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F/ARC=83-045

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Date 2.11.83

ETHICAL REVIEW COMMITTEE, ICDDR,B.

Principal Investigator Dr. G.H. Rabbani  
Application No. ~~82-074~~ (Revised) 83-045  
Title of Study Nutritional impact of periodic deworming of young children in Bangladesh.

Trainee Investigator (if any) \_\_\_\_\_  
Supporting Agency (if Non-ICDDR,B) \_\_\_\_\_  
Project status:  
(X) New Study  
( ) Continuation with change  
( ) No change (do not fill out rest of form).

Circle the appropriate answer to each of the following (If Not Applicable write NA).

- 1. Source of Population:
  - (a) Ill subjects Yes No
  - (b) Non-ill subjects Yes No
  - (c) Minors or persons under guardianship Yes No
- 2. Does the study involve:
  - (a) Physical risks to the subjects Yes No
  - (b) Social Risks Yes No
  - (c) Psychological risks to subjects Yes No
  - (d) Discomfort to subjects Yes No
  - (e) Invasion of privacy Yes No
  - (f) Disclosure of information damaging to subject or others Yes No
- 3. Does the study involve:
  - (a) Use of records, (hospital, medical, death, birth or other) Yes No
  - (b) Use of fetal tissue or abortus Yes No
  - (c) Use of organs or body fluids Yes No
- 4. Are subjects clearly informed about:
  - (a) Nature and purposes of study Yes No
  - (b) Procedures to be followed including alternatives used Yes No
  - (c) Physical risks Yes No
  - (d) Sensitive questions Yes No
  - (e) Benefits to be derived Yes No
  - (f) Right to refuse to participate or to withdraw from study Yes No
  - (g) Confidential handling of data Yes No
  - (h) Compensation &/or treatment where there are risks or privacy is involved in any particular procedure Yes No

- 5. Will signed consent form be required:
    - (a) From subjects Yes No
    - (b) From parent or guardian (if subjects are minors) Yes No
  - 6. Will precautions be taken to protect anonymity of subjects Yes No
  - 7. Check documents being submitted herewith to Committee:
    - NA Umbrella proposal - Initially submit an overview (all other requirements will be submitted with individual studies) Protocol (Required)
    - X Abstract Summary (Required)
    - X Statement given or read to subjects on nature of study, risks, types of questions to be asked, and right to refuse to participate or withdraw (Required)
    - X Informed consent form for subjects
    - X Informed consent form for parent or guardian
    - X Procedure for maintaining confidentiality
    - Questionnaire or interview schedule \*
- \* If the final instrument is not completed prior to review, the following information should be included in the abstract summary:
- 1. A description of the areas to be covered in the questionnaire or interview which could be considered either sensitive or which would constitute an invasion of privacy.
  - 2. Examples of the type of specific questions to be asked in the sensitive areas.
  - 3. An indication as to when the questionnaire will be presented to the Cttee. for review.

We agree to obtain approval of the Ethical Review Committee for any changes involving the rights and welfare of subjects before making such change.

G. H. Rabbani  
Principal Investigator

Trainee

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SECTION 1 - RESEARCH PROTOCOL

TITLE: NUTRITIONAL IMPACT OF PERIODIC DEWORMING OF YOUNG CHILDRENS IN BANGLADESH.

PRINCIPAL INVESTIGATOR: Dr. G. H. Rabbani

CO-INVESTIGATORS: Dr. John Clemens, Dr. Asma Khanam, B. Kirkwood (School of Hygiene, University of London) Statistician  
Dr. A.H. Baqui & Mr. Emdad (Matlab)

STARTING DATE: November 1983

COMPLETION DATE: October 1984

TOTAL INCREMENTAL COST: US \$ 10,850.00

SCIENTIFIC PROGRAMME: This protocol has been approved by the Nutrition Working Group.

PROGRAMME HEAD: W.B.S.

