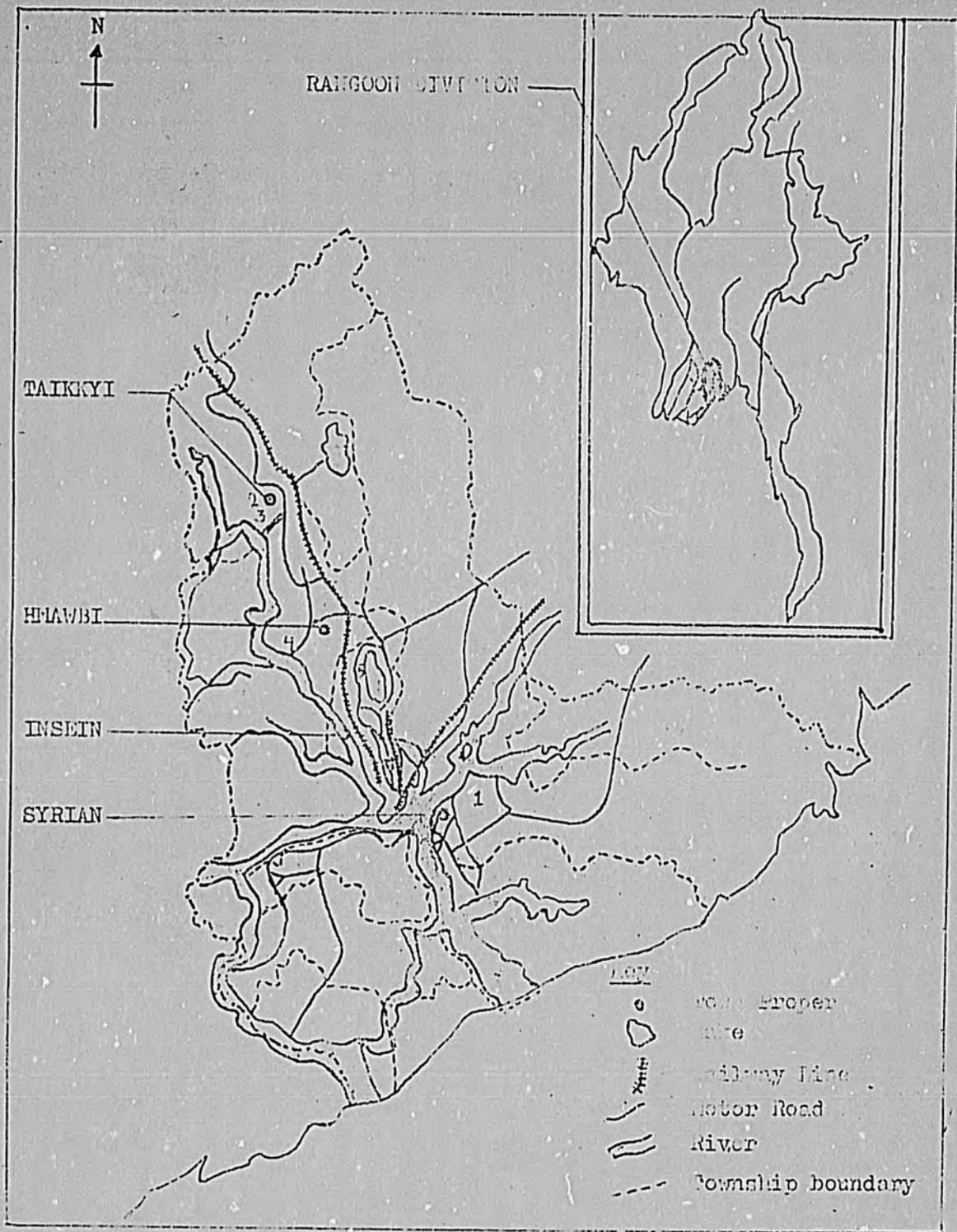
4.5 Intensity of infection

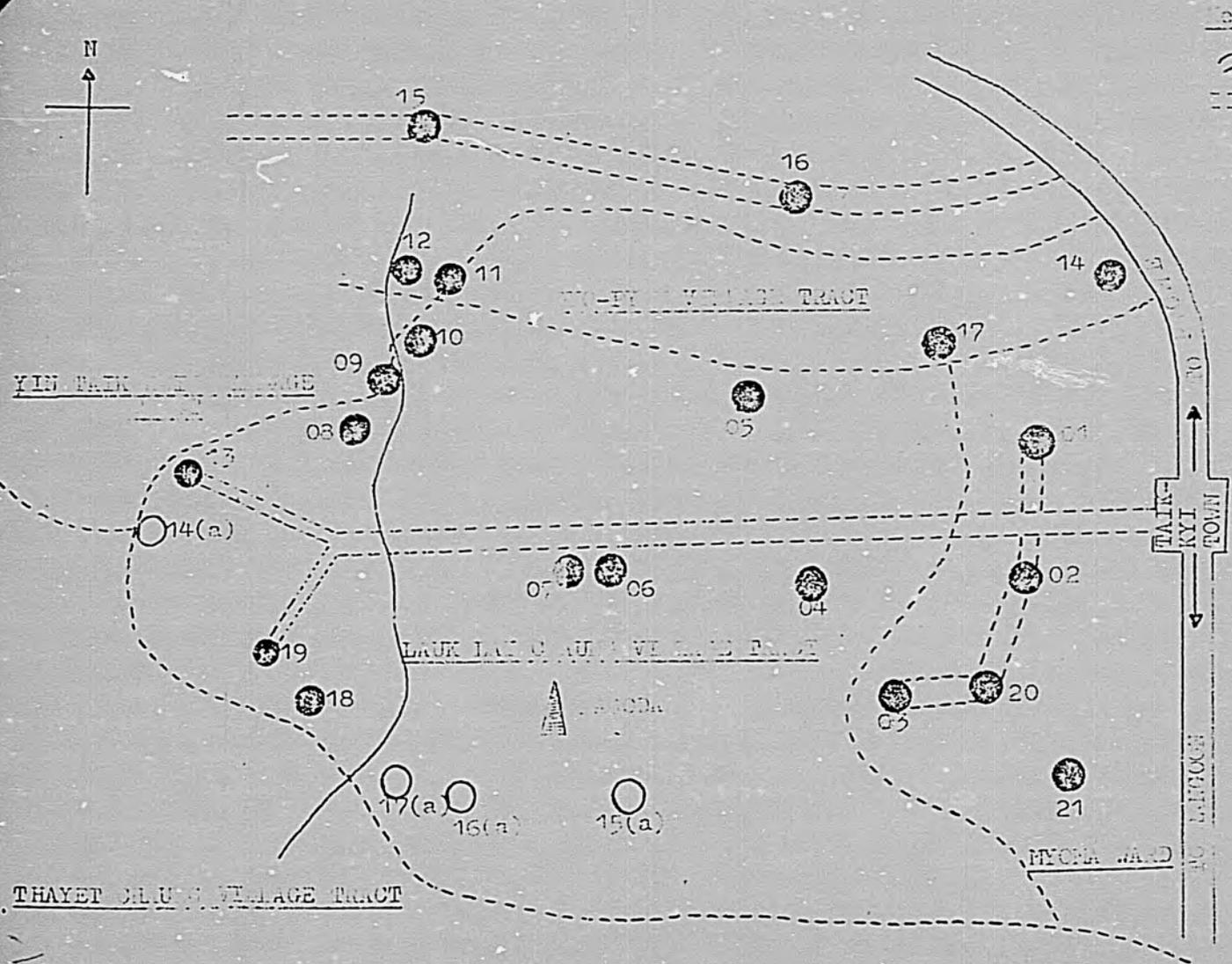
The mean worm burden per person varied from 8 to 20 in the studied villages (table 10).

5. Conclusions

During the period under report, three field surveys were undertaken in the study area. There are 8 study villages and 13 control villages. They are all located in similar ecological region and are comparable with reference to educational, occupational status of the head of household, the size of household and the presence or absence of latrines. Besides, the numbers of (2-12) year old children in both the study and control villages are almost equal. Moreover, the study area as a whole is a hyperendemic area of ascariasis and reinfection rate is very high. All these features indicate that the study area is a proper and suitable site for the research project.

