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Final Report

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COMMUNITY CONTROL OF SOIL TRANSMITTED HELMINTHS IN RURAL SRI LANKA

CENTRE FILE: 3-P-87-0061

FINAL REPORT

SUBMITTED TO

THE INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
OTTAWA CANADA
BY

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Sri Lanka

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LIST OF ABBREVIATIONS

FHW	Family Health Worker
FHWW	Family Health Workers
PHI	Public Health Inspector
PHII	Public Health Inspectors
SE	Standard Error
MEPG	Mean Eggs per Gram
ERR	Egg Reduction Rate

SUMMARY

This study was undertaken to determine the prevalence and severity of soil-transmitted helminthic infections in rural communities in Southern Sri Lanka, and to study control of these infections with anti-helminthic therapy together with health education through community participation.

250 rural families having children aged between 2 to 12 years, in two equal cluster samples of 125 families (Group A from Baddegama, Group B from Walpita) were selected from the Field Training Area of the Faculty of Medicine, University of Ruhuna, Galle.

In each group prevalence and severity of soil-transmitted helminths in children aged between 2 to 12 years were determined at the beginning of the study and at six monthly intervals on three successive stool examinations. Single dose Mebendazole (500 mg) was given to each ova positive child immediately after each stool examination.

Health education was provided with community participation to both groups after the collection of the first stool sample and in Group B health education programme was continued regularly with community participation upto the end of the study period.

Knowledge, attitudes and practices in respect of soil-transmitted helminthic infections were assessed before and after intervention.

Approximately 80% of families in each group had monthly incomes just below the threshold for poverty (less than Rs.1 000). Majority of families were in social class 4. Almost 60% of families had sub-standard houses. Approximately 98% of families obtained their drinking water from wells and of these wells just under 50% were unprotected. Almost half of the population had pit latrines.

In each group the prevalence and severity of soil-transmitted helminths was found to be low at the beginning of the study. In the two groups prevalence rates of Ascaris lumbricoides were 17% and 14,6% and for Trichuris trichiura 31,6% and 31,5%. Hook worm infection was not detected throughout the study period. The low prevalence of all soil-transmitted helminthic infections may be the result of the availability of anti-helminthic therapy (Mebendazole) free of charge at the local health clinics and school medical clinics and the high percentage of mothers who utilized this facility for their children.

With intervention in each group there was a significant fall in prevalence rates for both Ascaris lumbricoides and

Trichuris trichiura, when compared to rates before intervention. However there was no significant difference in the prevalence rates between the two groups after intervention. The severity of both Ascaris lumbricoides and Trichuris trichiura was also low at the beginning of the study. A fall in the severity of both infections was observed throughout the study period in both groups. Egg reduction rates were also achieved at successive stages of the study in both groups. The percentage reduction was higher in Group B that had continuous health education.

It was observed that knowledge regarding soil-transmitted helminths such as the infectious agents, methods of transmission improved after intervention in both groups. However a higher percentage increase in knowledge was observed in the group that had continuous health education.

A major factor elicited was that practices such as washing of hands with soap and water before meals and before cooking; proper disposal fo pre-school childrens' faeces; washing feet after using the latrine and covering of cooked food improved after intervention in both groups and the percentage increase in most practices was higher in the group with continuous health education. It was observed that the percentage improvement in the practice of using boiled cooled water for drinking in both groups was low. This may be related to the

low economic level of the study sample. Fire-wood used for boiling of water is an expensive item.

Change of behaviour of the study sample was assessed using questionnaire method. However if participatory observation method was used, better assessment of practices would have been achieved in respect of soil-transmitted helminthiases. Furthermore if the two study areas were compared with another, where health education was not provided by the researchers the impact of interval health education on the control of soil-transmitted helminthic infection could have been assessed.

A limitation observed in this study was that the investigators had no control on the health education received by the study sample through other sources such as mass media, other health personnel and non-governmental organizations throughout the study period. There was also no control on the anti-helminthic treatment of the study sample.

This study shows that measures such as anti-helminthic therapy and/or health education to improve knowledge and hygienic practices are essential to reduce prevalence and severity of soil-transmitted helminthic infections. However to achieve a further reduction it may be necessary to improve the economic status of the community.

Chapter 1

INTRODUCTION

Soil-transmitted helminthiases (geo-helminthiases) have received little attention compared to malaria, schistosomiasis, leprosy and leishmaniasis. However it is safe to assume that they adversely affect the health status of human population in almost all parts of the world. Geo-helminths ordinarily include the large round worm Ascaris lumbricoides, the hookworm Necator americanus and Ancylostoma duodenale and the whipworm Trichuris trichiura.

While high prevalence and intensity of these worms in developing countries have been established for a long time, the efforts made towards the control of them have been dis-proportionately small and barely minimal compared to other health activities.

This apparent lack of awareness, attention and action towards the soil-transmitted helminths are due to a multitude of interrelated factors. The most important single factor is the nature of soil-transmitted helminthiases themselves, their insidious onset, lack of specific signs and symptoms, their chronicity and persistence and the absence of sudden outbreaks of dramatic epidemics (1).

It is only recently the attention of health workers was focussed on this important public health problem.

The soil-transmitted helminths are generally prevalent both in rural and urban areas where there is sub-standard living conditions (2). The earliest community based study on geo-helminths reported from Sri Lanka is that of Sweet in 1924-1925 for the prevalence of hook worm infestation (3). In 1961 Sivalingam reported the prevalence of parasitic infestation among a group of individuals who came to the Medical Research Institute for immunization against rabies during 1946-1952 (4).

Community studies in the rural areas for the prevalence of worm infestation have been conducted by Jayawardana (5) and the W.H.O. diarrhoeal team (6). Both studies related to children and young adults upto the age of 20 years. Fernando and Balasuriya (7) showed high prevalence of Ascaris and hook worm infections among rural population in Sri Lanka. The prevalence of hookworm infestation was low among under fives.

The prevalence of helminthic infection in urban communities in Sri Lanka has been studied by De Silva, Ismail and Lionel (8) and De Silva and Jayathilaka (9).

The disease conditions caused by soil-transmitted helminths are primarily dependent on the intensity of infection (worm burden), the duration of infection and the age and nutritional status of the host. While high prevalence and intensities of infection were generally demonstrated, the actual disease status and their potential threat to nutrition and child growth was neither recognized nor registered by the health personnel.

The geo-helminths, mainly the giant worm Ascaris may affect the nutrition of the host by competing with it for nutrients causing malabsorption, inhibiting the host's digestive enzymes and increasing intestinal peristalsis. All these lead to malnutrition which is already existing among the children in developing countries due to multifactorial components of nutrition which encompass all aspects of health, diet, education, economic status and social and cultural practices pertaining to food and eating habits. However the effects of chronic, heavy Ascariasis on the nutritional status of already under nourished children cannot be over-emphasized (1).

Iron deficiency anaemia resulting from blood loss as a consequence of hook worm infestation was well established by experimental studies using radio active chromium (10). In addition to the intensity and duration of infection and the

age of the host the iron reserves of the host will also determine the severity of anaemia.

Abdominal symptoms, mainly non-specific abdominal pain and chronic persistent diarrhoea is another recognized entity due to geo-helminths as a result of inflammation and ulceration or increased motility of the gut. This will aggravate the condition of under nutrition among infected children as severe diarrhoea is often accompanied by significant loss of protein, water and electrolytes from the intestine.

Even though information is distressingly sparse regarding specific details and the basic mechanisms of pathogenesis of these effects, it is reasonable to postulate that control of geo-helminths will combat malnutrition directly blamed on the parasites.

Intestinal worms "steal" a portion of the scanty food available to this poor section of population in developing countries. Eradicating intestinal worms thus amounts to increasing the amount of food available in poverty-stricken areas. Worm infections cause and aggravate many diseases. Several of these diseases are more difficult to treat than the worm infection that caused them. Thus combating worms also means a saving of medical care.

Health education and community participation together with improvement in sanitary conditions, water supplies and socio-economic status are of primary importance in the control of soil-transmitted helminths (11). But these factors alone do not offer an immediate solution in communities with poor socio-economic and sanitary conditions. Chemotherapy with anti-helminthics comes at this level. Blanket chemotherapy of entire population or specific chemotherapy after stool examination has been proved effective in reducing the worm burden. Hence it has effects on the nutrition and growth of children on one hand and a reduction in environmental contamination with viable ova and subsequent reduction in the re-infection rates on the other hand. However the effects of anti-helminthics are short lived as they do not prevent re-infection which is rapid and continuous in communities where faecal pollution of the household environment is continuous. Therefore repeated chemotherapy is essential which can never be a cost-beneficial and cost-effective measure unless integrated with other efforts such as health education and improved sanitation.

With regard to the environmental control of soil transmitted helminths it is necessary to consider the biology of the parasites, environmental factors favourable or inimical to them and the habits and practices of the definitive hosts(12).

Since intestinal worms are transmitted through faeco-oral route, sanitation related technologies are important in prevention of transmission. The use of latrines by the entire community is critically important for eliminating the condition. Proper construction at a suitable place and its continued and proper usage by both adults and children (or disposal of children's faeces in to this) at all times of the day under any types of weather conditions is meant by this.

Adequate supply of safe water is crucial in the maintenance of domestic and environmental hygiene as hands, food, utensils, homes and surroundings cannot be properly washed and kept clean if water is in short supply.

High prevalence of infection in most communities was due mainly to ignorance and lack of adequate information about the mode of transmission of geo-helminths. Most of the adverse habits and practices that predispose a person or household to infection were not deliberate, but mainly culturally related, careless or ignorant actions (1).

For control of the geo-helminths to be effective in long term basis, health education is essential. This aims at enabling the people to participate with full understanding of the

condition. Beliefs, customs and the views of the people regarding transmission and manifestation of the disease may be either obstacles or aids in controlling the condition. Therefore preliminary attention has to be paid on identification of these aspects for a programme to be successful.

Effective communication between the health educator and the community is another important requirement in planning health education activities. The recommended changes in behaviour for health promoting habits and practices must be compatible and acceptable to the practical, economic, cultural, and social circumstances of the community (1).

One of the reasons for the frequent failures of numerous control projects against soil-transmitted helminthiases was the lack of involvement of such control projects by the community (1).

1. Main Objective

To study the severity and prevalence of soil transmitted helminths in Rural Communities in Southern Sri Lanka with a view to improve the well being of the community.

1.1 Specific Objectives

1.1.1 To study the prevalence and severity of soil transmitted nematode infections in rural villages in Southern Sri Lanka.

1.1.2 To identify epidemiological factors contributing to spread of soil-transmitted helminthiases and knowledge, attitude and practices towards the disease.

1.1.3 Health Education of the community with community participation for the control of soil transmitted nematode infections.

Chapter 2

BACKGROUND INFORMATION

A study was conducted by Kan and Poon (13) in Malaysia to determine the prevalence rate of soil-transmitted helminths among four different types of communities aged under 15 years. The prevalence rate was reported to be 41,4%. The infection was highest among children from urban slums. More than 1/3 of these children (36,2%) were infected with Trichuris trichiura, 19,3% had Ascaris lumbricoides and only 3,3% had hookworm infections. Ascariasis and trichuriasis were concentrated among children aged between 4-12 years whereas hookworm infection was more common among older children (7 to 15) specially in rural areas. There was no significant sex difference in the distribution of infection.

A further study in Malaysia on soil-transmitted helminthiases (14) in children of 5 to 12 years showed interesting results. Only 8,4% of the study sample were infected with soil transmitted helminths. Majority had a single infection with Trichuris or Ascaris alone. Mixed infections made up less than 5% of all infected cases. The worm burden of infected children were very low. There was no definite pattern of distribution of infection among children of different ages and no

significant sex difference was seen. Absence of suitable soil for the development and survival of infective helminths and the lack of contact with contaminated soil were the main factors reported for the low prevalence and intensity of infection (14).

Of the Indian inhabitants in Malaysia aged between 6 months to over 60 years, 51% were found to be infected. Soil-transmitted helminthiases were significantly more common among children and young adults from 6 months to 20 years of age where 67,1% of this age group were infected. The infection rate declined with the age thereafter. Trichuris was the commonest helminth observed both as single and mixed infections and Trichuris mixed with Ascaris was the commonest type of double infection reported at all age groups (15).

In a survey carried out in three villages in Philippines the prevalence rate of geo-helminthiases was found to be extremely high (97%). More than 70% harboured three or more helminths. Ascaris lumbricoides infection was more prevalent in school children and gradually decreased with age (16). The effects of Mebendazole was proven against soil-transmitted helminthiases specially Trichuriasis in the same study. The re-infection rates after mass treatment were examined. Two months after the first drug treatment the incidence of Ascariasis and Trichuriasis reverted nearly to pre-treatment levels whereas

hook worm infection rate remained significantly low. Four months after the second treatment the re-infection rate of Ascariasis was more than that of trichuriasis. In children below 14 years of age re-infection rate of Ascariasis was higher (63,6%) than that of adults (10,4%) at 4 months after mass treatment (16).

The prevalence rate of one or more geo-helminthic infection was found to be 83,5% in a study (7) carried out in a rural community in Sri Lanka, based on examination of a single stool specimen for ova of soil-transmitted helminths in a randomly selected sample of all age groups by Fernando et al. Ascaris was by far the commonest (64,4%) while it was 45,2% and 19,5% for Necator amiricarnus and Trichuris trichiura respectively. Ascaris lumbricoides was highest among children aged 10 to 14 years.

The prevalence and severity of soil-transmitted helminths among children aged below fourteen years in a urban slum community of Sri Lanka was conducted in 1981 by De Silva and Jayathilaka (9). Almost 100% of the children were found to be infected. Ascaris and Trichuris infections were equally common with infection rates of 91%. About 75% of the children had either heavy or moderate roundworm and whipworm infections. Balasuriya et al (20) compared the efficacy of a single dose of Mebendazole with three day multiple dose in mass treatment.

The multiple dose regime showed consistently better egg reduction rates and cure rates when compared to the single large dose in subjects harbouring one or more soil-transmitted helminths.

Kan has shown that administration of single dose of Mebendazole reduced the egg output by approximately 80% in all cases of very light to heavy Trichuris infection (17).

Repeated mass deworming with broad spectrum anti-helminthics once a yeary over a period of 5 years among four types of communities in Malaysia (18) showed an overall reduction in the prevalence of soil-transmitted helminthiases. It was highest (65,5%) among inhabitants in semi-urban settlements and only 35,5% in the urban slums. Reduction in infection with Trichuris trichiura was better than that with Ascaris lumbricoides, whereas hookworm infection was completely eliminated in some of the communities surveyed. This study showed the potential and feasibility of regular mass deworming as an immediate and effective measure for the control of soil-transmitted helminthiases.

In clinical trials on anti-helminthics against Trichuriasis, Ascariasis and hookworm infection carried out in a rural community in Irosin, Sorsogon (19) reported that Mebendazole

was promising if given as a single dose during mass treatment of geo-helminthiases.

In a study carried out in an estate population in Sri Lanka (8) although single doses of Mebendazole was shown to be effective in reducing the roundworm ova counts with cure rates of 86% and 89%, only 19,1% and 24,4% of Trichuris infection were completely cured.

Re-infection and infection rates of soil-transmitted helminthiases have been studied in Philippines (21). Children had higher and faster re-infection and infection rates for Ascaris lumbricoides. The start of re-infection and infection was at fourth month. After twelve months 97,7% of the children were re-infected with Ascaris lumbricoides. Re-infection of Trichuris trichiura took place after 12 months and the re-infection rate was 93,3% among children.

The higher the prevalence of Ascariasis in a community, the faster is the rate of re-infection probably because the soil is heavily polluted with human faeces containing eggs of these helminths. The re-infection rate was 85% during one year after a treatment in primary school children in Philippines (22) with a prevalence rate of 74%. About 15% of children remained negative for a period of one year after treatment.

In Sri Lanka, Ismail (23) reported that there was a decrease in both prevalence and intensity of Ascariasis (17,8%) and Trichuriasis (24,5%) with regular administration of (4 monthly) Mebendazole.

A parasitic control programme initiated in Philippines (24) with the three major components; repeated mass treatment, improvement of personal hygiene, environmental sanitation and health education showed that after five years of parasitic control the prevalence of hookworm dropped from 79,5% to 19,9%. Among primary school children in Java the prevalence rate of Ascaris lumbricoides has come down to approximately 10% from over 80% after five years of the same parasitic control programme.

A project on health education and environmental sanitation was conducted in Indonesia (25) for a period of two years. Beliefs or perceptions relating to use of water, worm infestation, sanitary practices etc were identified. This study revealed a requirement of a special focus on education and mobilization campaign.

In a study on the control of geo-helminthiases carried out in Nepal the researchers (26) reported that the parasites could never be controlled only by regular stool examination and drug administration but that community participation was necessary.

Zacher (27) found that although in a community adequate supply of safe water was essential to maintain food hygiene, household hygiene and personal hygiene and also excreta disposal which is intimately connected with the transmission of intestinal parasites, health education was very important to stimulate behaviour change before any health impact is to be expected.

A programme of improved latrine construction has been evaluated by Muller et al (28) in Mozambique in 1989, by analyzing the prevalence of Ascaris eggs in soil samples and in household residents. No significant difference was found between the type of latrine in use and the prevalence of Ascaris eggs in the soil or human Ascaris infection. The study revealed that faecal pollution of the household environment was due more to promiscuous defecation than to poor construction or maintenance of the latrines. This findings highlight the need to complement sanitation with health education.

Chapter 3

METHODOLOGY

Research Methodology

3.1 Summary

3.1.1. With the help of the Family Health Workers (FHWW) and the Public Health Inspectors (PHII) the study areas were selected. Two cluster samples with children aged between 2 to 12 years were selected.

3.1.2. A questionnaire was administered to the mother or the female who cared for the children for collection of base line data.

3.1.3. Stool samples of children between 2 to 12 years of age were examined initially and at six monthly intervals using Kato Katz (29) method.

3.1.4. Estimation of haemoglobin was carried out on children initially and at the end of the study period.

3.1.5. Ova positive children were treated immediately after each stool examination with single dose Mebendazole (500 mg).

3.1.6. Health Education was provided to the community in particular to the mothers with a view to control soil-transmitted helminthiases.

3.1.7 Knowledge attitudes and practices of mothers were assessed before and after intervention.

3.2 Methodology in Detail

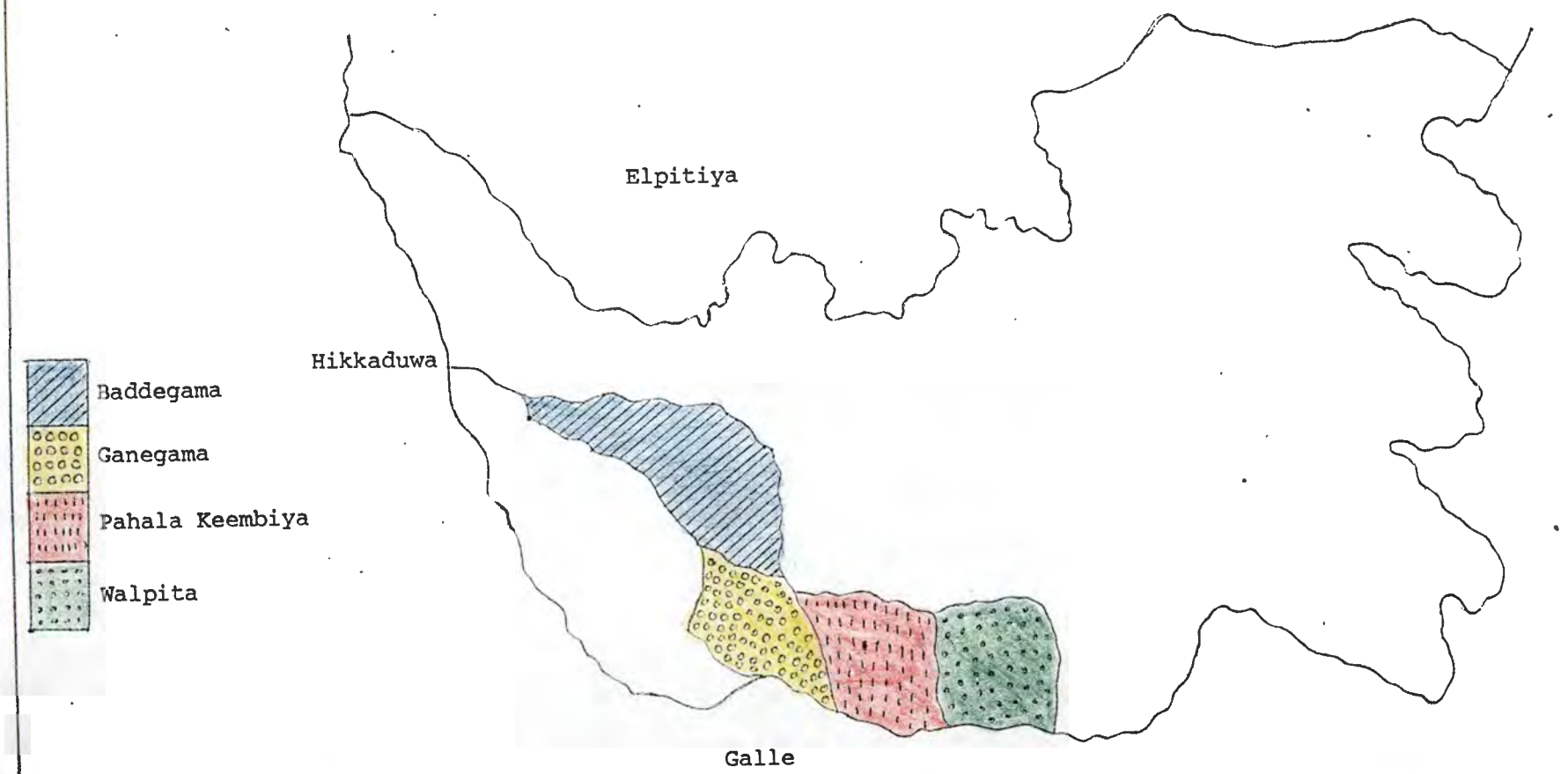
3.2.1 Study Area

This study was carried out in the Field Training Area of the Faculty of Medicine, Galle, Sri Lanka. This area is divided into four family health worker areas, namely Baddegama, Pahala Keembiya, Ganegama and Walpita (Map 1). The Field Training Area (30) is an economically backward rural area served poorly with the basic facilities such as health, education, employment etc. To the West of the area is Hikkaduwa, the popular tourist resort, to the North is Elpitiya, to the South is Galle, the Capital of Southern Province of Sri Lanka and to the East; Poddala. The extent of the area is about 125 sq. km. The total population of the area is about 30,000 of which about 98% are Sinhalese Buddhists, the rest being Tamils of Indian Origin. The average family size is 4.8 (as compared to 5.6 for the whole of the country (31)). About 32% of the population is below 15 years of age (National figure 38.9 (31)).