DATE: 06.10.83

ABSTRACT:

From several villages in the Matlab VTS area, 750 children aged between 2-3 years having moderate to high worm load will be selected for periodic deworming (4 times a year) and nutritional follow up for one year. Children will be selected and screened for the presence of malnutrition and for ascaris and hookworm infection. On the basis of this initial prevalence survey, the magnitude of association between malnutrition and worm infestation, controlling for the potential confounding variables, will be estimated. In patients showing evidence of mild or moderate malnutrition (70%-89% of Harvard median of height for weight) as well as worm infestation, a clinical trial to assess the impact of deworming upon nutrition will be undertaken.

A randomized double-blind procedure will be followed for allocating deworming therapy to ascaris and/or Hookworm infected children. After one year, childrens will be compared in relation to their growth changes. This study is expected to provide important data to understand the complex host-parasite relationship and would be useful for developing mass therapy programs in the national health plans.

REVIEWS:

- (a) Research involving human subject: \_\_\_\_\_
- (b) Research Review Committee: \_\_\_\_\_
- (c) Director: \_\_\_\_\_

## SECTION II - RESEARCH PLAN

### A. INTRODUCTION:

#### A.1. OBJECTIVES:

To assess the nutritional impact of periodic deworming of young children in Bangladesh in relation to Ascaris and Hookworm infection.

#### A.2. BACKGROUND:

##### The Problem:

Ascariasis is a world wide problem, more than one quarter of World's Population in the developing areas are infected with one or more species of intestinal parasites, notably Ascaris and Hookworm (WHO, JOICEF 1980). The interaction between the human host and the parasite is a complex one and involves a multiplicity of confounding factors. However, it is generally agreed that massive helminthic infections produce an adverse effects on the status of nutrition. It is however not clear to what extent different grades of infection contribute to malnutrition in the community. Field studies should therefore be carried out to assess the effects of various parasites at varying levels of wormload upon status of nutrition. It is not known whether parasite control by mass treatment improves community nutrition.

The prevalence rate of Ascaris infection varies widely depending upon the socio cultural condition of the population studied and the surrounding environmental condition. In Bangladesh, uncontrolled observations indicate that the prevalence rate of Ascaris infection in hospitalized adult population is about 60% and that for Hookworm 80% (Rabbani and Gilman 1979, CRL Pub.No. 30). Data collected at the Matlab Field Station of ICDDR,B indicate an infection rate for Ascaris of 85%, Hookworm 44% and Trichuris 36% (Hossain et al 1981). It is presumed that with concentration technique the infection rate in children may be much higher. The above report also showed that the prevalence of Ascaris (65%), Hookworm (52%) and Trichuris (36%) was greatest among children 5-14 years age. Prevalence data on helminthic infection in Bangladesh has been given in the following table:

Prevalence of Ascaris and Hookworm infection in Bangladesh:

Source	Area	Hookworm	Ascaris
Kuntz, 1960	Around Dacca City	48%	66%
Begum NN, 1975	N. A.	51%	24%
N. Zaman et al, 1967	Mymensingh	50%	41%
Muazzam et al 1961	Rural Area	57% (all helminths)	
Huq N et al, 1974	Urban Dacca	15%	55%
Mackay et al,	Sylhet Tea State	9%	48%
Aftabuddin, 1973	Mymensingh	32% (combined infection)	
Muttalib, 1975	Dacca University students	7%	39%
Hossain et al, 1981	Matlab Surveillance area, ICDDR,8	44%	85%

Complete reference at the end.