In view of the high response rate of the participants in the study area and if the same vigour and endeavour, on part of the project staff members be maintained, the research project will, no doubt, come to a successful end.





- ~~~~ = Motor Road
 - - - - = Dirt Road
 ● = Study Village
 ○ = Village
 ~~~~ = Creek  
 - - - - = Village Boundary

- 01 - In-gley
- 02 - In-gan-wi
- 03 - In-gin
- 04 - Ngan-gan-wi
- 05 - Swaitan-gon
- 06 - young Gu
- 07 - Kwan
- 08 - Lon-ko-kong
- 09 - young Gu
- 10 - Kallor
- 11 - Kwan-ga
- 12 - Kwan-gon
- 13 - Kwan-ga
- 14 - Kwan-ga
- 15 - Baik-tan
- 16 - Baik-tan-taw
- 17 - Ye-gya-wai
- 18 - Kwan-gin-tan
- 19 - Ye-gya
- 20 - Kwan-gon
- 21 - last Ye-twin-gon
- 14(a) - Thator Gu
- 13(a) - Tan-Ton-sint
- 16(a) - Ye-Twin-gon
- 17(a) - we-gyi

Figure 2. Lay out of the villages in the study area in Taikkyi Township

Table (1) Village, population census and population movement of area 2 in Taikkyi Township

| Village code | Name of Village | Name of village tract | Name of Household | Total pop: | 2-12 years old pop. | Whole year pop. movement |                                  | Remarks                    |
|--------------|-----------------|-----------------------|-------------------|------------|---------------------|--------------------------|----------------------------------|----------------------------|
|              |                 |                       |                   |            |                     | No. of day/visit         | No. of days travelled per person |                            |
|              | Ingalalay       | Kyoma                 | 78                | 413        | 106                 | x                        | x                                | Pop. movement not enquired |
|              | Ingalangyi      | "                     | 54                | 279        | 73                  | 7.78                     | 1.14                             |                            |
|              | Kanyin San      | "                     | 103               | 510        | 135                 | x                        | x                                |                            |
|              | Hrak-pyawtaw    | Lauklay chaung        | 41                | 197        | 51                  | 16.55                    | 1.85                             |                            |
|              | Swaikankan      | "                     | 15                | 69         | 19                  | x                        | x                                |                            |
|              | Kyaung Su       | "                     | 54                | 278        | 67                  | 3.68                     | 0.94                             |                            |
|              | Ywama           | "                     | 41                | 183        | 49                  | x                        | x                                |                            |
|              | Koakokong       | "                     | 35                | 178        | 53                  | 5.98                     | 1.34                             |                            |
|              | Chaung-kyo      | "                     | 32                | 193        | 57                  | 4.15                     | 4.75                             |                            |
|              | Balisu          | "                     | 10                | 57         | 15                  | 8.5                      | 0.6                              |                            |
| (a)          | San Pya         | "                     | 53                | 256        | 65                  | 6.8                      | 2.01                             | inundated in August 1984   |
|              | Kan-To-sint     | "                     | 117               | 608        | 160                 | 4.61                     | 0.78                             |                            |
| (a)          | Ye-Twin-Gon     | "                     | 55                | 309        | 89                  | x                        | x                                | "                          |
| (a)          | Kwo-Gyi         | "                     | 38                | 160        | 38                  | x                        | x                                | "                          |
|              | Chauk-Ain-Tan   | "                     | 55                | 256        | 60                  | x                        | x                                |                            |
|              | Thapya          | "                     | 61                | 278        | 82                  | x                        | x                                |                            |
|              | Chaung Na       | Joephyu               | 52                | 227        | 52                  | x                        | x                                |                            |
|              | Thaphan Gon     | "                     | 23                | 103        | 19                  | x                        | x                                |                            |
| (a)          | Thaton-Su       | Yirtaikwin            | 28                | 182        | 38                  | x                        | x                                | inundated in August 1984   |
|              |                 | Total                 | 945               | 4736       | 1228                |                          |                                  |                            |