MAP 1

FIELD TRAINING AREA

FACULTY OF MEDICINE, GALLE.



Out of the adult population 14% have had no schooling at all and 35% have studied only upto Grade 5. Only 1,3% had tertiary level education. 24% of the working population is unemployed with a remarkably low proportion of agricultural workers (13,7%) for such a rural area. Another 38% of the labour force is engaged in temporary or casual work (30).

Over 85% of the households earn less than Rs. 1 200/= per month, which is considered to be the threshold limit for poverty. Of this, 60% are in extreme levels of poverty, earning less than Rs. 300/= per month and receiving government 'dole' in the form of 'food stamps'(30).

General sanitation, housing and water supply in this area are very poor. Approximately 75% of the families live in self owned or rented out houses. Even when the houses are available, about 40% are not provided with the minimum requirement of ventilation and lighting. The commonest source of drinking water is common wells, of which 50% are unprotected. There is no programme for regular chlorination of these wells but they are generally bailed out and chlorinated only after floods. Only about 70% of the families have their own latrines, 10% share the latrines with others; 20% do not have latrines. None of these families have pre-school latrines and generally the small children defecate in their gardens. Being a rural area,there is no proper collection of refuse(30)

3.2 Selection of Study Sample

With the help of the FHWW and PHII, Baddegama & Walpita were selected as study areas. The reasons for selecting these areas were that they are geographically, similar and were not adjoining each other. Using household lists and information on household having two cluster samples of 125 households with children between 2 to 12 years were selected from each FHW area.

The following steps were taken in each group.

3.2.1 Baddegama - Group A

3.2.1.1 Administration of Questionnaire 1

Questionnaire 1 (Annexure 1A & 1B) was administered to the mothers at the beginning of the study for collection of baseline data and information on knowledge attitudes and practices towards soil-transmitted helminthic infection.

3.2.1.2 Examination of Stools

Stool samples of children between 2 to 12 years were collected and examined using Kato Katz method at the beginning of the study and thereafter at intervals of six months on three further occasions.

3.2.1.3 Estimation of Haemoglobin concentration was carried out twice, initially and at the end of the study period using BMS (Buffalo Medical Specialties MFG. INC) Haemoglobinometer (32).

3.2.1.4. Oral anti-helminthic therapy single dose Mebendazole (500 mg) was given to ova positive children aged between 2 to 12 years immediately after each examination of stools.

3.2.1.5 Health Education

Health education programme regarding control of soil transmitted helminths was conducted initially soon after the collection of first stool sample.

3.2.1.6 Administration of Questionnaire 2.

This questionnaire (Annexure 2A & 2B) was administered to the mothers at the end of the study period to assess knowledge, attitude and practices towards soil-transmitted helminthiases.

3.2.2 Walpita - Group B

3.2.2.1. Administration of Questionnaires 1 : as described under Group A.

3.2.2.2. Examination of stools: as described under Group A.

3.2.2.3. Oral anti-helminthic therapy: as described under Group A.

3.2.2.4. Estimation of Haemoglobin concentration: as described under Group A.

3.2.2.5. Health Education programme was conducted soon after the first collection of stool as described under Group A. This programme was repeated at regular intervals with the participation of the community, PHII, FHWW, medical students, health educators and a team of investigators.

3.3 Questionnaires

Two questionnaires were administered to the mothers by trained investigators.

These questionnaires were designed and were pretested for acceptability comprehension, ease of administration and validity by the investigators on 25 randomly selected families.

Questionnaire 1

Questionnaire 1 (administered at the beginning of the study) was prepared taking into consideration variables such as demographic and socio-economic characteristics of the family, environmental sanitation, knowledge, attitudes and practices on soil transmitted helminths, water usage and sanitation habits.

Questionnaire 2

This questionnaire (administered at end of study) included only variables on knowledge attitude and practices on soil transmitted helminths.

3.4 Selection of Community Workers

Ten community workers residing in the study areas were selected with the help of the FHWW and PHII. They were given an introduction to the project and trained in the administration of questionnaires, collection of stool samples, mobilization of community and health education on different aspects of soil transmitted helminthiases.

Each community worker was assigned 25 households. The investigators with the help of the FHWW and PHII introduced the community workers to the households and explained the details of the study.

3.5 Health Education Programme

3.5.1 Training of Health Educators

The team of investigators, FHWW and PHII carried out the training programmes for the selected health educators.

The selected personnel were provided health education on the infectious agents, mode of transmission of soil-transmitted nematode infections and health improvement measures in controlling soil-transmitted helminthic infections.

Teaching was carried out in a central place and took the form of lectures, panel and group discussions, demonstration of worms and worm eggs, visual aids such as posters regarding life cycle of worms and their modes of spread and control measures for soil-transmitted helminths.

3.5.2 Health Education of the Community

The team of investigators, Health Educators (Galle District), Medical Students and the trained community health educators provided necessary health education for the community in particular to the group of mothers.

Initially health education was provided for Groups A and B soon after the collection of the first stool samples. The health education programmes were carried out with the demonstration of adult worms and worm eggs, life cycle of worms their mode of spread and methods of control (Annexure 3 to 13).

Thereafter for Group B the team of investigators and the health educators provided health education at central points at three monthly intervals. The houses were visited monthly and leaflets and booklets were distributed (Annexure 3 to 14). A film on soil-transmitted helminthiases and the control measures that should be adopted was shown twice.

The results of initial assessment of knowledge attitude and practices were useful guidelines in arranging the health education programme in the project area.

3.6 Estimations of Haemoglobin

Haemoglobin estimation was carried out in the study sample of children initially and at the end of the study period.

Method:

BMS (Buffalo Medical Specialities MFG. INC.) Hemoglobinometer (32) was used. Finger tip was cleaned and pricked with a sterile blood lancet. The second drop of blood was allowed to flow directly from the pricking into the chamber surface of the haemoglobinometer by capillary attraction. Initially the blood chamber set of the haemoglobinometer which consisted of cover, chamber and clip were assembled and cover fitted

tightly to prevent any smearing of the chamber surface. Complete filling of the chamber entirely free of air bubbles was ensured. The chamber was next inserted fully into the blood chamber compartment and the indicator button was moved until there was no difference in colour intensity. Haemoglobin concentration was recorded.

3.7 Anti-helminthic Therapy

Single dose Mebendazole (500 mg) (Vermox provided by Janssen Pharmaceutica, Belgium) was administered to all ova positive children after each stool examination.

3.8 Examination of Stool Samples

Stools of all children in the study groups were examined at the beginning of the study and at six monthly intervals on three further occasions at six monthly intervals to assess the prevalence and severity of soil-transmitted helminthic infection. Community workers were trained to collect samples of stools.

Method:

Lid labeled disposable plastic containers were supplied before each collection. Stool specimens were sent to the Department of Community Medicine soon after collection and Kato Katz method (29) was employed to examine the stools samples. Commercially available Kato Katz Kit (Supplied by Japanese

Association of Parasite Control, Tokyo, Japan) was used for each stool examination. This consisted of a plastic spatula, plastic template and nylon screen. Faecal material was separated from the large debris using the nylon screen. The screened faecal material was transferred to the template which was laid flat centrally on a microscopic slide. Pre-prepared cellophane square 25x30 mm size soaked in 50% glycerol solution with malachite-green was placed over the faecal specimen. Faecal material was spread evenly under the cellophane and examined after one hour at room temperature under a light microscope. All the eggs were counted and the number of eggs observed was multiplied by 24 to obtain the number of eggs per gram of faeces.

3.9 Analysis of Data

Data was analyzed using a microcomputer. Standard error of difference between two proportions (33) was used for statistical analysis (Annexure 15).

3.10 Project Management

Institution responsible for the project implementation was the Faculty of Medicine, University of Ruhuna, Galle. Funds were managed by the Senior Assistant Bursar of the Faculty of Medicine under the direction of the Dean, Faculty of Medicine.

Chapter 4

RESULTS AND DISCUSSION

Two FHWW areas namely Baddegama and Walpita were selected from the Field Training Area of the Faculty of Medicine Galle. From each FHW area a cluster sample of 125 families having children aged between 2 to 12 years were selected. They were designated Group A (from Baddegama FHW area) and Group B (from Walpita FHW area).

4.1 Demography

4.1.1 Ethnic Distribution

All families in the study group were Sinhala.

4.1.2 Age Distribution of Children Between 2 and 12 Years

The percentage distribution of children in the age categories 2 to 4; 5 to 7 and 8 to 12 years is shown in Table 1. The highest percentage was in the age group 8 to 12 years. There was no statistically significant difference ($p<0,05$) between the two groups in the distribution of children.

Table 1: Age Distribution of Children Under 12 Years

Age Group	Group A No.	Group A %	Group B No.	Group B %	SE*
2-4	62	25,1	64	25,2	3,87
5-7	72	29,1	82	32,3	4,12
8-12	113	45,8	108	42,5	4,44
Total	247	100,0	254	100,0	

* SE - Standard Error

4.2 Economic and Social Factors

4.2.1 Level of Education of Mothers

Table 2 shows the level of education of the mothers in the study sample. 28,8% in Group A and 30,4% in Group B had educational level of less than Grade 5. There was no statistically significant difference in the percentage distribution of mothers in the two groups.

Table 2: Level of Education of the Mothers

Educational Level of Mother	Group A No.	Group A %	Group B No.	Group B %	SE*
No Education	11	8,8	9	7,2	3,4
< Grade 5	25	20,0	29	23,2	5,2
Grade 6-9	45	36,0	42	33,6	6,0
G.C.E (O/L)	36	28,8	41	32,8	5,8
G.C.E (A/L)	8	6,4	4	3,2	2,7
Total	125	100,0	125	100,0	

* SE - Standard Error

4.2.2 Monthly Income

Total monthly income of the families in the two areas is shown in Table 3. Majority of families in each area had monthly income of Rs.1000 or less. Only 6,4% of families in Group A and 1,6% in Group B had monthly income of more than Rs.2000. Income distribution of the families in the two groups was similar.

Table 3 : Monthly Income

Monthly Income in Rupees	Group A No.	%	Group B No.	%	SE*
<1000	99	79,2	98	78,4	5,16
1000-1500	12	9,6	11	8,8	3,65
>1500-2000	6	4,8	8	6,4	2,90
>2000	8	6,4	8	6,4	3,12
Total	125	100,0	125	100,0	

* SE - Standard Error

4.2.3 Social Class

Families were classified into 4 social classes taking into consideration the father's occupation. The social classes are as follows.

Social Class I - Leading Professions and Business
eg. Doctors, School Principals, Lawyers, Engineers, Company Directors etc.

Social Class II - Semi-professions and Business
eg. Teachers, Nursing Sisters etc.

Social Class III- Clerical and Skilled
eg. Clerks, Mechanics etc.

Social Class IV - Semi-skilled and Unskilled
eg. Machine Operators, Agricultural Workers, Labourers, Street Cleaners etc.

Table 4 shows the number and percentage of families in each social class in the two study areas. Majority of families were in social class IV.

Table 4: Social Class

Social Class	Group A		Group B		SE*
	No.	%	No.	%	
I	2	1,6	5	4,0	2,08
II	3	2,4	2	1,6	1,76
III	7	5,6	5	4,0	2,71
IV	108	86,4	113	90,4	4,04
Total	125	100,0	125	100,0	

* SE - Standard Error

There was no statistically significant difference ($p<0,05$) between the social classes of the families in the two study areas.

4.3 Housing, Water and Sanitation

4.3.1 Housing

4.3.1.1 Ownership

In Sri Lanka most people do not live in their own houses. Some live in rented or shared accommodations. This is directly related to the socio-economic status of the families. In our sample 30,4% of the families in the Group A and 32,8% of families in Group B lived in rented or shared accommodation (Table 5).

Table 5 : Ownership

Ownership	Group A No.	Group A %	Group B No.	Group B %	SE*
Owned	87	69,6	84	67,2	5,87
Shared	11	8,8	17	13,6	3,97
Rented	27	21,6	24	19,2	5,09
	125	100,0	125	100,0	

* SE - Standard Error

4.3.1.2 Housing

Housing is part of the total environment of man and to a great extent responsible for the status of health, and well being. In Sri Lanka houses are made of different materials and are sometimes classified as permanent or temporary according to the type of building materials.

In this study housing conditions were considered as 'standard' or 'sub-standard'. Houses with plastered walls, cemented floors and asbestos or tiled roofs were considered as 'standard'. Availability of toilets was not considered in this grouping.

Accordingly, 61,6% of Group A families and 60,8% of Group B families lived in sub-standard houses (Table 6).

Table 6 : Housing

Housing	Group A		Group B		SE*
	No.	%	No.	%	
Standard	48	38,4	49	39,2	6,16
Sub-standard	77	61,6	76	60,8	
Total	125	100,0	125	100,0	

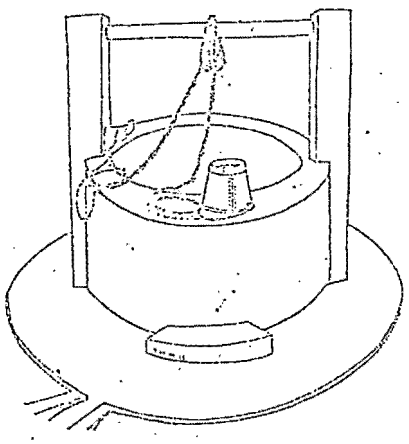
* SE - Standard Error

4.3.2 Source of Drinking Water

Much of ill health in the developing countries is largely due to lack of safe drinking water. No state of positive community health and well-being can be achieved without a safe water supply. In Sri Lanka wells are the main source of water supply in rural villages. A protected well is one which is properly located, well-constructed and protected

against contamination with a view to yield a supply of safe water. The well should be located at a reasonable distance (15 m) from a likely source of contamination. The lining of the well should be built of bricks or stones set in cement up to a depth of atleast 6 m so that water enters from the bottom and not from the sides of the well. The lining should also be carried 60-90 cm above ground level. There should be a parapet wall up to a height of atleast 70-75 cms above ground level. There should also be a cement-concrete platform round the well extending atleast 1 m in all directions. The platform should have a gentle slope outward towards a drain to carry off spilled water (Figure 1). The bucket which is used to draw water from the well should either be shared nor placed on the ground.

Figure 1 : Protected Well



Majority of families in the two study groups obtained their drinking water from wells (Table 7).

Table 7 : Source of Drinking Water

Source of Drinking Water	Group A No.	%	Group B No.	%	SE+
Other*	2	1,6	3	2,4	1,8
Well	123	98,4	122	97,6	
Total	125	100,0	125	100,0	

* Other: River or Stream
\+ SE - Standard Error

In each group nearly half the population had protected wells (Table 8).

Table 8 : Condition of Well

Condition of Well	Group A No.	%	Group B No.	%	SE*
Protected	62	50,4	66	54,1	6,37
Unprotected	61	49,6	56	45,9	
Total	123	100,0	122	100,0	

* SE - Standard Error

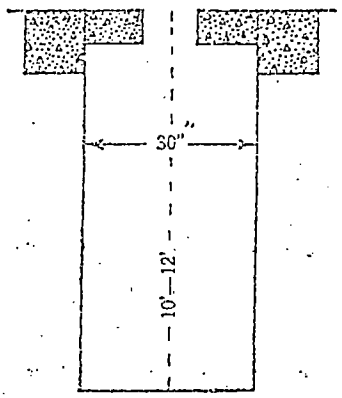
4.3.3 Type of Latrine

Human excreta is a source of infection and is an important cause of environmental pollution. In soil-transmitted helminthiasis the eggs are passed with the faeces of the infected persons. Contact with soil is essential to go through some stages of their life cycle to develop into infective stages. Proper disposal of faeces is therefore important in control of soil-transmitted helminthiasis thus interfering with the life cycles of these helminths.

As in many other developing countries of the world in proper disposal of human excreta cause problems of grave importance in Sri Lanka. There are two main types of latrines available in the rural communities. Pit latrines and Water-seal latrines. Pit latrine is the popular type in rural areas. A circular pit of about 75 cm in diameter and 3 to 3,5 m in depth is dug into the ground for the reception of the night soil (Figure 2). The pit may be lined with pottery rings to prevent caving in of the soil. A correct squatting plate is placed on the top of the pit and the latrine is enclosed with a superstructure. It is easy and cheap to construct this type of latrine and no special equipments are necessary. As the capacity of the pit is larger it is long

lasting. However these latrines do not provide adequate sanitary standards. As the night soil in the pit directly opens into the environment through the pit-hole, it becomes a breeding place for flies and furthermore leads to the nuisance of offensive odours.

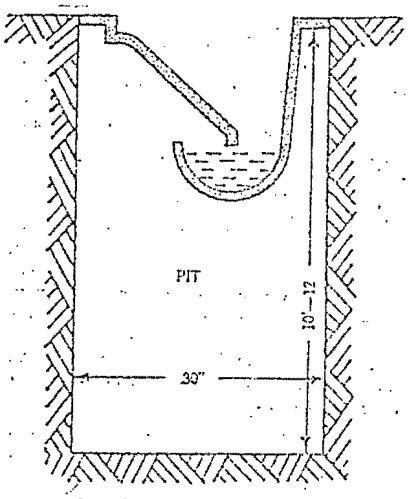
Figure 2: Pit Latrine



Hand flushed water-seal latrine is a little improvement. In this type of latrine the squatting plate is fitted with a water seal (Figure 3). The water seal performs two important functions. Firstly it prevents access by flies by a small depth of water contained in a bent pipe called the trap and secondly it prevents escape of odours and foul gases and thereby eliminates the nuisance from smell. The depth of the water seal is about 2 cm. The pan receives the

night soil, urine and wash water. There is a slope from front to back of the pan and given a smooth finish. The squatting plate, an important part in the latrine is made of an impervious materials so that it can be washed and kept clean and dry. This is an important aspect in preventing the survival of hook worm larvae, as the squatting plate gets contaminated with faeces during washing after defecation.

Figure 3 : Water-seal Latrine



In this study 6(4,8%) and 10(8%) of families in Group A and Group B respectively did not have latrines. Of the families who had latrines 59(47,2%) in Group A and 62(49,6%) in Group B had pit latrines (Table 9). There is no statistically significant difference ($p<0,05$) between the two groups when the type of latrine was compared.

Table 9 : Type of Latrine

Type of Latrine	Group A No.	Group A %	Group B No.	Group B %	SE*
Pit	59	47,2	62	49,6	6,3
Water-seal	60	48,0	53	42,4	6,2
Not available	6	4,8	10	8,0	3,2
Total	125	100,0	125	100,0	

* SE - Standard Error

4.4 KNOWLEDGE ATTITUDE AND PRACTICES

Knowledge attitude and practices towards soil-transmitted helminthiasis was assessed initially and at the end of the study period. Three and six families from Groups A and B respectively left the area during the study period.

4.4.1 Knowledge About Worms

Knowledge about soil-transmitted helminths was assessed by inquiry into the worms transmitted through soil the different types of soil-transmit helminths and there mode of transmission.

Before intervention in the two study Groups A and B almost equal percentage of mothers were aware of worms transmitted through soil. The awareness of mothers regarding soil-transmitted worms at the end of the study period was found to be 100% in Group B and 68,9% in Group A (Table 10). The percentage change in each area between the beginning and end of the study was statistically significant ($p < 0,05$). It is noted that in Group A with only initial health education knowledge on worms increased by 16%.

Table 10 : Knowledge about Worms

Knowledge about Worms	Group A				SE*	Group B				SE*
	Pre		Post			Pre		Post		
	No.	%	No.	%		No.	%	No.	%	
Yes	64	51,2	84	68,9	6,1	83	66,4	118	100,0	4,2
No	61	48,8	38	31,1		42	33,6	-	-	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

The mothers were questioned regarding the different types of soil-transmitted worms. Namely round worms, hook worms and whip worms. Knowledge was taken as `good´ if the mothers were aware of all three worms, `fair´ if they knew two and `poor´ if they did not know of worms or knew only one.

At the beginning of the study only 1,6% in both areas knew about round worms, whip worms and hook worms. At the end of study period with continuous health education in Group B and one initial health education programme in Group A the percentage increased to 98,3% in Group B and 20,5% in Group A. Although in both areas the percentage change is statistically significant ($p < 0,05$) the percentage increase in Group B is almost 97%. Furthermore after continuous health education there were no mothers in Group B without knowledge regarding atleast one worm. But in Group A 40% of mothers had no knowledge on atleast one worm (Table 11).