Effects of Ascaris infection on hosts nutrition (clinical studies):

Ascaris infection affects the physiology of the host in several ways, the most important of which is the effects on nutrition. There is abundant clinical evidence to suggest that Ascaris may affect the host's nutrition in the several ways:

- a by competing with it for nutrients (Venkatachalam 1953),
- b by causing malabsorption of fat and carbohydrate (Tripathy et al, 1971),
- c by inhibiting digestive enzymes (Collier 1941, Thompson et al, 1952),
- d by inducing negative nitrogen balance (Platt et al, 1965, Jelliffe 1953, Bulatao-Jayme et al, 1966, Tripathy et al, 1971, Venkatachalam et al, 1953, Brown et al, 1980),
- e by interfering with vitamin absorption and utilization. (Sadun et al, 1950, Rodger et al, 1969, Jelliffe 1968; Singh 1968, Venkatachalam, 1966, Rocival et al, 1978, Sivakumar et al, 1975, Mahalanabis, 1979, Blumenthal et al, 1970),
- f by ingesting host's food in the intestine (Woodraf 1967, Li et al),
- g by directly damaging intestinal wall (Tripathy, Jelliffe 1953), and

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h by Toxic action on the smooth muscle of the intestine (Raba 1967, Guardiaola 1964).

A critical analysis of these studies would clearly indicate that presence of Ascarids in the intestine is most likely to lead to intestinal malabsorption and malnutrition. Indeed a good number of clinical studies have demonstrated this fact and indicated that therapeutic removal of ascarids from previously infected individuals resulted in increased food utilization and subsequent improvement in the status of nutrition. (Brown et al, 1980, Lagmdoye 1972). On the basis of these grounds the treatment of individual patient, particularly those with heavy infection remains naturally justified.

#### Hookworm infection:

The relationship between the Hookworm infection and iron deficiency anemia is well established. Earlier studies indicated that Hookworm infection could cause mal-absorption (Boycott et al), low vitamin utilization (Foster 1932, 1935) and decrease in nitrogen absorption (Darke et al, 1959). The blood loss produced by the worms was found to range from about 2 ml/day in lightly infested subjects to about 100 ml/day in subject with heavy infestation. Studies in Japan showed that lower serum iron level and decreased work ability has been associated with Hookworm anemia (Masuya 1980). Similar observation has been reported in sugar cane cutters and latex tappers in Indonesia. In Bangladesh, where the Hookworm infection is highly endemic and the population in general has low iron reserve, the deleterious effects of the infection can easily be conceived.

#### Trichuriasis:

Trichuris infection occurs through the fecal contamination of foods. The adult worm resides in the caecum or lower ileum where it attaches itself to the mucosa. In general, trichuriasis has been considered a relatively harmless parasite producing symptoms only when present in large numbers. However, several workers have reported iron deficiency anemia in children with heavy trichuris infection (Jung et al 1951, Larysee et al 1968). This has been attributed to blood loss from the gut, though it is much less compared to Hookworm infection. Larysee et al found that the mean daily fecal blood loss ranged from 0.8 to 8.6 ml in heavily infected children.

#### Community Studies:

At the community level, studies were undertaken to assess the nutritional impact of mass treatment in several countries, however the results obtained were conflicting. Field studies done so far are only few, some of them failed to show the expected improvement in nutrition after mass chemotherapy.

To our knowledge only few longitudinal studies were conducted in the recent past to examine the relationship between Ascariasis and malnutrition in children. Results of these studies are conflicting and have to be interpreted with great caution.

Gupta et al (1977) studied the effect of periodic deworming on the nutritional status of Indian preschool children in two villages, one of which served as control. The results showed that the nutritional status remained unaltered in the controls but improved strikingly in treated children 8 to 12 months after therapy. These results may be inconclusive because (a) the number of subjects studied is too small (154) to demonstrate the nutritional impact and in addition, (b) food supplementation was given to some of the children by a food aid program (UNICEF) which has directly influenced the outcome on nutrition. Moreover no information was taken on the magnitude of weight changes and intensity of infection which is an important parasite factor on nutrition. No other parameters except weight for age was taken to measure the changes in nutrition.

Willet et al, (1979) studied Tanzanian preschool children who were randomly assigned to a levamisole or placebo treatment which was given at 3 months interval. The authors reported that in children infected with *Ascaris*, the rate of weight gain was 21% greater in treated than in untreated children. However, the sample size was small and the difference was only marginally significant. They have used levamisole which is a broad spectrum antihelminthic and probably has taken care of many other parasites too.