Table 2. Final population census of the study and control villages in the study area

| Village | Study village   |                  |            |                  | Village Code No. | Control village |                  |            |                  |
|---------|-----------------|------------------|------------|------------------|------------------|-----------------|------------------|------------|------------------|
|         | Name of village | No. of household | Total Pop. | 2-12 yr children |                  | Name of village | No. of household | Total Pop. | 2-12 yr children |
|         | Ingalarlay      | 91               | 453        | 119              | 02               | Ingalargyi      | 61               | 304        | 85               |
|         | Kanginsan       | 99               | 493        | 130              | 20               | ThayaGon        | 18               | 65         | 18               |
|         | Ngak-pyawtaw    | 38               | 93         | 58               | 21               | East-YetwinGon  | 42               | 197        | 51               |
|         | Kyaung Su       | 60               | 291        | 91               | 04               | Swaitawkan      | 14               | 64         | 24               |
|         | Ywama           | 41               | 182        | 60               | 08               | Koakokong       | 42               | 191        | 53               |
|         | Chaung-Kyo      | 32               | 187        | 54               | 10               | Balisu          | 12               | 68         | 21               |
|         | Thepya          | 59               | 267        | 68               | 13               | SanPya          | 63               | 306        | 85               |
|         | Daik-Kan        | 61               | 294        | 88               | 18               | Chaung-Ain-Tan  | 52               | 260        | 63               |
|         |                 |                  |            |                  | 11               | Chaung Na       | 52               | 236        | 59               |
|         |                 |                  |            |                  | 12               | ThaphanGon      | 22               | 106        | 20               |
|         |                 |                  |            |                  | 14               | Chauk taingKwe  | 63               | 315        | 85               |
|         |                 |                  |            |                  | 17               | KyoKyaKwin      | 42               | 215        | 56               |
|         |                 |                  |            |                  | 16               | KyaikHonTaw     | 41               | 203        | 68               |
|         | T o t a l       | 481              | 2260       | 668              |                  | T o t a l       | 524              | 2530       | 688              |

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Table 3. Percentage distribution by occupational status of head of household in study villages & control villages

| Occupational Status | Study village |       | Control village |      |
|---------------------|---------------|-------|-----------------|------|
|                     | No:           | %     | No:             | %    |
| Farm Owners         | 102           | 21.8  | 128             | 26.1 |
| Farmers             | 323           | 68.9  | 275             | 56.1 |
| Itenerant worker    | 2             | 0.4   | 8               | 1.6  |
| Others              | 112           | 9.0   | 79              | 16.2 |
| T o t a l           | 469           | 100.0 | 490             | 100  |

Table 4. Percentage distribution by educational status of household in study and control village.

| Occupational Status | Study village |       | Control village |       |
|---------------------|---------------|-------|-----------------|-------|
|                     | No:           | %     | No:             | %     |
| High school         | 5             | 1.1   | 17              | 3.5   |
| Secondary           | 26            | 5.6   | 44              | 9.0   |
| Primary             | 66            | 14.2  | 50              | 10.2  |
| Monestry/3rs        | 335           | 72.0  | 364             | 74.6  |
| Illiterate          | 33            | 7.1   | 13              | 2.7   |
| T o t a l           | 465           | 100.0 | 488             | 100.0 |

Table 5. Percentage distribution of family size of household in study and control villages.

| Family size | Study village                 |       | Control village               |       |
|-------------|-------------------------------|-------|-------------------------------|-------|
|             | No:                           | %     | No:                           | %     |
| <5          | 223                           | 45.4  | 249                           | 47.9  |
| 5 - 6       | 162                           | 33.0  | 168                           | 32.3  |
| 7 +         | 106                           | 21.6  | 103                           | 19.8  |
| T o t a l   | 491                           | 100.0 | 520                           | 100.0 |
| M e a n     | 4.6659 <sup>±</sup> 2.7 (S.E) |       | 4.5173 <sup>±</sup> 2.7 (S.E) |       |

Table 6. Percent distribution of type of latrine of household in control villages and study villages.