Table 11 : Types of Worms

Knowledge Types of Worms	Group A				SE*	Group B				SE*
	Pre		Post			Pre		Post		
	No.	%	No.	%		No.	%	No.	%	
Good	2	1,6	25	20,5	3,8	2	1,6	116	98,3	1,6
Fair	62	49,6	48	39,3	6,3	71	56,8	2	1,7	4,5
Poor	61	48,8	49	40,2	6,2	52	41,6	-	-	4,4
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.2 Knowledge about Transmission of Worms

To assess mothers' knowledge regarding mode of transmission of soil-transmitted helminthiasis atleast 10 questions were asked (Annexure 1 & 2). If a mother was aware of all six correct modes of transmission it was considered as good knowledge, if they were aware of 3-5 possible ways fair and less than 3 poor.

There was statistically significant increase ($p < 0,05$) in the percentage of mothers in both groups on knowledge regarding transmission of worms at the end of the study. At the beginning of the study in Group B there were 24% without knowledge on transmission. However after the health education programme there were no mothers with poor knowledge category. In Group A however the reduction in the percentage of mothers on poor knowledge category was only 4% (Table 12).

In the fair knowledge category at the beginning of study there were 80% of mothers in Group A and 73,6% in Group B. At the end of the study period the figures decreased to 49,2% and 5,1% in Groups A and B respectively. One can assume that the percentage increase in the category with good knowledge in Group A were mainly from the group that had fair knowledge at the beginning of the study and not from the poor knowledge category.

Table 12 : Knowledge about Transmission of Worms

Knowledge Transmission	Group A Pre No.	Pre %	Post No.	Post %	SE*	Group B Pre No.	Pre %	Post No.	Post %	SE*
Good	5	4,0	47	38,5	4,7	3	2,4	112	94,9	2,3
Fair	100	80,0	60	49,2	5,7	92	73,6	6	5,1	4,4
Poor	20	16,0	15	12,3	4,3	30	24,0	-	-	3,8
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.3 Knowledge about Worm Eggs

Assessment of the knowledge about intestinal helminthiasis is incomplete unless knowledge about worm eggs is considered, as eggs are the source of infections in round worm and whip worm infections.

At the beginning of the study only 25,6% of mothers in Group A and 19,2% in Group B knew about worm eggs. However at the end of the study there was statistically significant increase ($p<0,05$) in the percentages in both areas. All mothers in Group B knew of worm eggs (Table 13).

Table 13 : Knowledge about Worm Eggs

Knowledge Worm Eggs	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Yes	32	25,6	56	45,9	5,9	24	19,2	118	100,0	3,5
No	93	74,4	66	54,1		101	80,8	-	-	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.4 First Choice of Treatment

The Government of Sri Lanka provides free health care services to every citizen of the country and health care delivery units are found on the average not further than 4,8 km of the patient's home (31). The Family Health Bureau is the central organization within the Ministry of Health that is responsible for Maternal and Child Health Services. There are health units serving demarcated areas, in charge of a Medical Officer of Health (MOH). In each MOH Division oral anti-helminthic therapy (Mebendazole) is available for management of soil-transmitted helminthic infections in children. Generally Mebendazole is prescribed at four monthly intervals for children attending Maternal and Child Health Clinics.

At the beginning of the study the first choice of treatment for worm infestation was assessed to study the attitude of mothers on available health resources. 85,6% and 89,6% of mothers in Groups A and B respectively indicated that their first choice of treatment for worms was western medicine. (Table 14).

Table 14 : First Choice of Treatment

Choice of Treatment	Group A No.	%	Group B No.	%
Home Remedies	6	4,8	7	5,6
Ayurvedic Treatment	12	9,6	6	4,8
Western Treatment	107	85,6	112	89,6
Total	125	100,0	125	100,0

4.4.5 Frequency of Treatment

In Group A, 64,8% and Group B, 60,8% of mothers have adopted the practice of giving Mebendazole to their children at intervals of three to six months (Table 15).

Table 15 : Frequency of Treatment

Mebendazole 3 to 6 monthly	Group A No.	%	Group B No.	%	SE*
Yes	81	64,8	76	60,8	6,1
No	44	35,2	49	39,2	
Total	125	100,0	125	100,0	

* SE - Standard Error

4.4.6 Place of Defecation

In our study only one family had a pre-school latrine. Disposal of pre-school childrens' faeces, in this study, was considered adequate and correct if mothers practiced disposal of stools into a latrine or burying deep in the soil.

The percentage of mothers who practiced correct disposal of pre-school childrens' faeces was similar in both groups at the commencement of the study. There was a significant improvement in the percentage of mothers who practiced correct disposal at the end of the study in both groups. At the end of the study in Group B, 86,4% of mothers practiced correct disposal of faeces of their pre-school children However there were 13,6% of mothers in this group who practiced proper method on and off but not all the time (Table 16)

Table 16 : Disposal of Faeces of Pre-school Children

Disposal of Faeces	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Correct	61	48,8	94	77,0	5,8	56	44,8	102	86,4	5,5
Poor	64	51,2	28	23,0		69	55,2	16	13,6	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.7 Cleanliness of the Latrine

The cleanliness of the latrine will depend on proper use of pan for defecation, proper flushing of pan after use and frequent and proper washing of the squatting pan and plate. Therefore the availability of water is one important factor that determines the cleanliness of a latrine, for prevention of geo-helminthiasis and other faecal transmitted diseases.

In this study cleanliness of the latrine was considered by examining the cleanliness of pan, squatting plate and floor. The latrine was considered as 'clean' if all these areas were clean. In both groups approximately only 2% of families had clean latrines before intervention.

There was a statistically significant ($p < 0,05$) difference in the percentages who had clean latrines in each group at the end of the study period. There was a 40% increase in families with clean latrines in Group A who received only initial health education (Table 17).

Table 17 : Condition ot Latrines

Condition of Latrines	Group A Pre No.	Pre %	Post No.	Post %	SE*	Group B Pre No.	Pre %	Post No.	Post %	SE*
Clean	3	2,4	52	42,6	4,68	2	1,6	111	94,1	2,44
Dirty	122	97,6	70	57,4		123	98,4	7	5,9	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.8 Washing Hands with Soap and Water after Defecation - Mothers

In Sri Lanka toilet paper is not used for cleaning after defecation. The general practice is to wash the perianal area with water using fingers. Washing of young children after defecation is generally done by the mother. Although washing of hands with soap and water after defecation is not a factor in the transmission of geo-helminths this was included in the questionnaires to assess hygienic practices of mothers and children.

Approximately two thirds of mothers in the two groups at the beginning of the study practiced washing of hands with soap and water after defecation or washing of young children following defecation. At the end of the study the percentage of mothers who washed their hands after defecation or washed their children following defecation increased to 83,6% in Group A and 91,5% in Group B (Table 18). This change when compared with percentages at the beginning of the study is statistically significant ($p < 0,05$) in both groups. But the percentage increase was more in Group B.

Table 18 : Washing Hands with Soap and Water after Defecation Mothers

Washing Hands after Defecation	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Yes	84	67,2	102	83,6	5,3	81	64,8	108	91,5	4,9
No	41	32,8	20	16,4		44	35,2	10	8,5	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.9 Washing Hands with Soap and Water after Defecation - Children over 8 years

Before intervention, of the children aged between 8 and 12 years 51,9% in Group B and 48,7% in Group A did not practice washing of their hands with soap and water after defection. At the end of the study only 16,5% in Group B did not practice washing of their hands after defecation (Table 19).

Table 19: Washing Hands with Soap and Water after Defecation- Children over 8 years

Washing Hands after Defecation	Group A				SE*	Group B				SE*
	Pre		Post			Pre		Post		
	No.	%	No.	%		No.	%	No.	%	
Yes	58	51,3	84	75,7	6,2	52	48,1	86	83,5	6,0
No	55	48,7	27	24,3		56	51,9	17	16,5	
Total	113	100,0	111+	100,0		108	100,0	103+	100,0	

\+ Left Area Group A=2, Group B=5
* SE - Standard Error

Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.10 Foot-wear and Washing of Feet

As described earlier, the latrines get contaminated with faeces due to washing practices after defecation. Therefore it is important to practice washing of feet after using the latrine. Of the families 102 of Group A and 109 of Group B did not use foot-wear. This may be related to the poor economic status of the families.

At the beginning of the study of the families who did not wear foot-wear, only 5,9% in Group A and 2,8% in Group B practiced washing of their feet after using the latrine. At the end of the study 74,8% in Group B and 56,4% in Group A practiced washing of their feet after using the latrine. In both groups when pre and post intervention percentages are compared there is a statistically significant increase. This increase was higher in Group B (Table 20)

Table 20 : Foot-wear and Washing of Feet

Foot-wear	Group A				SE*	Group B				SE*
	Pre		Post			Pre		Post		
	No.	%	No.	%		No.	%	No.	%	
Yes	6	5,9	53	56,4	5,6	3	2,8	83	74,8	4,4
No	96	94,1	41	43,6		106	97,2	28	25,2	
Total	102	100,0	94	100,0		109	100,0	111	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.11 Washing Hands with Soap and Water Before Meals - Adults

In Sri Lanka knives, forks and spoons are not generally used during meal times. Fingers are used to eat food during meals. Therefore to prevent contamination of food during meal times it is essential to wash hands with soap and water before meals.

16,8% and 20% of adults in Groups A and B respectively had practiced washing of their hands with soap and water before meals at the beginning of the study. There was a statistically significant increase ($p < 0,05$) in percentages regarding this practice in both groups at the end of the study period. However in Group B 12,7% continued to wash their hands before meals either sometimes or never (Table 21).

Table 21: Washing Hands with Soap and Water Before Meals - Adults

Washing Hands Before Meals	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Always	21	16,8	73	59,8	5.5	25	20,0	103	87,3	4,7
Sometimes or Never	104	83,2	49	40,2		100	80,0	15	12,7	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

* SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.12 Washing Hands with Soap and Water Before Meals - Children

Washing of hands with soap and water before meals was assessed in children aged between 5 and 12 years at the beginning of the study. Only 13% and 18,4% in Groups A and B respectively always washed their hands with soap and water (Table 22).

At the end of the study there was a increase in percentages of children who washed their hands with soap and water. The percentage increase was higher in Group B (58,5%) when compared to Group A (40,3%). However there was a statistically significant difference in the percentages in both Groups after intervention.

Table 22: Washing Hands with Soap and Water Before Meals- Children

Washing Hands Before Meals	Group A					Group B				
	Pre		Post		SE+	Pre		Post		SE+
	No.	%	No.	%		No.	%	No.	%	
Always	24	13,0	96	53,3	4,5	35	18,4	140	76,9	4,2
Sometimes or Never	161	87,0	84	46,7		155	81,6	42	23,1	
Total	185	100,0	180*	100,0		190	100,0	182*	100,0	

* Left area Group A=5, Group B=8
\+ SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.13 Washing Hands Before Cooking

Hygienic practice of washing hands always before cooking was reported by 78,4% in Group A and 80,8% in Group B at the beginning of the study. This increased to 90,9% in Group A and to 100% in Group B (Table 23). This percentage increase in both groups after intervention when compared to the percentages in the respective groups before intervention was found to be statistically significant ($p < 0,05$).

Table 23 : Washing Hands Before Cooking

Washing Hands Before Cooking	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Yes	98	78,4	111	90,9	4,5	101	80,8	118	100,0	3,5
No	27	21,6	11	9,1		24	19,2	-	-	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

*SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.14 Covering of Cooked Food

Insects, particularly flies are responsible in the transfer of infective eggs of geo-helminths from soil to prepared food. Therefore it is essential to cover prepared food to prevent transmission of soil-transmitted helminths.

At the beginning of the study more than 95% of mothers reported covering of prepared food. In both groups all mothers reported proper covering of prepared food after intervention. (Table 24).

Table 24 : Covering of Cooked Food

Covering Food	Group A				SE*	Group B				SE*
	Pre		Post			Pre		Post		
	No.	%	No.	%		No.	%	No.	%	
Always	123	98,4	122	100,0	1,43	121	96,8	118	100,0	1,6
Sometimes or Never	2	1,6	-	-		4	3,2	-	-	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

*SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.15 Use of Boiled Cooled Water for Drinking

To prevent transmission of soil-transmitted helminthiasis it is important to use boiled cooled water for drinking. Approximately 50% of the families in this study had unprotected wells (Table 8). Before intervention only 18,4% and 16% of adults in Group A and B respectively used boiled cooled water for drinking. At the end of the study although there was a statistically significant increase in the percentage of adults using boiled cooled water in both groups there were 70,5% in Group A and 63,3% in Group B who still continued to use unboiled water for drinking (Table 25).

Table 25 : Use of Boiled Cooled Water for Drinking -Adults

Boiled Cooled Water	Group A Pre No.	Pre %	Post No.	Post %	SE*	Group B Pre No.	Pre %	Post No.	Post %	SE*
Always	23	18,4	36	29,5	5,4	20	16,0	43	36,4	5,5
Sometimes or Never	102	81,6	86	70,5		105	84,0	75	63,6	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

*SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

Table 26 shows the percentage of mothers who gave boiled cooled water to their children. In each group higher percentage of mothers used boiled cooled water always for their children compared to their own use at the beginning of the study. There was a statistically significant ($p < 0,05$) increase in the practice of giving boiled cooled water to their children in both groups after intervention. The percentage increase was very much higher in Group B. However of the children in Group B, 40,7% still continued not to drink boiled cooled water always. This may be explained by the low economic status of the families. Boiling of water is done in the rural communities using mainly fire-wood. Fire-wood is an expensive commodity.

Table 26 : Use of Boiled Cooled Water for Drinking - Children

Boiled Cooled Water	Group A				SE	Group B				SE
	Pre		Post			Pre		Post		
	No.	%	No.	%		No.	%	No.	%	
Always	38	30,4	53	43,4	6,1	24	19,2	70	59,3	5,7
Sometimes or Never	87	69,6	69	56,6		101	80,8	48	40,7	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.16 Washing Hands of Children After Playing with Mud and Soil

Continuous presence of infective eggs in the soil in communities where there is continuous contamination of night-soil with the environment with night soil enhances transmission of soil-transmitted helminthic infections to children as they generally play frequently with mud and soil. Therefore washing hands with soap and water after playing out-doors is an important aspect in the prevention of soil-transmitted disease.

The percentage of mothers who washed the hands of their children always after playing with mud and soil increased to 79,7% from 20,8% in Group B after continuous health education. But in Group A only 29,5% always washed the

hands of their children after playing with mud and soil after intervention when compared to 18,4 before intervention (Table 27).

Table 27 : Washing Hands After Playing with Mud and Soil

Washing Hands	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Always	23	18,4	36	29,5	5,4	26	20,8	94	79,7	5,2
Sometimes or Never	102	81,6	86	70,5		99	79,2	24	20,3	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

*SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.17 Disposal of Refuse

In rural areas of Sri Lanka there is no system for collection and disposal of refuse. Refuse is thrown around the houses indiscriminately resulting in gross pollution of the soil. The problem of refuse disposal in rural areas can be solved by burning, composting or digging "manure pits" by the individual householders. In this study disposal of refuse by any one of these methods were considered to be a correct practice. Disposal of refuse is not important in the transmission of soil-transmitted helminths. However this was included in the questionnaires to assess the practices of mothers.

At the commencement of the study 70,4% and 69,6% in Groups A and B respectively used correct methods for disposal of refuse. After intervention in both groups the number of families that adopted proper disposal of refuse increased and this percentage increased was statistically significant ($p<0,05$) in both groups, but was higher in Group B (Table 28).

Table 28 : Disposal of Refuse

Proper Disposal	Group A					Group B				
	Pre		Post		SE*	Pre		Post		SE*
	No.	%	No.	%		No.	%	No.	%	
Yes	88	70,4	109	89,3	4,95	87	69,6	111	94,1	4,6
No	37	29,6	13	10,7		38	30,4	7	5,9	
Total	125	100,0	122	100,0		125	100,0	118	100,0	

*SE - Standard Error
Group A - Health Education once (initially)
Group B - Health Education continuous

4.4.18 Common Beliefs of Symptoms of Worm Infections

In Sri Lanka mothers report several symptoms in young children of worm infections. Symptoms of worm infections as perceived by mothers in this study are shown in Table 29. Approximately 90% of mothers believed that worm infections resulted in large abdomen, grinding of teeth and pruritus ani. Sleeping in the prone position was found to be the commonest symptom. Loss of appetite was also believed to be a common symptom of worm infestation. None of the mothers however reported that passing worms or beetles was a symptom of worm infection.

Table 29 : Common Beliefs of Symptoms of Worm Infections

Symptom	Group A		Group B	
	No.	%	No.	%
Lethargy	44	35,8	53	42,6
Loss of appetite	95	75,8	102	82,2
Large abdomen	119	95,2	116	92,8
Irritability	78	62,4	66	53,2
Halitosis	68	54,8	67	53,2
Teeth grinding	117	94,0	111	89,0
Pruritus ani	110	88,0	118	94,4
Sleeping prone	122	98,2	120	96,4

4.5 Health Education

In this study before intervention mothers were questioned whether they had received health education regarding soil-transmitted helminths. As shown in Table 30. 17,6% and 21,6% in Group A and B respectively had received some form of health education on this subject.

Table 30 : Health Education

Health Education	Group A		Group B	
	No.	%	No.	%
Yes	22	17,6	27	21,6
No	103	82,4	98	78,4
Total	125	100,0	125	100,0

4.6 Prevalence and Severity of Soil-transmitted Helminths

4.6.1 Ascaris lumbricoides Infection

4.6.6.1 Prevalence

Table 31 shows the prevalence rates and intensity of Ascaris lumbricoides of the study samples at the four stages of stool examinations. As shown here the prevalence rates of Ascaris lumbricoides in Group A and Group B were 17% and 14,6% respectively before intervention.

In Group B with treatment of ova positive children with single dose Mebendazole (500 mg) after the results of the first stool examination and with continuous health education the prevalence rate of Ascaris lumbricoides was found to be 9,6% at the second stool examination. The prevalence rates of Ascaris lumbricoides infection was found to be 3,3% and 2,5% respectively at the third and fourth stool examinations.

In Group A where only initial health education together with treatment of ova positive children with single dose Mebendazole (500 mg) was carried out after the examination of first stool sample, the prevalence rate decreased to 12,2% at the end of first six month. After the second and third stool examinations at six monthly intervals thereafter, and treatment of ova positive children soon

after these examinations, the prevalence rates were found to be 7,5% and 5,9% respectively at the third and fourth examinations.

There was no statistically significant ($p > 0,05$) difference in the prevalence between the two groups before intervention and after intervention. However, in each group there was a statistically significant ($p < 0,05$) difference in prevalence in each group before and after intervention (Table 31).

Figure 4 shows the prevalence rates of Ascaris lumbricoides infection in the two groups at different stages of the study.

4.6.1.2 Severity

As shown in Table 31 the mean egg count per gram of faeces (MEPG) was found to be low in both areas at the commencement of the study. This shows that there was only a mild infection with Ascaris lumbricoides in the study sample. The MEPG for Ascaris lumbricoides in Group B decreased from 14 112 at the first examination to 6 528, 3 880 and 3 592 respectively at the second, third and last stool examinations. In Group A, MEPG was found to be 13 200 at the beginning of the study and decreased to 8 256, 4 152 and 4 008 respectively at second, third and fourth examinations. Figure 5 shows the MEPG at succssive stool examinations.