| Type of latrine | Study village |       | Control village |                   |
|-----------------|---------------|-------|-----------------|-------------------|
|                 | No:           | %     | No:             | %                 |
| Pit             | 194           | 42.5  | 267             | 54.3 <sup>?</sup> |
| Surface         | 191           | 41.9  | 199             | 10.9              |
| No latrine      | 71            | 15.6  | 21              | 4.3               |
| T o t a l       | 456           | 100.0 | 487             | 100.0             |

Table 7. Participation rates of 2-12 year old children  
in study and control villages by research  
activity and survey

| A c t i v i t y                | Survey I |         | Survey II |         | Survey III |         |
|--------------------------------|----------|---------|-----------|---------|------------|---------|
|                                | Study    | Control | Study     | Control | Study      | Control |
| Stool specimens collection     | 91.51    | 90.14   | 84.39     | x       | 77.28      | x       |
| Administration of anthelmintic | 94.91    | x       | 82.27     | x       | 90.4       | x       |
| Anthropometry                  | 91.98    | 93.42   | x         | x       | 93.44      | 90.51   |
| Sample size                    | 648      | 669     | 634       | x       | 625        | 643     |

x = not relevant.

Table 8. Prevalence rate of ascariasis in communities of 3 villages (Baseline Survey)

| Age Group | Kanyin San |       | Thepya |       | Daikkan |       |
|-----------|------------|-------|--------|-------|---------|-------|
|           | * No:      | %     | No:    | %     | No:     | %     |
| <1        | 11         | 45.45 | 3      | 33.33 | 6       | 33.33 |
| 1-4       | 49         | 73.47 | 21     | 80.92 | 26      | 83.46 |
| 5-9       | 48         | 89.58 | 29     | 82.76 | 43      | 88.37 |
| 10-14     | 49         | 91.84 | 32     | 87.50 | 34      | 91.18 |
| 15-24     | 69         | 71.01 | 45     | 68.89 | 39      | 82.05 |
| 25-44     | 76         | 78.95 | 48     | 66.67 | 64      | 79.69 |
| 45+       | 81         | 70.37 | 56     | 58.93 | 44      | 84.09 |
| All ages  | 383        | 77.02 | 234    | 70.94 | 256     | 83.59 |

\* No: = No. of persons examined

Source of data: Parasitology Research Division

Table 9. Prevalence and re-infection rates of *Ascaris lumbricoides* of 2-12 year old children in study villages and prevalence rate in control villages\*

| Survey | Prevalence Rate  |                 | Reinfection Rate |
|--------|------------------|-----------------|------------------|
|        | Study village    | Control village | Study village    |
| 1      | 75.59<br>(584)** | 82.84<br>(606)  |                  |
| 2      |                  |                 | 65.57<br>(546)   |
| 3      |                  |                 | 63.83<br>(481)   |

Table 10. Mean worm burden per person in 2-12 year old children in study village (baseline Survey)

| V i l l a g e | No. of persons dewormed and stool given | No. of worm expelled | Mean worm burden/person |
|---------------|-----------------------------------------|----------------------|-------------------------|
| Daikkan       | 67                                      | 595                  | 8.8806                  |
| Thepya        | 61                                      | 495                  | 8.1148                  |
| Kanyinsan     | 120                                     | 1480                 | 12.3333                 |
| Kyaung su     | 81                                      | 909                  | 11.2222                 |
| Ywana         | 55                                      | 526                  | 9.5636                  |
| Hpakpyawta    | 57                                      | 1151                 | 20.1930                 |
| Ingalarlay    | 116                                     | 1596                 | 13.7586                 |
| Chaungkyo     | 50                                      | 485                  | 9.7                     |
| T o t a l     | 607                                     | 7237                 | 11.9226                 |

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| Thepya      | 61                                      | 495                  | 8.1148                  |
| Kanyinsan   | 120                                     | 1480                 | 12.3333                 |
| Kyaung su   | 81                                      | 909                  | 11.2222                 |
| Ywama       | 55                                      | 526                  | 9.5636                  |
| Ngakpyawtaw | 57                                      | 1151                 | 20.1930                 |
| Ingalarlay  | 116                                     | 1596                 | 13.7586                 |
| Chaungkyo   | 50                                      | 485                  | 9.7                     |
| Total       | 607                                     | 7237                 | 11.9226                 |

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