Table 31 : Prevalence and Intensity of Ascaris lumbricoides

Group	Before Intervention No. (%)	MEPG	2nd No. (%)	MEPG	3rd No. (%)	MEPG	4th No. (%)	MEPG
A*	42 (17,0) n=247	13200	30 (12,2) n=245	8256	18 (7,5) n=241	4152	14 (5,9) n=238	4008
B*	37 (14,6) n=254	14112	24 (9,6) n=250	6528	8 (3,3) n=243	3880	6 (2,5) n=242	3592

MEPG - Mean eggs per gram of faeces
Group A - Health Education once (initially)
Group B - Health Education continuous

Standard Error for comparison of prevalence before intervention between the two groups = 3,2

Standard Error for comparison of prevalence after intervention between the two groups = 1,8

Standard Error for comparison of prevalence before and after intervention

Group A = 2,8
Group B = 2,4

Figure 4: Ascaris lumbricoides - Prevalence Rates

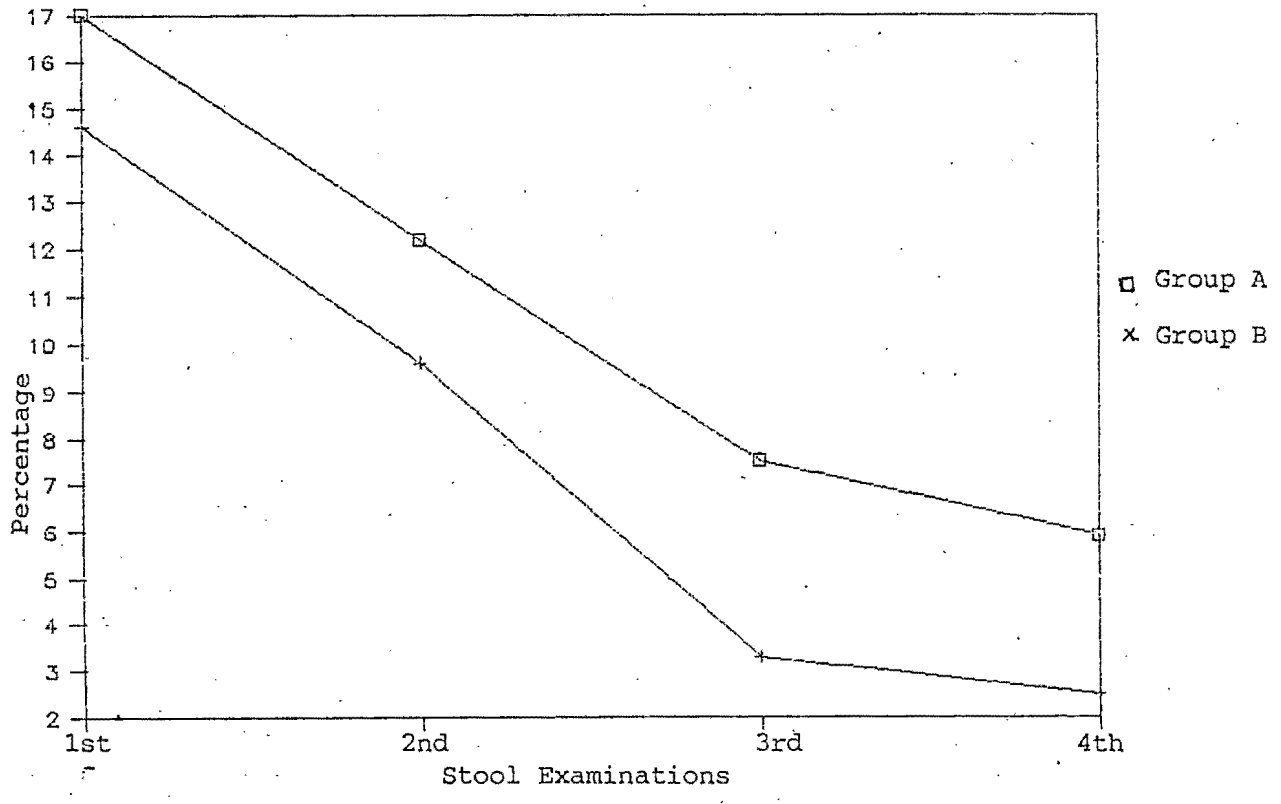
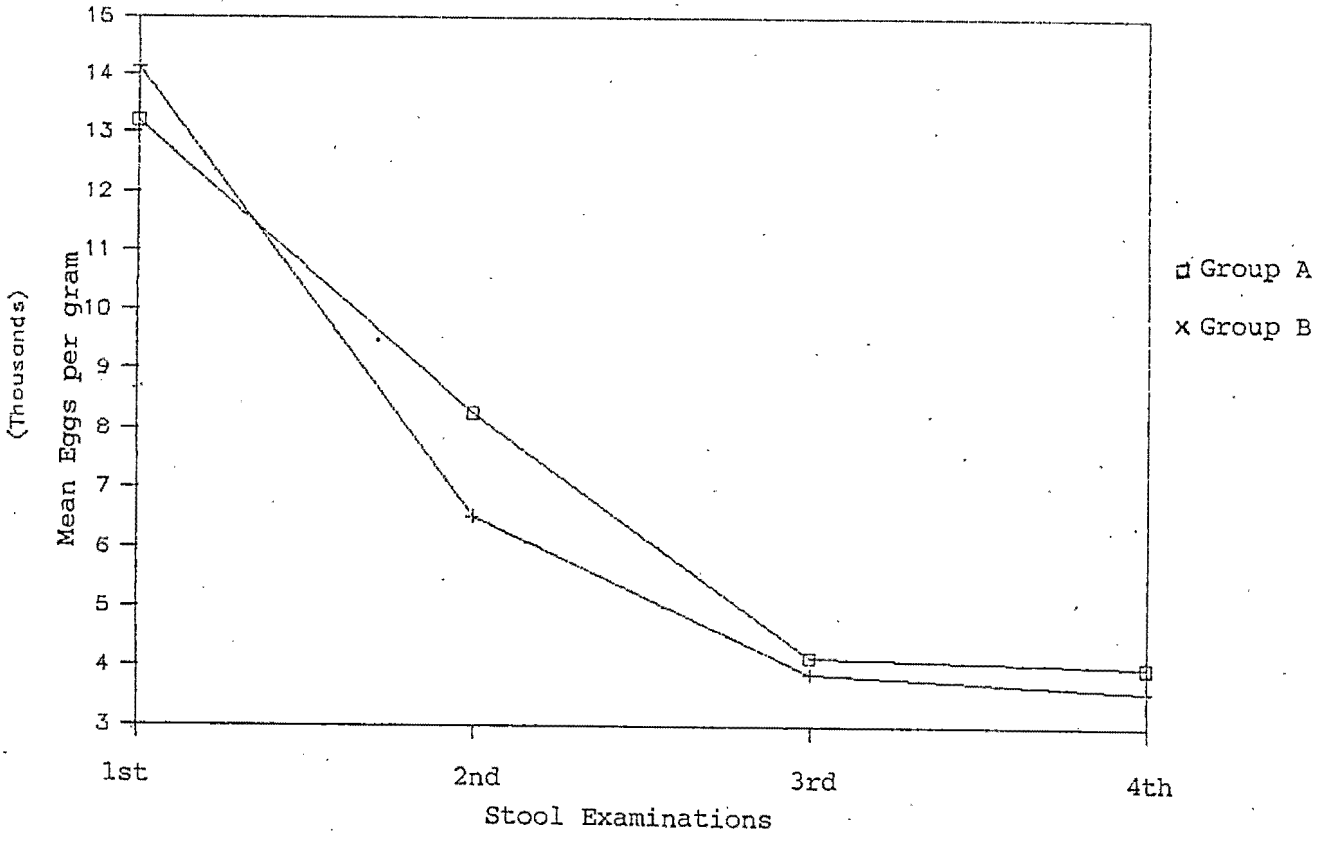


Figure 5 : Ascaris lumbricoides - Severity Rates



4.6.1.3 Egg Reduction Rate (ERR)

Table 32 shows ERR of the two study groups. Egg reduction rates of 55,3% and 69,9% were observed in Groups A and B respectively at the second stool examination. ERR of 94,1% was observed in Group B at the third stool examination while that of Group A after the fourth stool examination was only 89,9%. Final ERR of 95,9% was achieved in Group B at the end of the study period.

Table 32 : Egg Reduction Rate - Ascaris lumbricoides

Stool Examination	Group A TEPG	Group A ERR	Group B TEPG	Group B ERR
Before Intervention	554 400	-	522 144	-
2nd	247 680	55,3%	156 672	69,9%
3rd	74 736	86,5%	31 040	94,1%
4th	56 112	89,9%	21 552	95,9%

TEPG - Total eggs per gram of faeces
ERR - Egg reduction rate

Group A - Health Education once (initially)
Group B - Health Education continuous

4.6.2 Trichuris trichiura Infection

4.6.2.1 Prevalence

The prevalence rates of Trichuris trichiura in the two study groups are shown in Table 33 and Figure 6. Before intervention the prevalence rates were found to be 31,6% and 31,5% respectively in Groups A and B. Gradual fall in the prevalence rates was observed in each group at successive stool examinations.

There was no statistically significant ($p > 0,05$) difference in the prevalence between the two groups before intervention and after intervention. However, in each group there was a

statistically significant ($p < 0,05$) difference in prevalence in each group before and after intervention (Table 33).

4.6.2.2 Severity

As shown in Table 33 the mean egg count per gram of faeces (MEPG) in each area was found to be low at the commencement of the study. A gradual fall in MEPG was observed at successive stool examinations in both areas (Figure 7).

Table 33 : Prevalence and Intensity of Trichuris trichiura

Group	Before Intervention No. (%)	MEPG	2nd No. (%)	MEPG	3rd No. (%)	MEPG	4th No. (%)	MEPG
A*	78 (31,6) n=247	720	38 (15,5) n=245	504	28 (11,6) n=241	480	17 (7,1) n=238	360
B*	80 (31,5) n=254	768	32 (12,8) n=250	456	18 (7,4) n=243	312	8 (3,3) n=242	216

MEPG - Mean eggs per gram of faeces
Group A - Health Education once (initially)
Group B - Health Education continuous

Standard Error for comparison of prevalence before intervention between the two groups = 4,1

Standard Error for comparison of prevalence after intervention between the two groups = 2,0

Standard Error for comparison of prevalence before and after intervention

Group A = 2,9
Group B = 2,0

Figure 6: Trichuris trichiura - Prevalence Rates

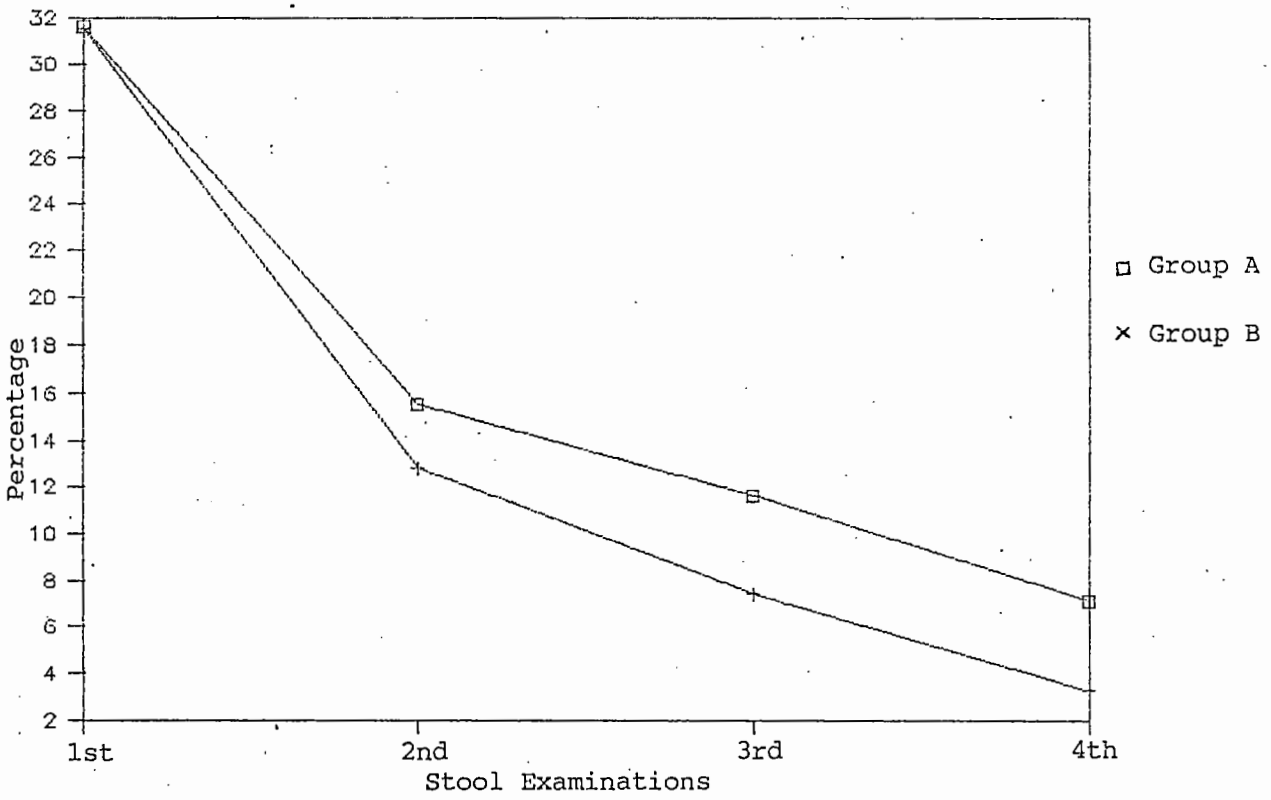
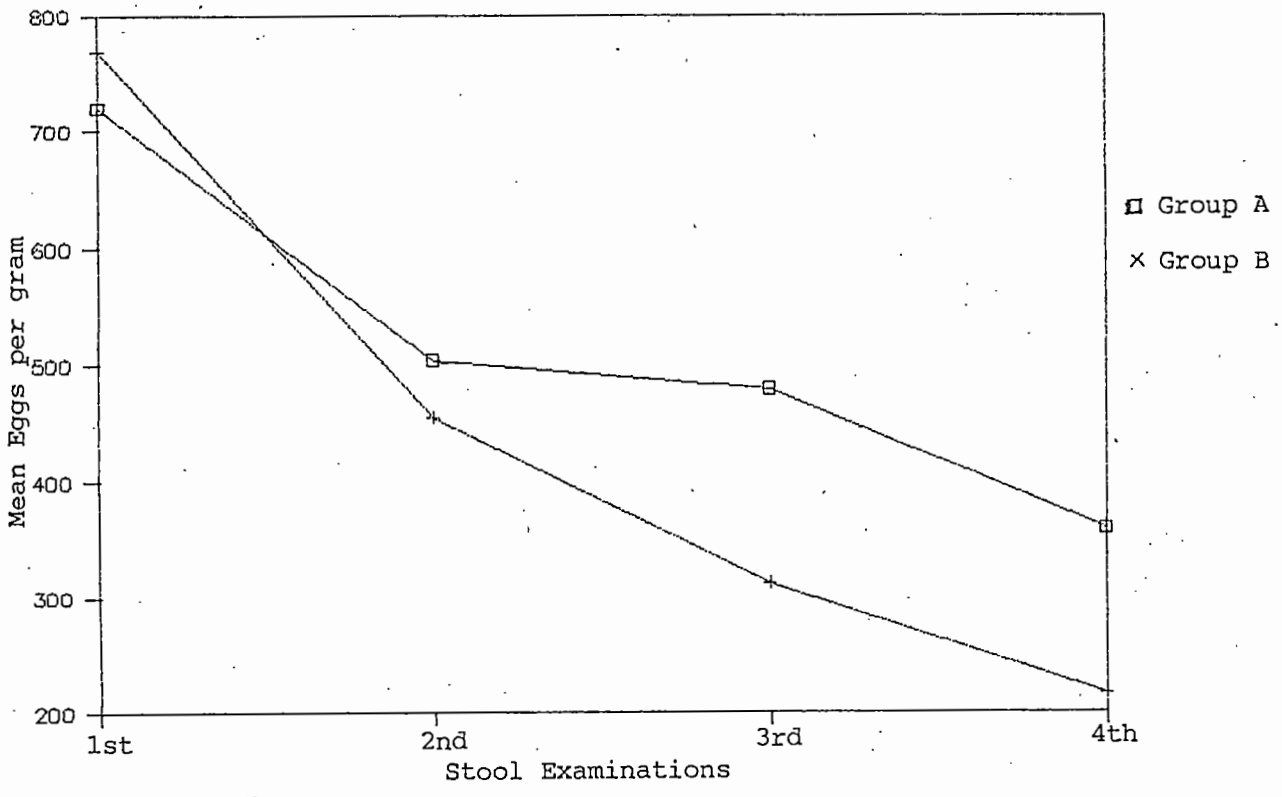


Figure 7: Trichuris trichiura - Severity Rates



6.2.2.3 Egg Reduction Rate (ERR)

Egg reduction rates for Trichuris trichiura are shown in Table 34. In Group B, ERR after the second, third and fourth examinations were found to be 76,3%, 90,1% and 97,1% respectively and in Group A 65,9%, 76,1% and 89,1% respectively. Although TEPG was higher in Group B at the beginning of the study the percentage egg reduction was found to be higher in this group was higher by the end of the study period.

Table 34 : Trichuris trichiura Egg Reduction Rates (ERR)

Stool Examination	Group A TEPG	Group A ERR	Group B TEPG	Group B ERR
Before Intervention	56 160	-	61 440	-
2nd	19 152	65,9%	14 592	76,3%
3rd	13 440	76,1%	5 618	91,1%
4th	6 120	89,1%	1 728	97,1%

TEPG - Total eggs per gram of faeces
ERR - Egg reduction rate

Group A - Health Education once (initially)
Group B - Health Education continuous

4.7 Haemoglobin Content

Table 35 and 36 shows the changes in the haemoglobin values of children aged between 2 to 6 years and over 7 years respectively at the beginning and end of the study. Due to the time interval between the two estimations of haemoglobin in the analysis of haemoglobin values, the children aged 5 and 6 years at the initial evaluation were included with the children aged over 7 years at the final evaluation.

According to WHO standards (32) of the children aged between 2 and 6 years 22,2% and 19,1% respectively in Groups A and B were found to be anaemic at the beginning of the study. There was no statistically significant difference ($p>0,05$) in the percentage of children with anaemia at the end of the study.

Considering anaemia again according to WHO standards (32), in Groups A and B, of children aged over 7 years 34,5% and 38,4% respectively were anaemic at the beginning of the study. Here too, there was no statistically significant difference ($p>0,05$) in the percentage of children with anaemia at the end of the study.

These findings may be reflecting the absence of hookworm infection in the study groups throughout the study period.

Table 35 : Haemoglobin Values of Children Aged between 2-6 years

Hb g/100 ml	Group A Pre No.	%	Post No.	%	SE+	Group B Pre No.	%	Post No.	%	SE+
< 11	24	22,2	11	20,4	6,8	23	19,1	7	16,7	6,8
=>11	84	77,8	43	79,6		98	80,9	35	83,3	
Total	108	100,0	54*	100,0		121	100,0	42*	100,0	

Anaemia = Haemoglobin <11 g/100 ml (32)
* Children aged over 7 years not included
+ SE - Standard Error

Group A - Health Education once (initially)
Group B - Health Education continuous

Table 36 : Haemoglobin Values of Children Aged more than 7 years

Hb g/100 ml	Group A Pre No.	%	Post No.	%	SE*	Group B Pre No.	%	Post No.	%	SE*
< 12	48	34,5	61	33,2	5,3	51	38,4	71	35,5	5,4
=>12	91	65,5	123	66,8		82	61,6	129	64,5	
Total	139	100,0	184+	100,0		133	100,0	200+	100,0	

Anaemia = Haemoglobin <12 g/100 ml (32)
+ Includes children aged 5 and 6 at initial haemoglobin assessment
* SE - Standard Error

Group A - Health Education once (initially)
Group B - Health Education continuous

CONCLUSIONS

1. The prevalence and severity of soil-transmitted helminths Ascaris lumbricoides and Trichuris trichiura were low at the commencement of the study. There were no children with hookworm infection.

2. A fall in the prevalence rates and intensities, and a rise in the egg reduction rates were observed in the two groups who had either continuous health education or only initial health education. The observed change was higher in the group where continuous health education was provided.

3. Improvement in knowledge and hygienic practices were observed in the groups who had either continuous health education or only initial health education. The percentage changes observed were higher in the group with continuous health education.

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Annexure 1 A

Questionnaire I

Baseline Data and Knowledge, Attitude and Practices Regarding Soil-Transmitted Helminth Infections

1. FHW Area:-
2. Family No:-
3. Name of Chief Occupant:-
4. Address:-
5. Ethnic Group:-
6. Religion:-
7. Occupants:-
   - 7.1 Total No:-
   - 7.2 Children between 2-12 years

Name	Age	Sex	School Grade

8. Monthly Income:-

200	☐	1500 - 2000	☐
200 - 500	☐	2000 - 3000	☐
500 - 750	☐	3000 - 5000	☐
750 - 1000	☐	5000	☐
1000 - 1500	☐		

8.1 House:- Permanent ☐
Temporary ☐

8.2 Own ☐
Rented ☐
Shared ☐
Other (Specify) ☐

8.3 Floor:- Cement ☐
Mud ☐
Other (Specify) ☐

8.4 Roof:- Tiles ☐
Thatched ☐
Asbestos ☐
Other (Specify) ☐

8.5 Walls:- Brick ☐
Mud ☐
Thatched ☐
Other (Specify) ☐

9. Water Supply:-

9.1 Private tap ☐ 9.1.1. Inside the house ☐
9.1.2. Outside the house ☐

9.2 Common tap ☐

9.3 Well 9.3.1. Common ☐ 9.3.3. Protected ☐
9.3.2. Private ☐ 9.3.4. Unprotected ☐

9.4 River ☐
9.5 Stream ☐

10. Disposal of refuse:-

Burn ☐ Pit ☐ Bury ☐ Throw ☐

10.1 Place of defaecation of family members

Family member	Private latrine	Shared latrine	Public latrine	Garden	Other

10.2 Type of latrine:-

Water seal ☐ Pit ☐ Bucket ☐ Other ☐

10.2.1 Condition of the latrines:-

Temporary ☐ Permanent ☐

10.2.2 Pan:- Dirty ☐ Clean ☐
10.2.3 Footrests Dirty ☐ Clean ☐
10.2.4 Rim :- Dirty ☐ Clean ☐
10.2.5 Floor:- Dirty ☐ Clean ☐

10.2.6 Pre-school latrine available: Yes No

10.2.7 If no, mothod of Disposal of Pre-school children's faeces.

Bury ☐
Put into a pit ☐
Throw to the garden ☐
Put into a latrine ☐
Other ☐

11. Washing hands after defaecation:-

11.1 Do you use soap and water?

11.1.1. Adults and children over 5 years

	Yes	No
Adults		
Children		

12. Washing hands before meals:-

Do you wash your hands before meals -

12.1 With water only

12.2. With soap and water

	Water only		With soap and water	
	Adults	Children	Adults	Children
Most of the time				
Always				
Occasionally				
Never				

13. Washing hands before cooking:-

Yes ☐ No ☐

14. Washing feet after using the latrine:-

Yes ☐ No ☐

15. Do you use boiled cooled water for drinking:-

	Adults	Children
Most of the time		
Always		
Occasionally		
Never		

16. Do you have a separate water container (bucket) for the latrine?

Yes ☐ No ☐

17. Use of foot wear

	Adults	Children
Always		
Most of the time		
Occasionally		
Never		

To be answered by an adult

18. Do you cover cooked food?

Always	☐
Most of the time	☐
Occasionally	☐
Never	☐

19. Do they wash their hands after playing with mud/soil etc.?

	With water only	With soap and water only
Always		
Most of the time		
Occasionally		
Never		

20. Regarding worm infections.

20.1 Do you know of worms

Yes ☐ No ☐

20.2 Are worms infective:

Yes ☐ No ☐

20.3 What are the types of worms that you know?

Round worm ☐ Hook worm ☐ Other ☐

Thread worm ☐ Whip worm ☐

20.4 How does one contact worms

do not know	☐
on it's own	☐
after having meals with dirty hands	☐
by not washing hands after playing with mud	☐
from food	☐
from water	☐
from air	☐
walking bare foot	☐
after contact with other persons	☐
after eating sugar sweets	☐
due to unhygenic habits	☐
other (Specify)	☐

20.5 What are the symptoms and signs of worm infections

lethargy		passing worms	
loss of appetite		pruritus ani	
large abdomen		abdominal pain	
irritability		vomiting	
fever		looss of weight	
other (Specify)			

20.7 Do you know of worm eggs?

Yes ☐ No ☐

20.8 Regarding worm treatment:

20.8.1 What do you do for worm infestations?

Try home remedies	
Consult Ayurvedic Practioner	
Consult Western Practioner	
Attend Hospital	
Obtain treatment from a pharmacy	
Other (Specify)	

20.8.2 When was last treatment given for worms?

20.8.3 How often do you treat your child for worms?

once in three months	
once in four months	
once in six months	
once a year	
no routine	
as and when required	
never	

20.9 What environmental factors are responsible for spread of worm infections

20.10 How do you prevent worm infestation?

washing hands after playing	☐
washing hands before meals	☐
preventing finger sucking	☐
regular nail trimming	☐
proper disposal of stools	☐
regular deworming	☐

21. THe Health Education

21.1 Source of Health Education for the family

21.2 Have you had health education regarding worm infections

Yes ☐ No ☐

If yes comment.

Annexure IB

පසේ විසිරී ඇති පණු රෝගබීජ වල ආකාරය හා ක්‍රියාමාර්ගය සම්බන්ධව හැදෑරීම

(1) පවුල් සෞඛ්‍ය සේවා පලාත :-

(2) ගෘහමූලික අංකය :-

(3) ගෘහමූලිකයාගේ නම :-

(4) ලිපිනය :-

(5) ජාතිය :-

(6) ආගම :-

(7) නිවසේ මුළු සාමාජික සංඛ්‍යාව :-

අංකය	නම	වයස	ස්ත්‍රී/ පුරුෂ	අධ්‍යාපන තත්වය	රැකියාව

(8) මාසික ආදායම

200 ට අඩු	☐	1500–2000	☐
200–500	☐	2000–30000	☐
500–750	☐	3000–5000	☐
750– 1000	☐	5000	☐
1000–1500	☐		

නිවස 8 : 1.

ස්ථිර	☐
අර්ධකාලීන	☐
තාවකාලික	☐

8 : 2

තමාගේම	☐
කුලියට	☐
තමාට අයත් නැති කුලියට නොවන	☐
වෙනත්	☐

8:3 ගෙබිම: සිමෙන්ති ☐
මැටි ☐
වෙනත් ☐

8:4 වහල: උලු ☐
පොල් අතු ☐
ඇස්බැස්ටස් ☐
වෙනත් ☐

8:5 බිත්ති: ගඩොල් ☐
මැටි ☐
පොල් අතු ☐
වෙනත් ☐

(9) පානීය ජලය ලබා ගැනීම

9:1 පෞද්ගලික ජල නල මඟින් ☐
9:2 පොදු ජලනල මඟින් ☐
9:3 ළිඳ
9:3:1 පොදු ☐ 9:3:1 ආරක්ෂිත ☐
9:3:2 පෞද්ගලික ☐ 9:3:2 අනාරක්ෂිත ☐

9:4 ගඟ ☐
9:5 ඇල ☐

(10) කෑම් කසල ඉවත් කිරීම:

10:1 වලලා දැමීමෙන් ☐ 10:4 පිසිකිරීමෙන් ☐
10:2 වලනට දැමීමෙන් ☐ 10:5 පොහොර වලනට දැමීමෙන් ☐
10:3 පුච්චා දැමීමෙන් ☐

(11) පවුලේ සාමාජිකයින් මලපහ කරන ස්ථානය

පවුලේ සාමාජිකයින් ගණන	පෞද්ගලික වැසිකිලිය	හවුල් වැසිකිලිය	මහජන වැසිකිලිය	වත්ත	වෙනත්

11:2 වැසිකිලි වර්ගය

11:2:1 ජල මුද්‍රිත ☐ වල ☐ බාල්දි ☐ වෙනත් ☐

11:2:2 වැසිකිලි ගොඩනැගිල්ලේ තත්වය
තාවකාලික ☐ ස්ථිර ☐

11:2:3 පෝච්චිය	අපවිත්‍රයි	☐	පවිත්‍රයි	☐
11:2:4 පා අඩි	අපවිත්‍රයි	☐	පවිත්‍රයි	☐
11:2:5 වල වැසිකිලියේ තට්ට	අපවිත්‍රයි	☐	පවිත්‍රයි	☐
11:2:6 බිම	අපවිත්‍රයි	☐	පවිත්‍රයි	☐

11:2:7 පවුලේ පෙර පාසල් වැසිකිලියක් තිබේද?
ඔව් ☐ නැත ☐

11:2:8 වැසිකිලියක් නැත්නම් (පෙර පාසැල් ළමුන්ගේ)
ඔවුන්ගේ මලපහ බැහැර කිරීම
(1) කඩදාසියක් මතට දමා
1. වලකට දමා වැලලීමෙන් ☐
2. වලකට දැමීමෙන් ☐
3. වත්තෙන් පිටට දැමීමෙන් ☐
4. වෙනත් ☐

(12) මලපහ කිරීමෙන් පසු අත් සබන් ගා සේදීම
12:1 ඔබ සබන් ගා ජලය පාවිච්චි කරනවාද?
12:1:1 වැඩිහිටියන් හා අවුරුදු පහට වැඩි ළමයින්

වැඩිහිටි	ඔව්	☐	නැත	☐
ළමා	ඔව්	☐	නැත	☐

(13) නෑමට පෙර අත් සේදීම,

	ජලය පමණක් භාවිතාකර		සබන් හා ජලය භාවිතාකර	
	වැඩිහිටියන්	ළමයින්	වැඩිහිටියන්	ළමයින්
සමහර වෙලාවට				
සැමවිටම				
තලාතූරකින්				
නවදාවත් නැත				

(14) නෑම පිලියෙල කිරීමට පෙර අත් සෝදනවාද?
ඔව් ☐ නැත ☐

(15) අපිරිසිදු ස්ථානවල ගමන් කිරීමට පසු (උදා: වැසිකිලිය)
15:1 ඔබ පා සෝදනවාද? ඔව් ☐ නැත ☐

(16) බීම සඳහා නිවාහත් ඌණුවතුර පාවිච්චි කරනවාද?

	වැඩිහිටියන්	ළමයින්
සමහර වෙලාවට හැමවිටම තලාතුරතින් කවදාවත් නැත		

(17) වැසිකිලියේදී වෙනම බාල්දියන් පාවිච්චි කරනවාද?

ඔව් ☐ නැත ☐

(18) ඔබ පාවහන් පාවිච්චි තරනවාද?

	වැඩිහිටියන්	ළමයින්
කවදාවත් නැත සෑම විටනදීම ගෙදරින් පිට යනවිට පමණක් නොකඩවා වත්තෙන් පිටයන විට සෙල්ලම් කිරීමට පිටට යනවිට. නොකඩවා වැසිකිලියට යනවිට		

<u>වැඩිහිටියන් විසින් පිලිතුරු සැපයිය යුතුයි.</u>
පිලිතුරු සපයන අයගේ අංකය:

(19) ඔබ පිසින ලද ආහාර වසා තබනවාද?

1. සැමවිටම ☐
2. සමහරවිට ☐
3. තලාතුරතින් ☐
4. කවදාවත් නැත ☐

(20) ඔබගේ ළමයින්ට මඩ/පස් සමඟ සෙල්ලම් කිරීමට ඉඩ දෙනවාද?

ඔව් ☐ නැත ☐

'ඔව්' නම්
20:1 ඔබගේ ළමයින් මඩ/පස් සමඟ සෙල්ලම් කිරීමෙන් පසු අත් සෝදනවාද?

	ජලය සමඟ	ජලය හා සබන් සමඟ
හැමවිටම සමහරවිට තලාතුරතින් කවදාවත් නැත		

(21) අත්වල නියපොතු

21:1 කපා දැමීම

ඔබ පරීක්ෂාතර බලනවාද? ඔව් ☐ නැත ☐

'ඔව්' නම්

කොපමණ කාලයකට වරක් අත්වල නියපොතු කපනවාද?

21:2 පිරිසිදු කිරීම

ඔබගේ නියපොතු ඔබ පිරිසිදු කරනවාද?

ඔව් ☐ නැත ☐

'ඔව්' නම්

කොපමණ කාලයකට වරක්ද?

21:3 නියපොතු කෑම සාමාන්‍ය පුරුද්දක් ලෙස ඔබ පවුලේ අය සලකනවාද?

ඔව් ☐ නැත ☐

(22) පණු ආසාදනය නිරීක්ෂණය කිරීම.

22:1 ඔබ පණුවන් ගැන දන්නවාද? ඔව් ☐ නැත ☐

22:2 ඔබ දැනසිටින්නේ කුමන වර්ගයේ පණුවන් ගැනද?

1. වක්‍රාකාර පණුවන් ☐
2. කොකු පණුවන් ☐
3. තිරි පණුවන් ☐
4. කස පණුවන් ☐
5. වෙනත් ☐

22:3 පණුවන් ශරීරගත වන්නේ කෙසේද?

1. දන්නේ නැත ☐
2. ඉඹේටම ☐
3. කෑමට පෙර අත් නොසෝදා ආහාර ගැනීම ☐
4. වැලි සමඟ සෙල්ලම් කලාට පසු අත් නොසේදීමෙන් ☐
5. ආහාර මඟින් ☐
6. ජලය මඟින් ☐
7. වාතය මඟින් ☐
8. පාවහන් නොපැලඳීමෙන් ☐
9. මිනිසුන් මඟින් ☐
10. පැණිරස කෑමෙන් ☐
11. සෞඛ්‍යයට අහිතකර පුරුදු මඟින් ☐
12. වෙනත් ☐

22:4 පණුවන් ශරීරගත වීමෙන් ඇතුනා ගතහැකි රෝග ලක්ෂණ මොනවාද?

1. අප්‍රාණිකත්වය ☐
2. ආහාර අරුචිය ☐
3. උදරය විශාලවීම ☐
4. නොරිස්සුම් ගතිය ☐
5. කට ගඳ ගැසීම ☐
6. දත් කැඟැ. කෑම ☐
7. ගුද මාර්ගය කැසීම ☐
8. බඩ යටවන සේ මුනින් අතට නිදා ගැනීම ☐
9. වෙනත් ☐

22:5 ඔබ පණු බිත්තර ගැන දන්නවාද?

ඔව් ☐ නැත ☐

22:6 <u>පණුරෝග වලට ප්‍රතිකාර කිරීම</u>

22:6:1 පණුරෝග සඳහා ඔබ කරන ප්‍රතිකාර මොනවාද?

1. ගෙදරදී කරන සුළු ප්‍රතිකාර ☐
2. ආයුර්වේද වෛද්‍යවරයා මගින් ☐
3. බටහිර වෛද්‍යවරයා මගින් ☐
4. රෝහලකට යාමෙන් ☐
5. බෙහෙත් ශාලාවකට යාමෙන් ☐
6. වෙනත් ☐

22:6:2 අවසන් වරට පණුරෝග සඳහා ප්‍රතිකාර ලබාගත්තේ කවදාද?

22:6:3 ඔබ විසින් පණු රෝග සඳහා ගනුලබන ප්‍රතිකාර වල ගුණ අගුණ බලා ගන්නේ කෙසේද?

22:6:4 ඔබේ ළමුන්ට පණුරෝග සඳහා කී වරක් ප්‍රතිකාර කරනවාද?

1. මාස කිහිපයට වරක් ☐
2. මාස හතරකට වරක් ☐
3. මාස හයකට වරක් ☐
4. අවුරුදු එකකට වරක් ☐
5. කාලපරිච්ඡේදයක් නොමැතිව ☐
6. අවශ්‍ය වූ විට ☐
7. කවදාවත් නැත ☐

22:7 පණුරෝග පැතිරීමට අවට පරිසරයේ වගකිවයුතු හේතූන් මොනවාද?

.....

.....

22:8 පණුවන්ට ප්‍රතිකාර කළාට පසුවත් පණුවන් පිටවීම සිදුවනවාද?

ඔව් ☐ නැත ☐

'ඔව්' නම්

කොපමණ කාලයකට පසුවද?

22:9 පණු රෝග වලක්වා ගන්නේ කෙසේද?

1. සෙල්ලම් කිරීමෙන් පසු අත් සෝදා කෑම ගැනීමෙන් ☐
2. කෑම ගැනීමට පෙර අත් සෝදා ගැනීමෙන් ☐
3. කට තුලට ඇඟිලි දැමීමෙන් වැලකීමෙන් ☐
4. ක්‍රමවත්ව නියපොතු කැපීමෙන් ☐
5. මලපහ පිටතට වීසි කිරීමෙන් වැලකීමෙන් ☐
6. ක්‍රමවත්ව පණුවන්ට ප්‍රතිකාර ගැනීමෙන් ☐

(23) විටින් විට ගෘද මාර්ගය කසන විට පණුවන් යනවාද?

ඔව් ☐ නැත ☐

'ඔව්' නම්

කොපමණ කාලයකට වරක්ද?

(24) <u>සෞඛ්‍ය අධ්‍යාපනය</u>

24:1 පවුල් සඳහා සෞඛ්‍ය අධ්‍යාපනය ලබා ගත හැකි ක්‍රම

24:2 පණුරෝග සම්බන්ධව ඔබ සෞඛ්‍ය අධ්‍යාපනය ලබා තිබෙනවාද?

ඔව් ☐ නැත ☐

'ඔව්' නම් විස්තරය

Annexure 2 A

Questionnaire II

Study of Knowledge, Attitude and Practices Regarding Soil-Transmitted Helminth Infections

1. FHW Area:
2. Family No:
3. Name of Chief Occupant:
4. Address:
5. Disposal of refuse:

Burn ☐ Pit ☐ Bury ☐ Throw ☐ Composting ☐

5.1 Place of defaecation of family members

Family member	Private latrine	Shared latrine	Public latrine	Garden	Other

5.2 Condition of the latrines:

Temporary ☐ Permanent ☐

5.3 Pan: Dirty ☐ Clean ☐

5.4 Footrests Dirty ☐ Clean ☐

5.5 Rim: Dirty ☐ Clean ☐

5.6 Floor: Dirty ☐ Clean ☐

5.7 Pre-school latrine available:

Yes ☐ No ☐

5.8 If no, method of Disposal of Pre-school children's faeces.

Bury ☐
Put into a pit ☐
Throw to the garden ☐
Put into a latrine ☐
Other ☐

9. Washing hands after defaecation:-

9.1 Do you use soap and water?

9.1.1. Adults and children over 5 years Yes ☐ No ☐

10. Washing hands before meals:-

Do you wash your hands before meals -

10.1 With soap and water

	With soap and water	
	Adults	Children
Most of the time		
Always		
Occationally		
Never		

11. Washing hands always before cooking:

Yes ☐ No ☐

12. Washing feet always after using the latrine:

Yes ☐ No ☐

13. Do you use boiled cooled water for drinking

	Adults	Children
Most of the time		
Always		
Occasionally		
Never		

14. Use of foot wear for latrine

	Adults	Children
Always		
Most of the time		
Occasionally		
Never		

<u>To be answered by an adult</u>

15. Do you cover cooked food?

Always	☐
Most of the time	☐
Occasionally	☐
Never	☐

16. Do your children wash their hands after playing with mud/soil etc.?

	Water only	With soap and water
Always		
Most of the time		
Occasionally		
Never		

17. Regarding worm infections

17.1 Do you know of worms

Yes No

17.2 Are worms infective

Yes ☐ No ☐

17.3 What are the types of worms that you know?

Round worm ☐ Hook worm ☐ Other ☐

Thread worm ☐ Whip worm ☐

17.4 How does one contact worms

do not know ☐
on it's own ☐
after having meals with dirty hands ☐
by not washing hands after playing with mud ☐
from food ☐
from water ☐
from air ☐
by walking bare foot ☐
after contact with people ☐
after eating sugar sweets ☐
due to unhydenic habits ☐
other(Specify) ☐

17.5 Do you know of worm eggs?

Yes ☐ No ☐

17.6 What environmental factors are responsible for spread of worm infections

17.8 How do you prevent worm infestation?

Washing hands after playing	☐
Washing hands before meals	☐
Preventing finger sucking	☐
Regular nail trimming	☐
Proper disposal of stools	☐
Regular deworming	☐

18. <u>The Health Education</u>

18.1 Source of Health Education for the family

18.2 Have you had health education regarding worm infections

Yes ☐ No ☐

If yes comment.

ANNEXURE 2B

පයේ විසිරි ඇති පණු රෝග බීජ වල ආකාරය හා ක්‍රියා මාර්ගය

සම්බන්ධව හැදෑරීම - 11

(1) පවුල් යොමු සේවා පලාත:-

(2) ගෘහමූලික අංකය:-

(3) ගෘහමූලිකයාගේ නම:-

(4) ලිපිනය:-

(5) තණු කසල ඉවත් කිරීම:

5:1	වලලා දැමීමෙන්	1	5:4	වීසි කිරීමෙන්	4
5:2	වලකට දැමීමෙන්	2	5:5	පොහොර වලකට දැමීමෙන්	5
5:3	පුච්චා දැමීමෙන්	3			

(6) පවුලේ සාමාජිකයින් මලපහ කරන ස්ථානය:

පවුලේ සාමාජිකයන්ගේ අංකය	පෞද්ගලික වැසිනිලිය	භවුල් වැසිනිලිය	මහජන වැසිනිලිය	වත්ත	වෙනත්

6:2 වැසිනිලි වර්ගය:

6:2:1 ජලමුද්‍රිත [4] වල [1] බාල්දි [2] වෙනත් [3]

6:2:2 වැසිනිලි ගොඩනැගිල්ලේ තත්වය:

තාවකාලික [1] ස්ථිර [2]

6:2:3	පෝච්චිය	අපවිත්‍රයි	1	පවිත්‍රයි	2
6:2:4	පා අඩි	අපවිත්‍රයි	1	පවිත්‍රයි	2
6:2:5	වල වැසිනිලියේ තට	අපවිත්‍රයි	1	පවිත්‍රයි	2
6:2:6	බිම	අපවිත්‍රයි	1	පවිත්‍රයි	2

6:2:7 පවුලේ පෙර පාසල් වැසිනිලියන් තිබේද?

ඔව් [1] නැත [2]

6:2:8 වැසිකිලියක් නැත්නම් (පෙර පාසල් ළමුන්ගේ)
ඔවුන්ගේ මලපහ බැහැර කිරීම

(1) කඩදාසියක් මතට දමා,
1. වලකට දමා වැලලීමෙන් | 1 |
2. වලකට දැමීමෙන් | 2 |
3. වත්තෙන් පිටට දැමීමෙන් | 3 |
4. වැඩිහිටි වැසිකිලියට යාමෙන් | 4 |

(7) මලපහ කිරීමෙන් පසු අත් සබන් ගා සේදීම

7:1 ඔබ සබන් ගා ජලය පාවිච්චි කරනවාද?

7:1:1 වැඩිහිටියන් හා අවුරුදු පහට වැඩි ළමයින්

ඔව් [1] නැත [2]

ළමයින් ඔව් [1] නැත [2]

(8) කෑමට පෙර අත්සේදීම

	ජලය පමණක් භාවිතා කර		සබන් හා ජලය භාවිතාකර	
	වැඩිහිටියන්	ළමයින්	වැඩිහිටියන්	ළමයින්
සමහර වෙලාවට				
සෑමවිටම				
කලාතුරකින්				
කවදාවත් නැත				

(9) කෑම පිලියෙල කිරීමට පෙර අත් සෝදනවාද? ඔව් [1] නැත [2]

(10) අපිරිසිදු ස්ථානවල ගමන් කිරීමට පසු (උදා: වැසිකිලිය)

10:1 ඔබ පා සෝදනවාද? ඔව් [1] නැත [2]

(11) බීම සඳහා නිවාගත් උණුවතුර පාවිච්චි කරනවාද?

	වැඩිහිටියන්	ළමයින්
සමහර වෙලාවට		
හැමවිටම		
කලාතුරකින්		
කවදාවත් නැත		

(12) වැසිකිලිසේදී වෙනම බාල්දියක් පාවිච්චි කරනවාද?

ඔව් [1] නැත [2]

(13) ඔබ පාඩහන් පාවිච්චි කරනවාද?

	වැඩිහිටියන්	ළමයින්
1. කවදාවත් නැත		
2. සෑම විටකදීම		
3. ගෙදරින් පිට යන විට පමණක්		
4. නොකඩවා වත්තේ පිට යන විට		
5. සෙල්ලම් කිරීමට පිටට යන විට		
6. නොකඩවා වැසිකිලියට යන විට		
7. වෙනත්		

<u>වැඩිහිටියන් විසින් පිලිතුරු සැපයිය යුතුයි.</u>

පිලිතුරු සපයන අයගේ අංකය:

(14) ඔබ පිසින ලද ආහාර වසා තබනවාද?

1. සැමවිටම	1
2. සමහරවිට	2
3. කලාතුරකින්	3
4. කවදාවත් නැත	4

(15) ඔබගේ ළමයින් මඩ/පස් සමඟ සෙල්ලම් කිරීමට ඉඩ දෙනවාද?

ඔව් [1] . නැත [2]

ඔව් නම්,

15:1 ඔබගේ ළමයින් මඩ/පස් සමඟ සෙල්ලම් කිරීමෙන් පසු අත් සෝදනවාද?

	ජලය සමඟ	ජලය සහ සබන් සමඟ
1. හැමවිටම		
2. සමහරවිට		
3. කලාතුරකින්		
4. කවදාවත් නැත		

(16) අත්වල නියපොතු

16:1 කපා දැමීම, ඔබ පරීක්ෂා කර බලනවාද? ඔව් [1] නැත [2]

ඔව් නම්,

කොපමණ කාලයකට වරක් අත්වල නියපොතු කපනවාද?

16:2 <u>පිරිසිදු කිරීම</u>

ඔබගේ නියපොතු ඔබ පිරිසිදු කරනවාද? ඔව් [1] නැත [2]

ඔව් නම්,

කොපමණ කාලයකට වරක්ද?

16:3 නියපොතු කෑම සාමාන්‍ය පුරුද්දක් ලෙස ඔබ පවුලේ අය සලකනවාද?

ඔව් [1] නැත [2]

(17) පණු ආසාදනය නිරීක්ෂනය කිරීම

17:1 ඔබ පණුවන් ගැන දන්නවාද? ඔව් [1] නැත [2]

17:2 ඔබ දැන සිටින්නේ කුමන වර්ගයේ පණුවන් ගැනද?

1. වත්‍රාකාර පණුවන්	1	2. කොකු පණුවන්	2
3. කිරි පණුවන්	3	4. කස පණුවන්	4
5. වෙනත්	5		

17:3 පණුවන් ශරීරගත වන්නේ කෙසේද?

1. දන්නේ නැත	1
2. ඉඹීමෙන්	2
3. කෑමට පෙර අත් නොසෝදා ආහාර ගැනීම	3
4. වැලි සමඟ සෙල්ලම් කලාට පසු අත් නොසේදීමෙන්	4
5. ආහාර මඟින්	5
6. ජලය මඟින්	6
7. වාතය මඟින්	7
8. පාවහන් නොපැලඳීමෙන්	8
9. මිනිසුන් මඟින්	9
10. පැණි රස කෑමෙන්	10
11. සෞඛ්‍යයට අහිතකර පුරුදු මඟින්	11
12. වෙනත්	12

17:4 ඔබ පණු බිත්තර ගැන දන්නවාද?

ඔව් ☐ නැත ☐

17:5 පණු රෝග පැතිරීමට අවට පරිසරයේ වග කිවයුතු හේතූන් මොනවාද?

17:6 පණු රෝග වලක්වා ගන්නේ කෙසේද?

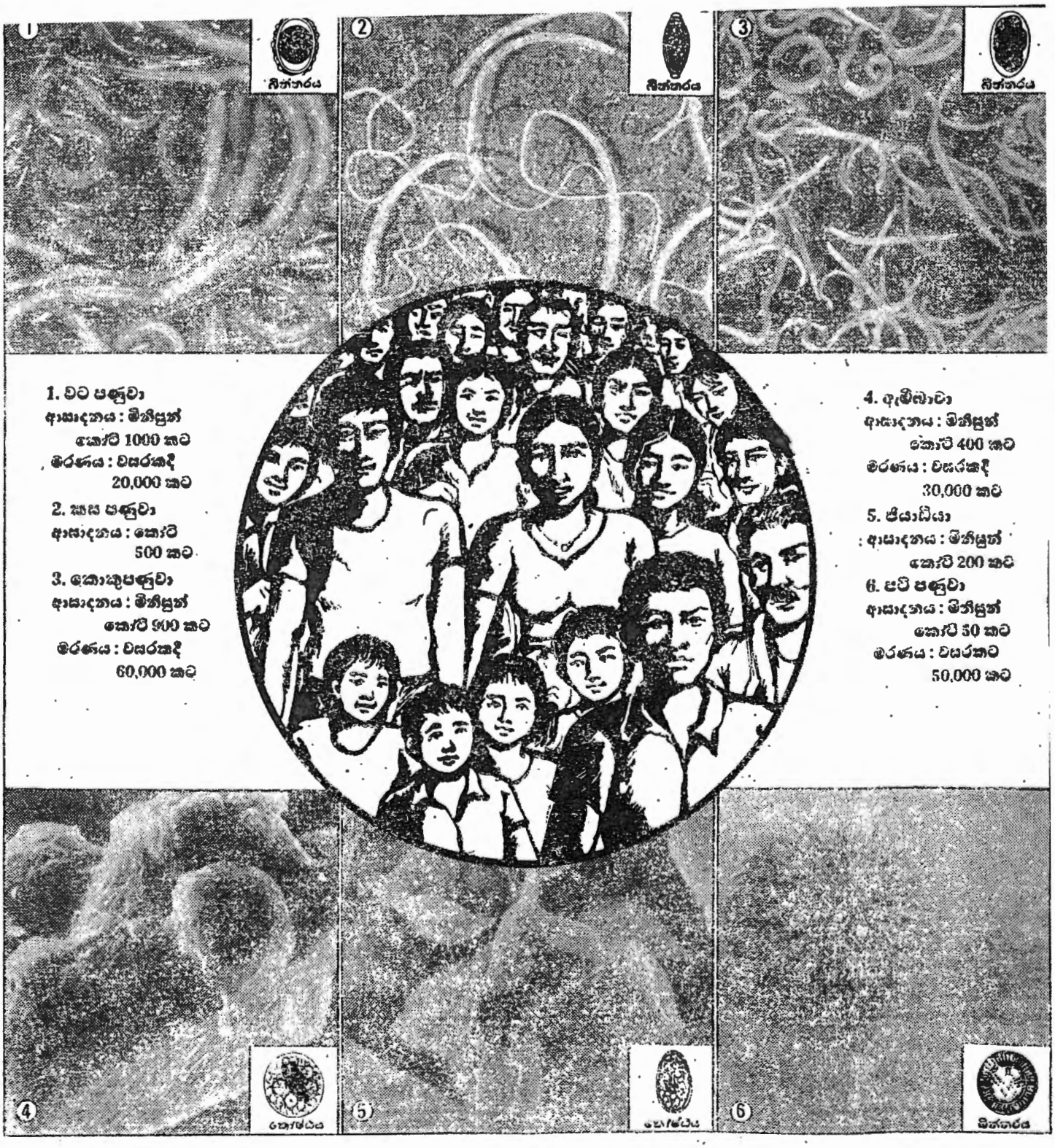
1. සෙල්ලම් කිරීමෙන් පසු අත් සෝදා කෑම ගැනීමෙන්	☐
2. කෑම ගැනීමට පෙර අත් සෝදා ගැනීමෙන්	☐
3. කට තුලට ඇඟිලි දැමීමෙන් වැලකීමෙන්	☐
4. ක්‍රමවත්ව නියපොතු කැපීමෙන්	☐
5. මලපහ පිටතට විසිකිරීමෙන් වැලකීමෙන්	☐
6. ක්‍රමවත්ව පණුවන්ට ප්‍රතිකාර ගැනීමෙන්	☐

(18) පණුරෝග සම්බන්ධව ඔබ සෞඛ්‍ය අධ්‍යාපනය ලබා තිබෙනවාද?

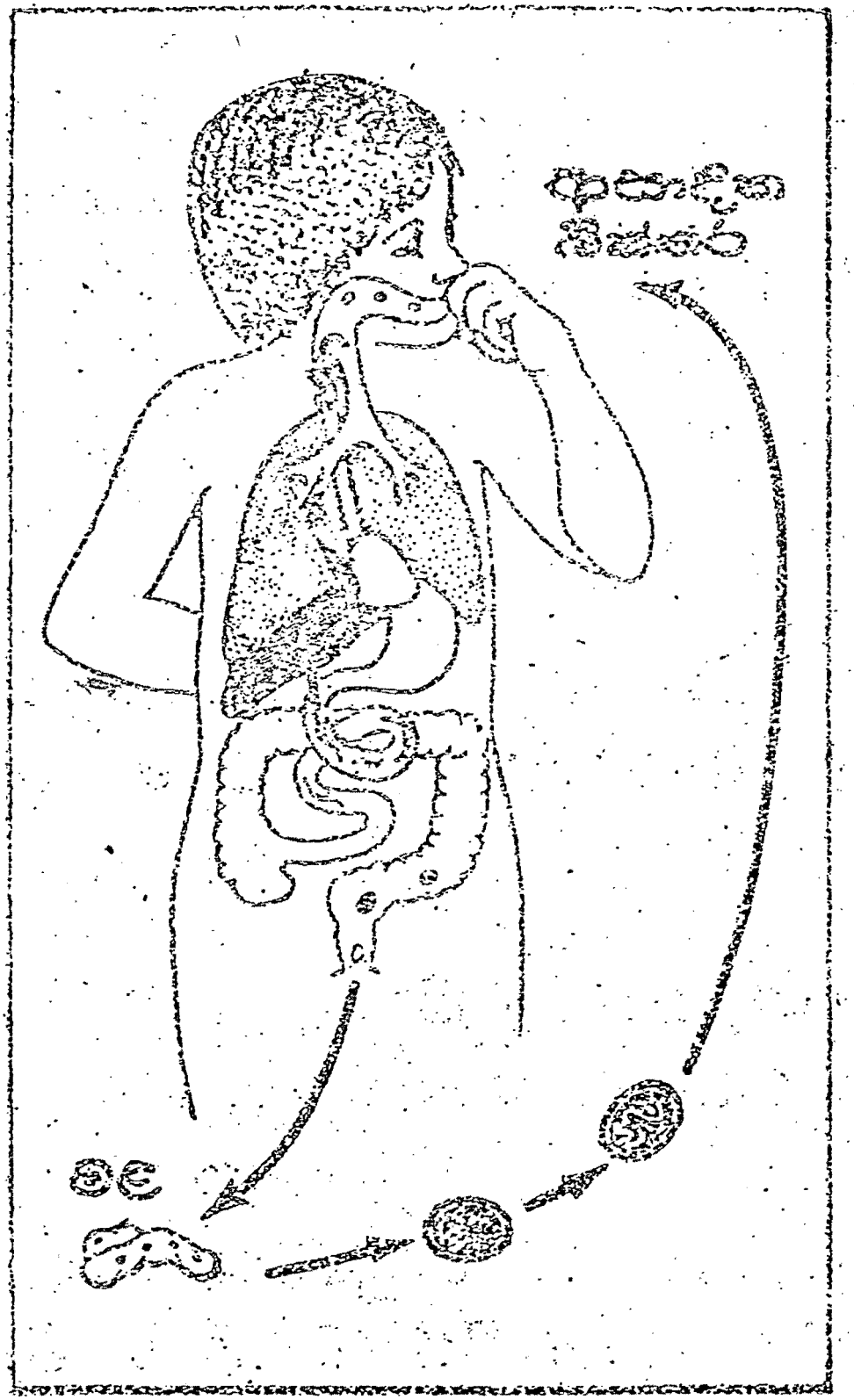
ඔව් ☐ නැත ☐

'ඔව්' නම් විස්තරය

ANNEXURE 3


1
නින්නරය
2
නින්නරය
3
නින්නරය
1. වට පණුවා
ආසාදනය : මිනිසුන් කෝටි 1000 කට
මරණය : වසරකදී 20,000 කට
2. කෂය පණුවා
ආසාදනය : කෝටි 500 කට
3. කොකුපණුවා
ආසාදනය : මිනිසුන් කෝටි 900 කට
මරණය : වසරකදී 60,000 කට
4. ඇම්බාඩා
ආසාදනය : මිනිසුන් කෝටි 400 කට
මරණය : වසරකදී 30,000 කට
5. ජියාඩියා
ආසාදනය : මිනිසුන් කෝටි 200 කට
6. පටි පණුවා
ආසාදනය : මිනිසුන් කෝටි 50 කට
මරණය : වසරකට 50,000 කට
4
රෝගය
5
රෝගය
6
මිත්තරය

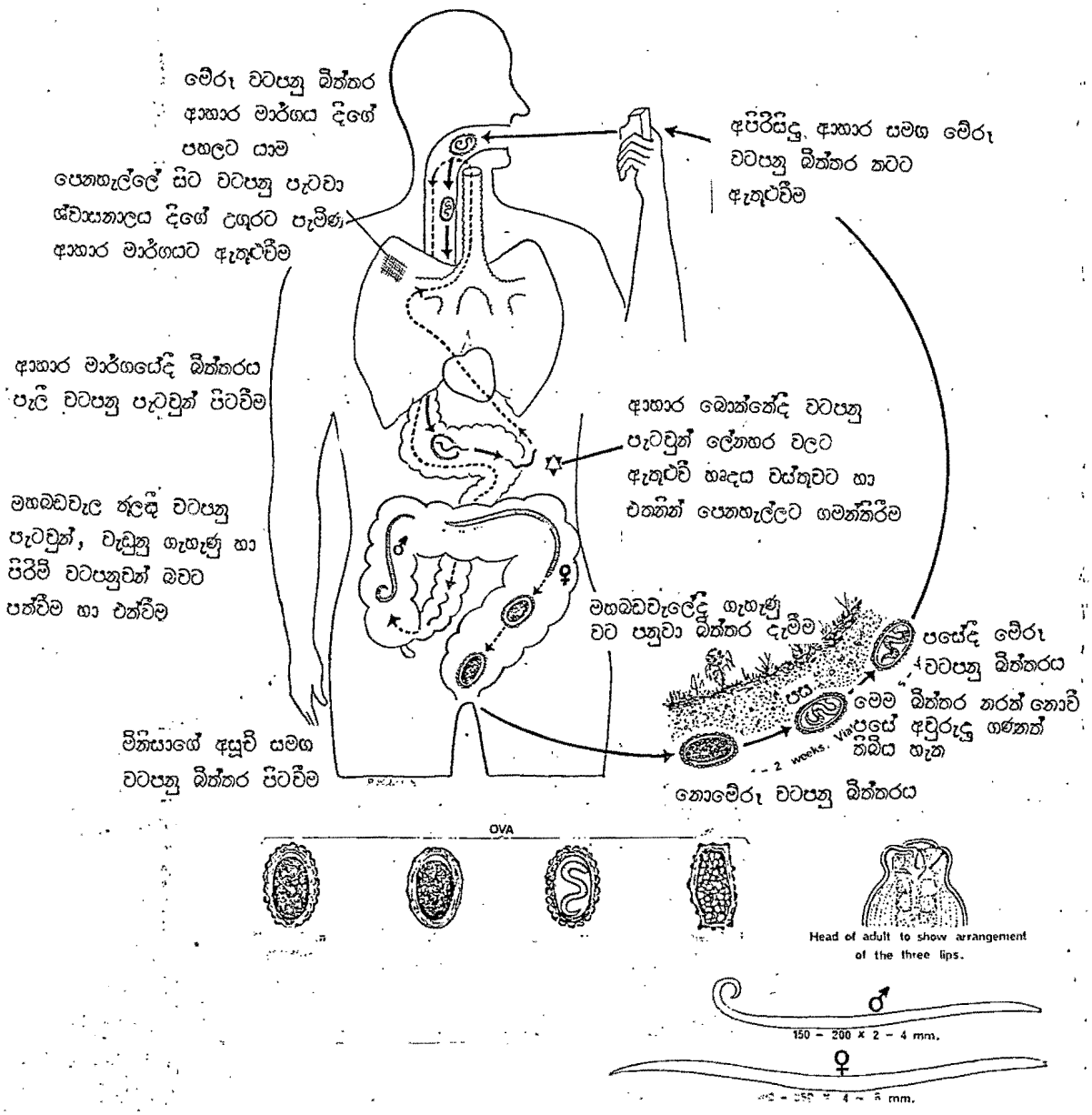
ANNEXURE 4

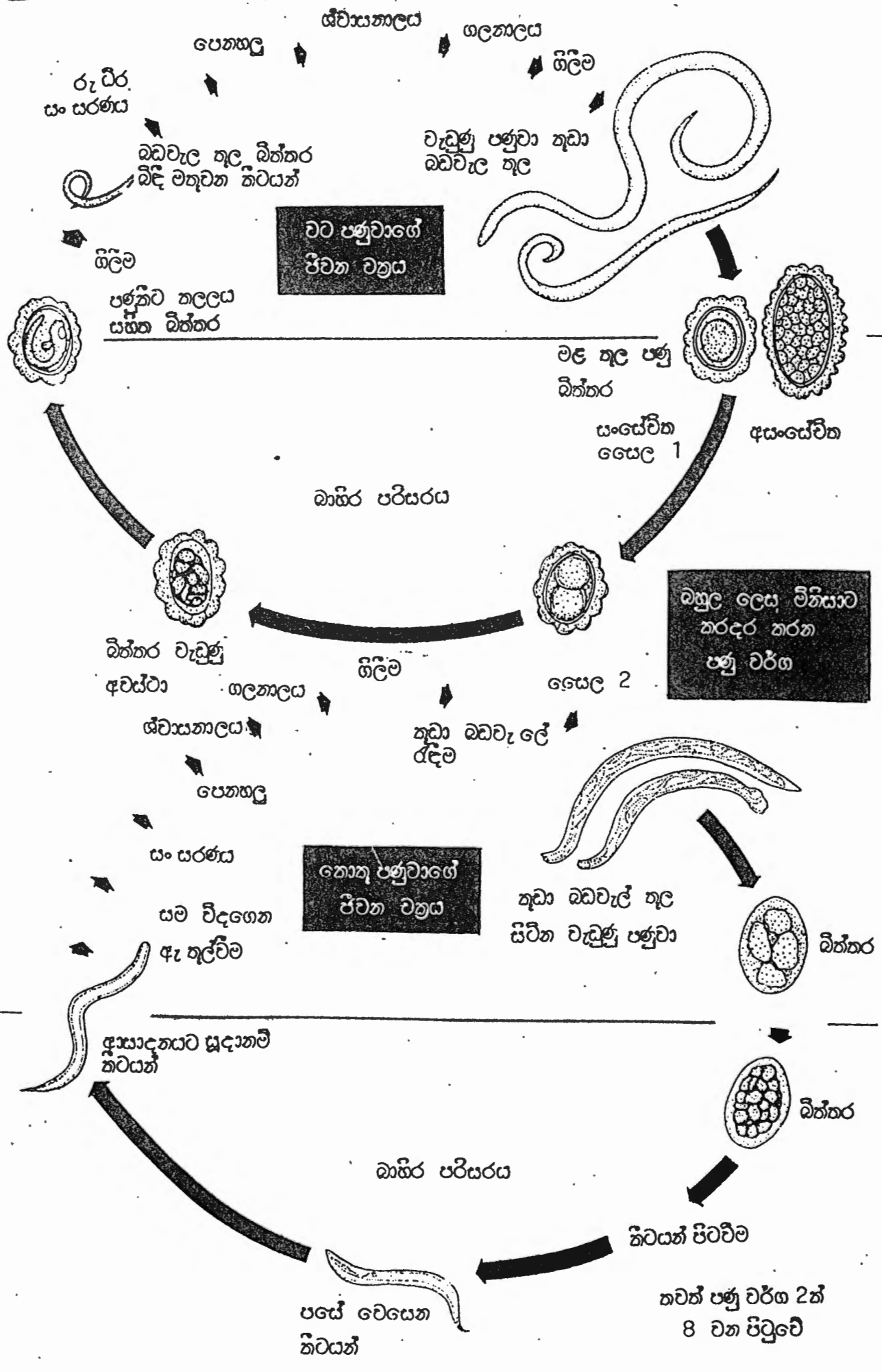


ANNEXURE 5

වට පනුවා

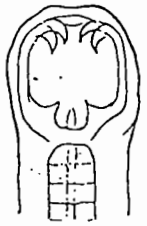
Ascaris lumbricoides (The round worm)




ශ්වාසනාලය
ගලනාලය
පෙනහලු
ගිලීම
රුධිර සංසරණය
වැඩුණු පණුවා තුඩා බඩවැල තුල
බඩවැල තුල බිත්තර බිඳී මතුවන කීටයන්
වට පණුවාගේ ජීවන චක්‍රය
ගිලීම
පණ්ඩිට තලලය සහිත බිත්තර
මළ තුල පණු බිත්තර
සංසේචිත සෛල 1
අසංසේචිත
බාහිර පරිසරය
බහුල ලෙස මිනිසාට හරදර තරන පණු වර්ග
බිත්තර වැඩුණු අවස්ථා
ගලනාලය
ගිලීම
සෛල 2
ශ්වාසනාලය
තුඩා බඩවැ ලේ රැඳීම
පෙනහලු
සංසරණය
කොකු පණුවාගේ ජීවන චක්‍රය
සම විදගෙන ඇතුල්වීම
තුඩා බඩවැල් තුල සිටින වැඩුණු පණුවා
බිත්තර
ආහාදනයට සූදානම් කීටයන්
බිත්තර
බාහිර පරිසරය
කීටයන් පිටවීම
පසේ වෙසෙන කීටයන්
තවත් පණු වර්ග 2ක් 8 වන පිටුවේ

කොකු පනුවා

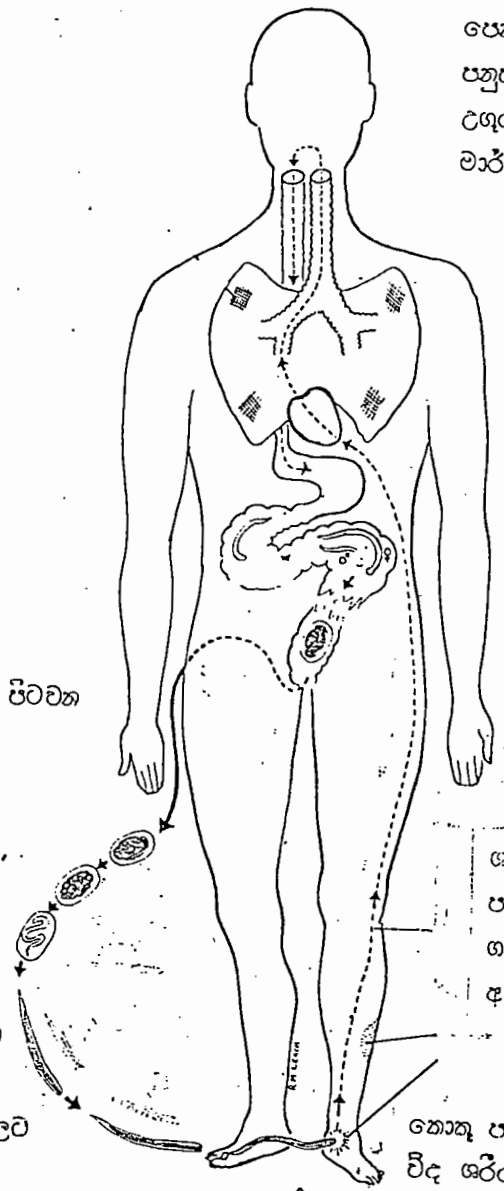
The Hookworms



මිනිසාගේ අසූචි සමග පිටවන
කොකු පනු බිත්තරය

බිත්තරය පස තුළදී මේරීම සඳහා
දින 7 ත් ගතවේ.

මේරූ බිත්තරය පැලී පසතුලට
පිටවූ කොකු පනුපැටවා



පෙනහැල්ලේ සිට කොකු
පනුපැටවා ශ්වාසනාලය දිගේ
උගුරට පැමිණ ආහාර
මාර්ගයට ඇතුළුවීම

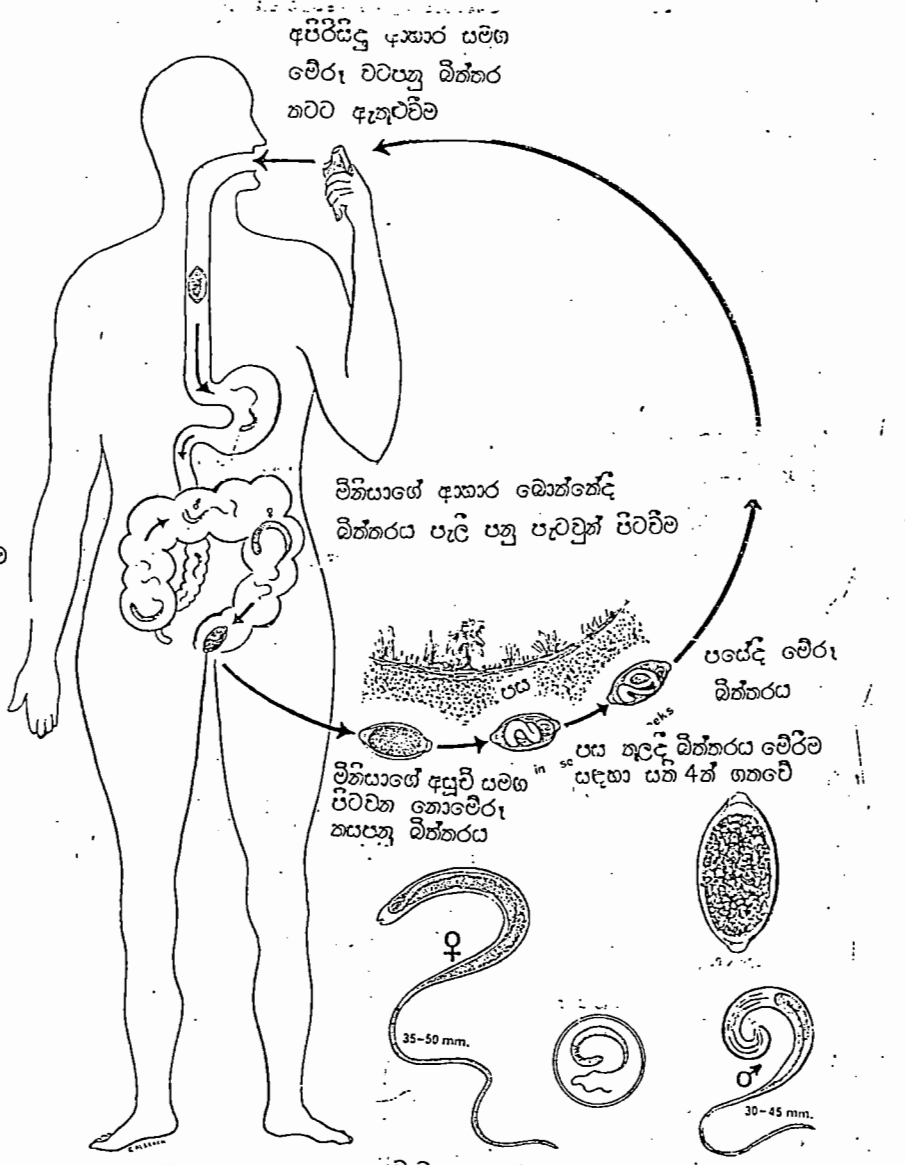
ගැහැණු කොකු පනුවා
බිත්තර දැමීම

ශරීරයට ඇතුළුවූ කොකු
පනුපැටවා ලේ සමග
ගමන්කර පෙනහැල්ලට
ඇතුළුවීම

කොකු පනුපැටවා කකුලෙහි සම
විදා ශරීරයට ඇතුළුවීම

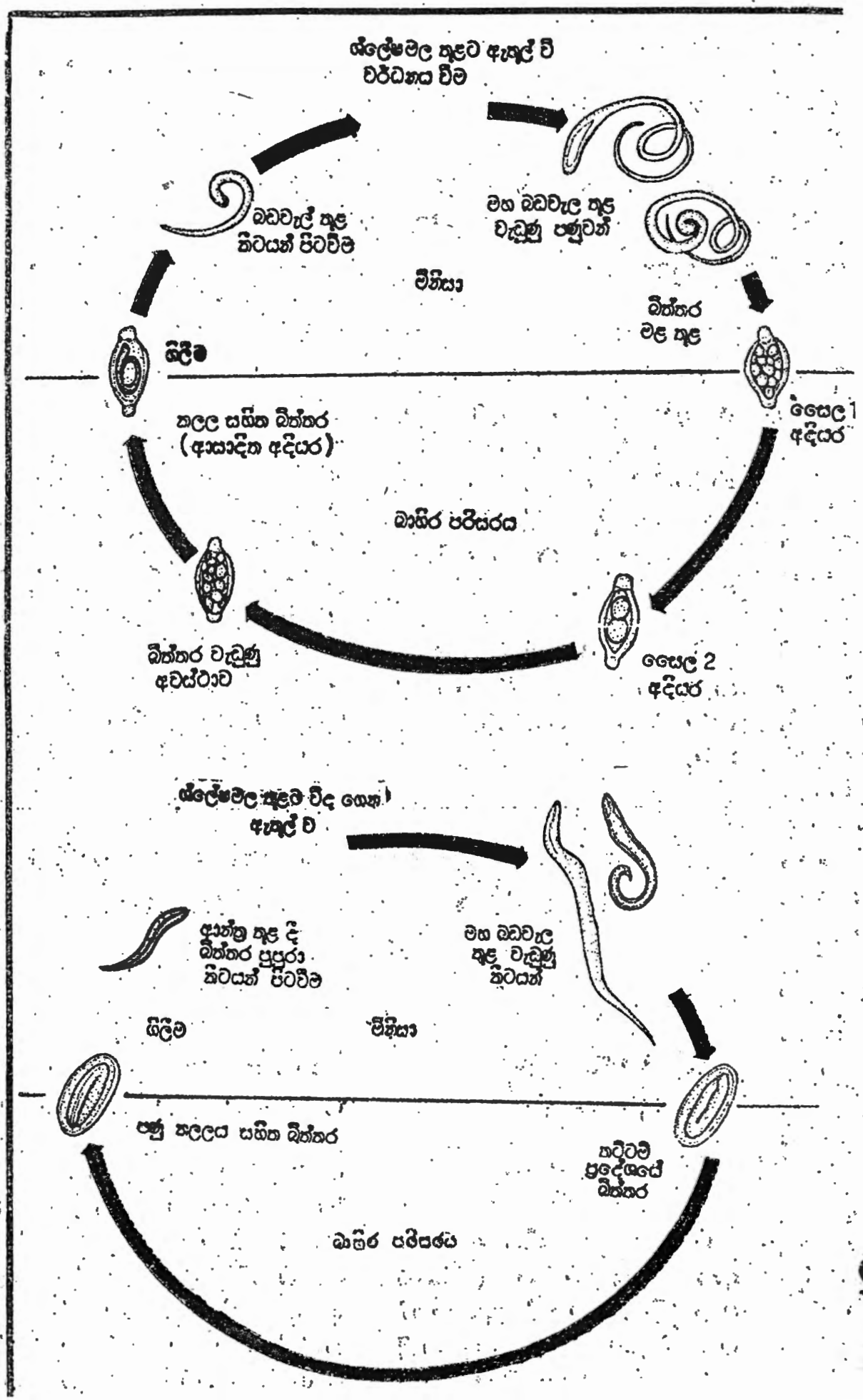
කස පනුවා

Trichuris trichiura (The Whip worm)

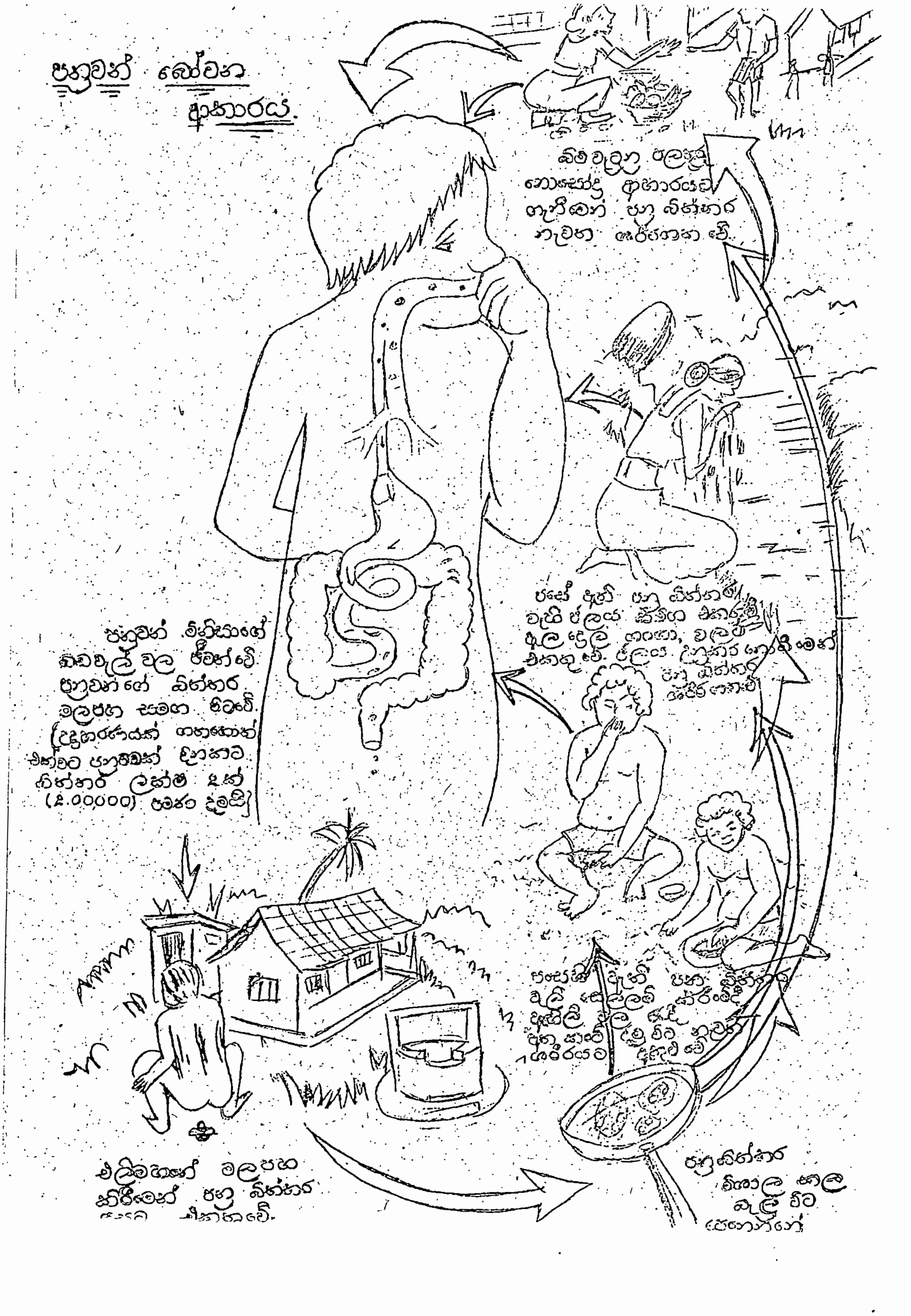


වැඩුනු ගැහැණු කසපනුවා ⁊ වැඩුනු පිරිමි කස පනුවා

ANNEXURE 9


ශ්ලේෂ්මල තුළට ඇතුල් වී
වර්ධනය වීම
බඩවැල් තුළ
බිටයන් පිටවීම
මහ බඩවැල තුළ
වැඩුණු පණුවන්
මිනිසා
බිත්තර
මළ තුළ
හිඳීම
සෙල 1
අදියර
තලල සහිත බිත්තර
(ආසාදිත අදියර)
බාහිර පරිසරය
බිත්තර වැඩුණු
අවස්ථාව
සෙල් 2
අදියර
ශ්ලේෂ්මල තුළට විද ගොන්
ඇතුල් වී
අාන්ත්‍ර තුළ දී
බිත්තර පුපුරා
බිටයන් පිටවීම
මහ බඩවැල
තුළ වැඩුණු
බිටයන්
ගිලීම
මිනිසා
පණු තලලය සහිත බිත්තර
තට්ටම්
ප්‍රදේශයේ
බිත්තර
බාහිර පරිසරය

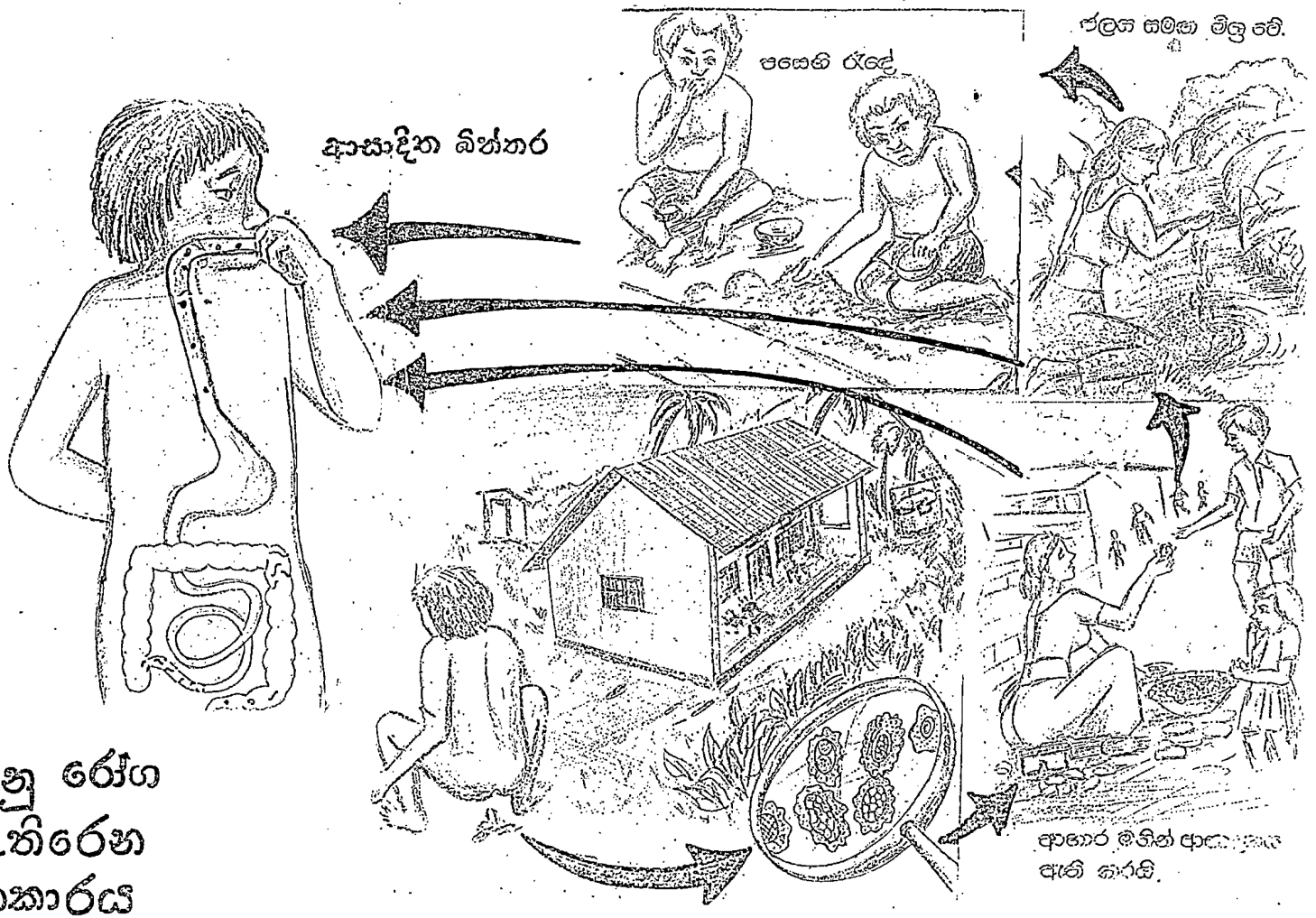
ANNEXURE 10



ANNEXURE 11

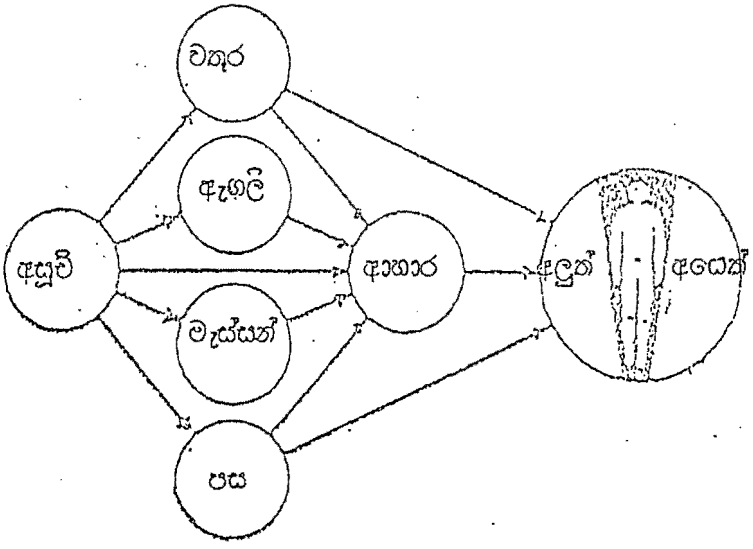

මේ පරපෝෂිතයෝ -
පසෙහි රැඳී මිනිසා වෙත යළි එක්වෙති.
ජලය සමග පැමිණ ආසාදන ඇති කරති.
ආහාර මගින් ආසාදන ඇති කරති.
වතුර උණුකර බීමෙන්
ඔබට ඒවා වළක්වා ගත හැකියි
වැසිකිලි පාවිච්චියෙන්
ආහාර ගැනීමට පෙර
අත් සබන් ගා සෝදීමෙන්
එළවළු පළතුරු
හොඳින් සෝදා ගැනීමෙන්
මැස්සන් හා වෙනත් සතුන්ගෙන්
ආහාර ආරක්ෂා කර ගැනීමෙන්
හොඳින් පිසූ ආහාර ගැනීමෙන්

ANNEXURE 12

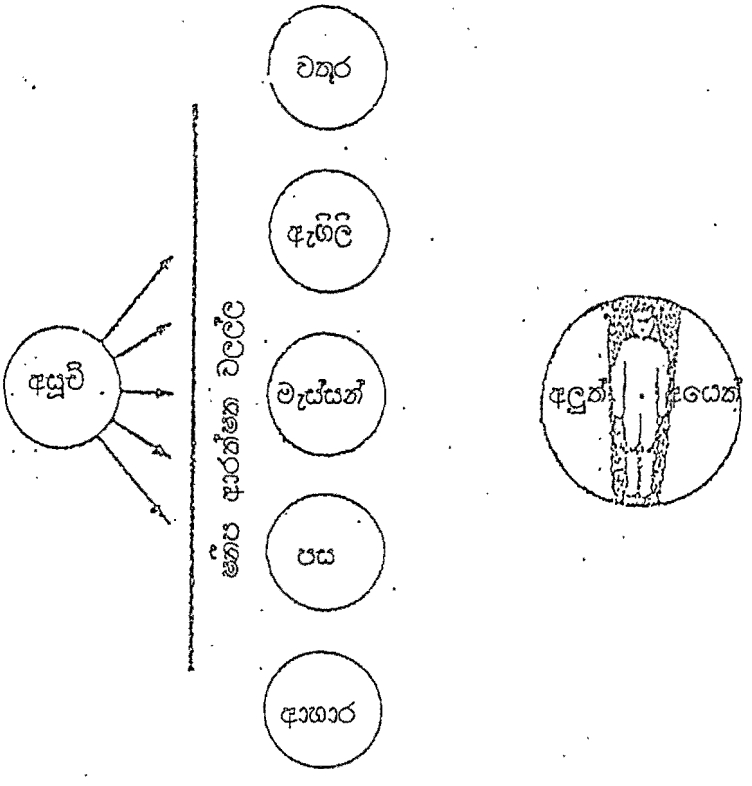


පනු රෝග පැතිරෙන ආකාරය

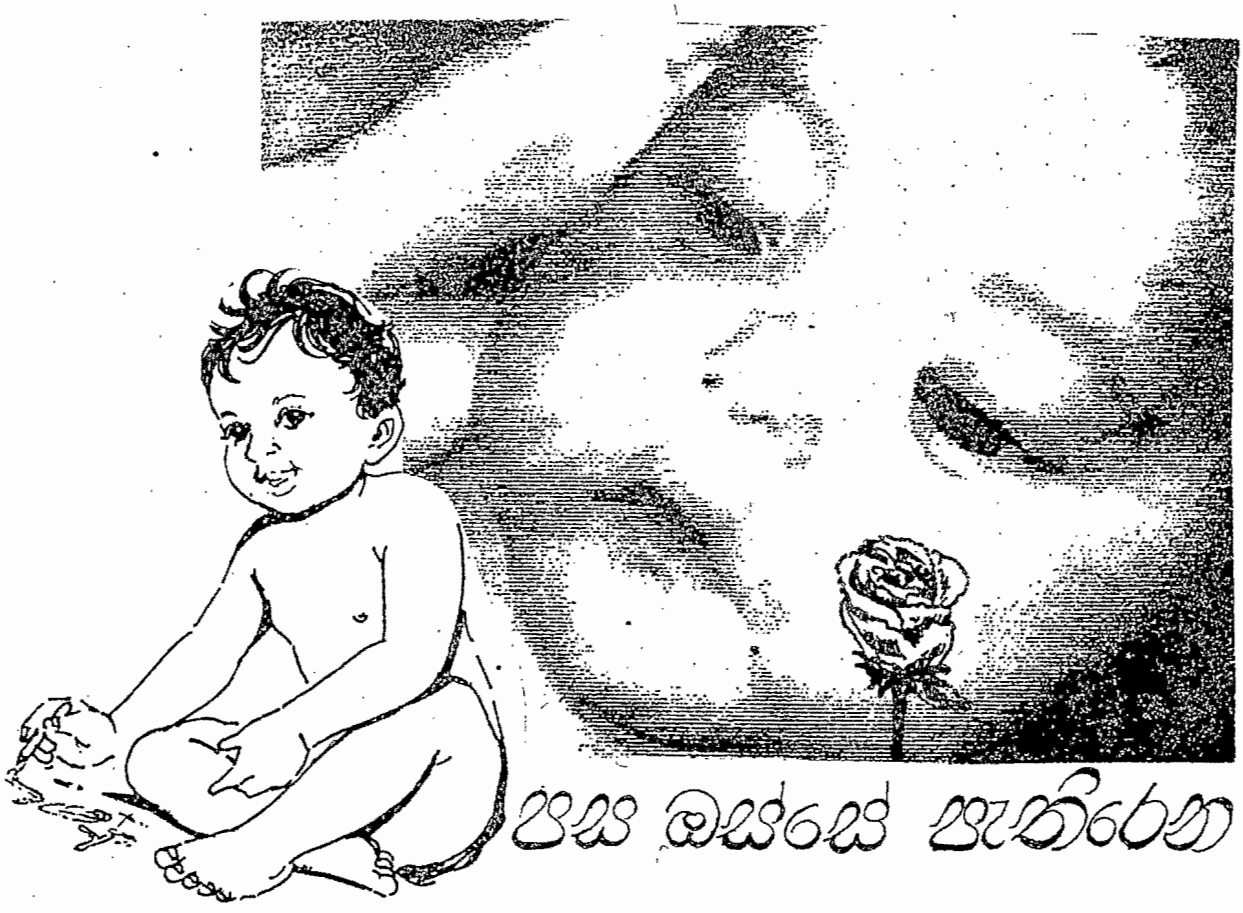
ANNEXURE 13



අසූචි වලින් වැළඳෙන රෝග ශරීරගත වන ආකාරය



අසූචි වලින් වැළඳෙන රෝග වලක්වන ආකාරය



පය වයසේ පැතිරෙන

ඌරාශ්‍රිත

පණු රෝග

මෙම රෝග වඩාත් වැදගත් වන්නේ මේවා ලංකාවේ සුලභව
ඒ වගේම ඔබට නිතර කරදර හෙනදෙන ඒවා වීම නිසාය.

i. වට පණු ආසාදනය.

වට පණුවෙක්

ii. කෂ පණු ආසාදනය

කෂ පණුවන්

iii. කොකුපණු ආසාදනය

කොකු පණුවන්

මේ පණු රෝග ගැන අප සැලකිලිමත් විය යුත්තේ ඇයි?

i. වට පණුවෝ පෝෂ්‍යදායී කොටස් උරා ප්‍රයෝජනයට ගන්නා නිසා අපගේ ආහාරයේ නියම ඵල භුක්ති විඳින්නෝය.

ii. කොකු පණුවෝ අප ආහාර මාර්ගයෙන් ලේ උරමින් අපට රක්තහීනතාවය ඇති කරවන්නෝය.

iii. වට පණුවන්, කොකු පණුවන් ඔවුන් ජීවිත කාලයෙන් කොටසක් අපගේ පෙනහලුවල ලැගුම් ගන්නා නිසා මොවුන් ගෙන් ශ්වසන පද්ධතියේ රෝග ඇති කළ හැකිය.

iv. කස පණුවෝ අපගේ ආහාර මාර්ගයේ බිත්තියට හානි කරමින් අපට ලේ සීදම් සමග පාචනය ඇති කරවා පමණක් නොව ආන්ත්‍රික රෝග වලට අප පහසුවෙන් ගොදුරු කරවන්නෝය.

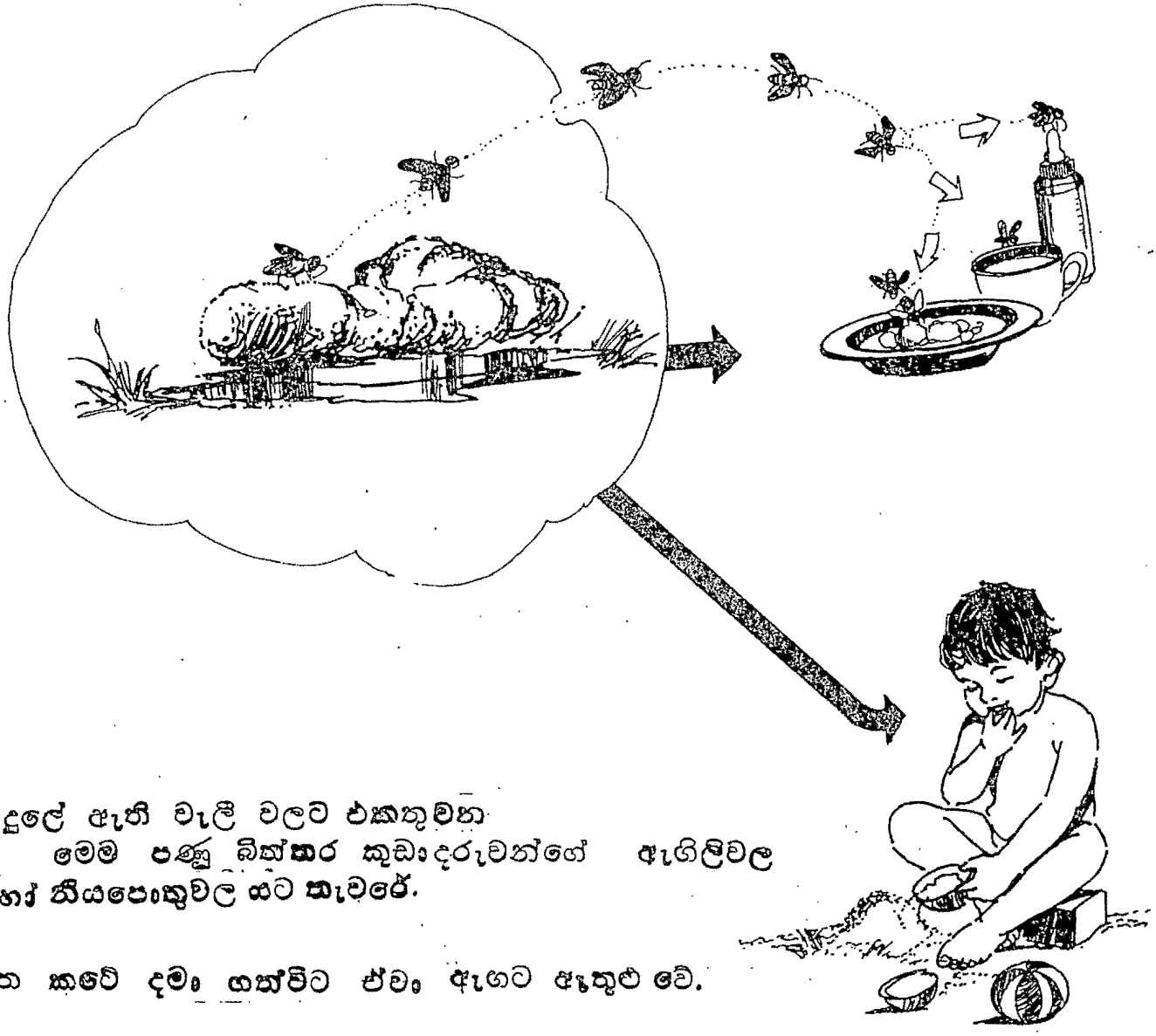
මීට අමතරව මෙම පණුවන් විවිධ රෝග ඇති කරමින් අපවැනි දුප්පත් රටවල අකල් මරණ සංඛ්‍යාව වැඩි කිරීමට බෙහෙවින් උපකාර වන බව ඔබ මෙතෙක් නොදැන සිටියාද?

මේ පණුවෝ උපදින විට අප ශරීරයේ සිටින්නෝ නොවෙති. එසේ නම් ඔවුන් අප ඇඟට ඇතුළු වන්නේ කොහොමද?

වැසිකිලි පාවිච්චි නොකොට එළිමහනේ මලපහ කළාම...

එම අසූචිවල ඇති වට පණු, කෂ පණු බිත්තර මැස්සන් විසින් අප කෑමට බීමට සන්නෘ අහාර වලට ගොසින් දමේ.

එම ආහාර කෑමට ගැනීමෙන් පණු බිත්තර ඇගට ඇතුලුවේ.

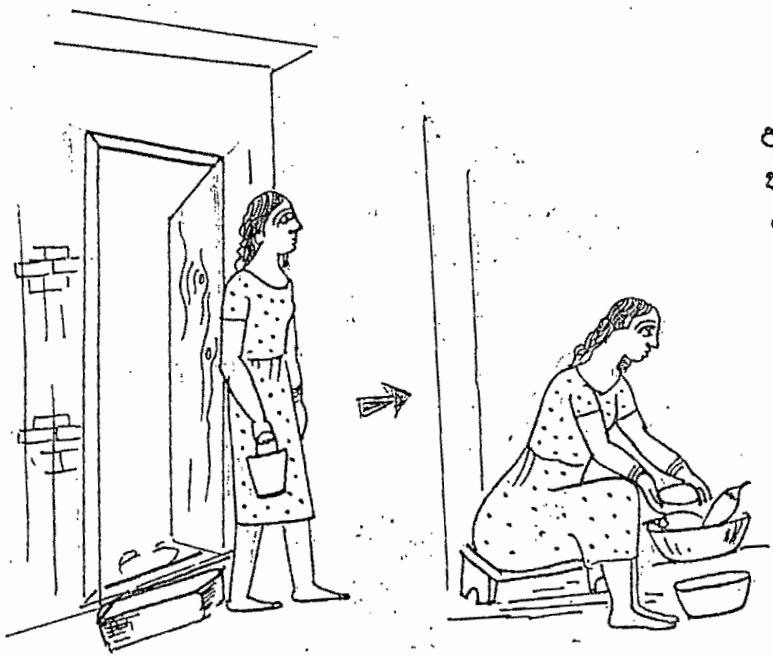


මිදුලේ ඇති වැලි වලට එකතුවන මෙම පණු බිත්තර කුඩා දරුවන්ගේ ඇඟිලිවල හෝ නියපොතුවල ඇට කැවරේ.

අප කවේ දමා ගත්විට ඒවා ඇගට ඇතුළු වේ.

මෙම පණු බිත්තර දිය පහර වලට ද එකතුවේ.
වතුර උණු නොකොට පානය කළ විට එම බිත්තර අප ඇඟට ඇතුළුවේ.
හොඳින් අවේරනය නොකරන ලද බඩ වතුර ගන්නා ලිං වල ද මෙම බිත්තර රැඳී තිබීමට පුළුවන.

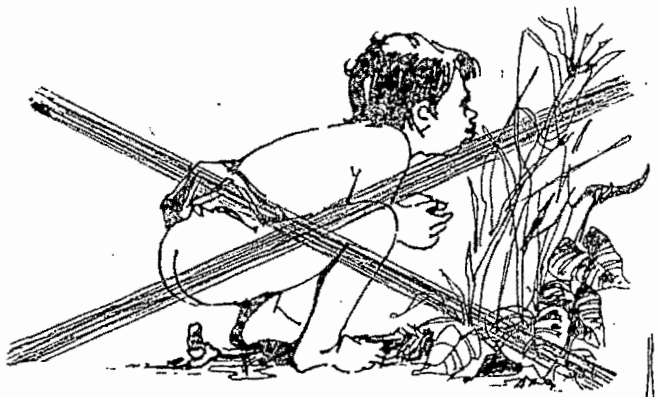
පොළොව මතින් අප ලබා ගන්නා පලා වර්ග, එළවළු හා පළතුරු මත ද මෙම පණු බිත්තර රැඳී තිබීමට පුළුවන.
හොඳින් නොසේදූ අමුවෙන් ඒවා ආහාරයට ගත් විට පණු බිත්තර එමගින් ඇඟට ඇතුළු වීමට පුළුවන



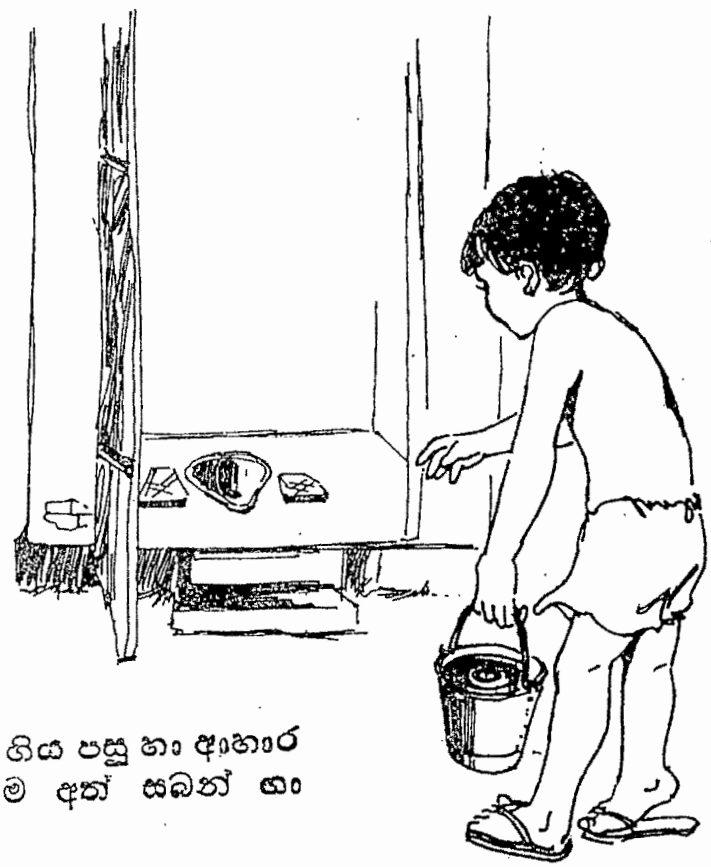
වැසිකිලි ගිය පසු හරිහැටි අත නොසෝදා ආහාර පිළියෙල කිරීමෙන් පණු බිත්තර ඇඟට ඇතුළු වන තවත් ක්‍රමයකි.

කොකු පණු පැටවුන් පසේ සිට ඇඟට ඇතුළු වන්නේ ඇඟිලි කරු හෝ යටි පතුල් විද ගෙනයි.

ඉතින් සබඳ, මේ පණුවන් ඇඟට ඇතුළු වීම අපි කෙසේ වළක්වා ගනිමු ද?



ගෙම්දුලේ මලපහ නොකෙරන්න ඔබේ දරුවන්ට පුරුදු කරන්න.



සනීපාරක්ෂක වැසිකිලි පාවිච්චියට පුරුදුවන්න.

එසේ කිරීමට ඔබේ දරුවාට පුරුදු කරන්න.

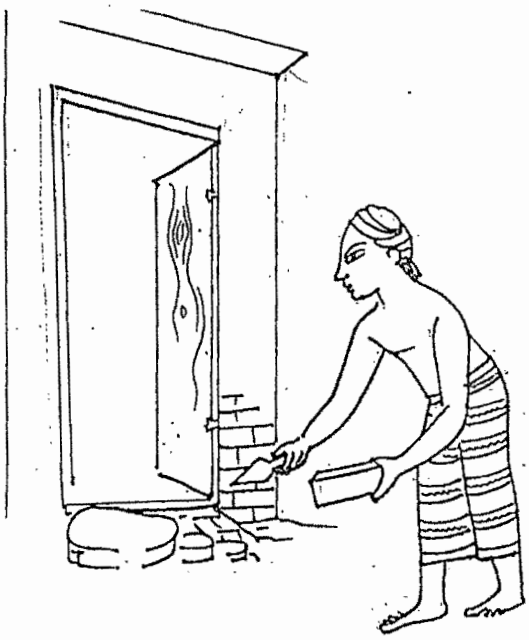
වැසිකිලි ගිය පසු හා ආහාර ගැනීමට ප්‍රථම අත් සබන් හා සෝදන්න.

දරුවන්ට ද එය පුරුදු කරන්න

මැස්සන් බෝවෙන කුණු
කසළ ගොඩවල් විනාශ කර දමන්න.

එළවළු හා පළතුරු හොඳින්
සෝදා ප්‍රයෝජනයට ගන්න.

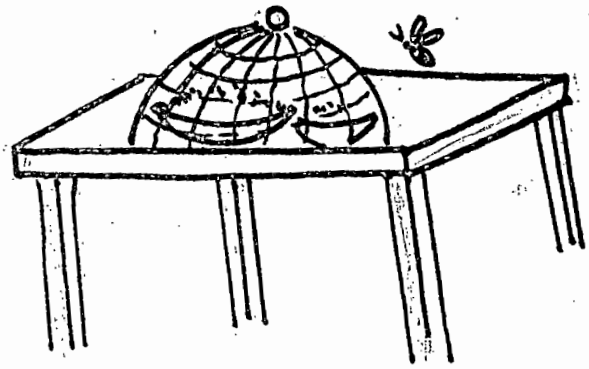
ඔබේ දරුවාගේ අසූචි වැසිකිලියකට දමීමට හෝ වලක් කපා වල දමීමට පුරුදු වන්න.

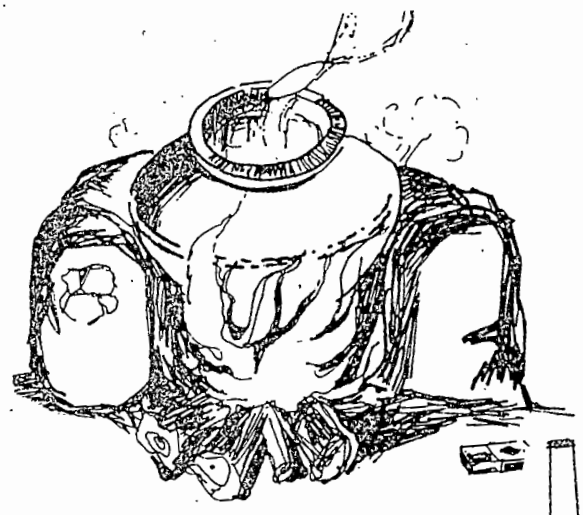


දැනට ඔබ නිවසේ වැසිකිලියක් නොමැති නම් ප්‍රදේශයේ සෞඛ්‍ය වෛද්‍ය නිලධරයාගේ ආධාර ලබමින් වැසිකිලියක් තනා ගැනීමට උත්සුක වන්න.

වැසිකිලි යන විට හා ගෙම්-දුලේ අපවිත්‍ර තැන්වලට යන විට පාවහන් පැළඳීමට පුරුදුවන්න.

පසුමෙන් පසු අංහාර
හොඳින් වසා තබන්න.





වතුර කොතරම් පැහැදිලි
වුවත් හොඳින් උණු කොට වසා
තබා පාවිච්චියට ගන්න.

ඔබේ දරුවාට හෝ ඔබට පණු රෝගයක් ඇතැයි ඔබ සැක සිතන්නේ නම්

වහාම වෛද්‍යවරයෙකු හමුවී
ප්‍රතිකාර හා උපදෙස් ලබන්න.

පණුවන් අප තුලට ඇතුළුවීම වලක්වා පණු රෝග වලින් අප සමාජය රැක ගනිමු.

නිරෝගිකම උතුම් සැපතයි.

නිරෝගී හෙට දවසකට අද උත්සුක වෙමු.

Annexure 15

STATISTICAL TEST

Standard Error of Difference between Two Proportions $= \sqrt{\frac{p_1 \times q_1}{n_1} + \frac{p_2 \times q_2}{n_2}}$

p_1 Percentage of 1st Sample
q_1 (100 - p_1)
p_2 Percentage of 2nd Sample
q_2 (100 - p_2)
n_1 Number in 1st Sample
n_2 Number in 2nd Sample