Freij et al, (1979) studied Ethiopian children with Ascariasis and reported that antihelminthic treatment did not produce any evidence of improved intestinal morphology and absorption of nutritional elements. Therapy had no impact on anthropometric measurements in an additional study group of children. The major deficiency of the study is the smallness of the sample size (only 13 and 84 in two trials). The intensity of infection was very mild which might have influenced the nutritional outcome.

Shah et al, (1975) studied the effect of periodic deworming on the nutritional status of 320 Indian preschool children in a study and control village in Bombay. The authors reported that the impact of periodic deworming on the nutritional status of the children could not be proved significant. This observation is not convincing because the children were followed up only for 3 months, the placebo treatment contained folic acid and iron, wormload was not determined and nutritional status was measured by direct weight changes only.

Stephenson et al, (1980) performed a similar study in 375 Kenyan preschool children and reported that after deworming, previously infected children showed a better weight gain than the controls. Skinfold thickness

also showed significant improvement after treatment. The authors conclude that *Ascaris* infection adversely affects the nutritional status and therefore periodic deworming is highly recommended. However, the study design was not precise since the authors selected the initially negative children as their own controls and removed those children from the final analysis who later contracted the infection.

Greenberg et al, (1981) treated 185 Bangladeshi *Ascaris* infected children with a single dose of piperazine and followed them nutritionally for 7 months. No difference was found between the treated and non treated group. A single dose of treatment was given and the cure rate was 31-53%. This indicates partial removal of worms, one would not expect significant improvement in nutrition from this kind of therapy. Children with heavy infection are most likely to benefit from such treatment, however the number of such children were too small in the study.

Results of these studies were summarised in the following table:

#### Nutritional Impact of Deworming

Authors	Place/Time	Effect on Nutrition	Study design
Gupta et al	India (1977)	+	-
Stephenson et al	Kenya (1980)	+	+
Freij et al	Ethiopia (1979)	-	-
Shah et al	India (1975)	-	-
Willet et al	Tanzania (1979)	+	-
Greenberg et al	Bangladesh (1981)	-	+

#### COMMENT:

All these studies must be considered inconclusive because they examined very limited population and because most of the experimental design lacked precision.

A comprehensive review of available literature on parasitic infection and malnutrition was done by the recent seminar "On parasite control in the prevention of malnutrition", jointly organized by WHO, UNICEF, Japanese organization for International Cooperation in Family Planning (JOICEF) and Japan Association of Parasite Control (JAPC) 1980. After careful review of the current knowledge the committee agreed:

"THAT THE RELATIONSHIP BETWEEN INFECTION BY THE SOIL-TRANSMITTED HELMINTHS AND NUTRITION DEFINITELY EXISTS, BUT THE EXTENT OF ITS CONTRIBUTION TO THE GENERAL PROBLEM OF MALNUTRITION IS NOT WELL UNDERSTOOD: SPECIALLY PRECISE INFORMATION IS LACKING ABOUT THE EFFECT THAT PARASITE CONTROL THROUGH PERIODIC DEWORMING WOULD HAVE ON THE STATE OF NUTRITION".

"...THEREFORE THE ASSEMBLED RECOMMEND THAT A WELL DESIGNED EPIDEMIOLOGICAL STUDY OF THE EFFECT OF PERIODIC DEWORMING ON NUTRITION BE CONDUCTED ...".

And this is what has been planned in the present protocol.

### A.3. RATIONALE:

Parasitic infestations are thought to be a very common health problem in developing countries. Much has been talked about this problem but little has been done. Still we do not definitely know to what extent each individual helminth can impair growth in a developing child. However many programs have been launched on the assumption that deworming would improve nutrition. At this point it is essential to answer the question that to what extent a parasite control program, through periodic deworming would have on the status of nutrition. This information are crucial for the formulation of a national health policy.

### B. SPECIFIC AIMS:

1. The primary aim of this study is to determine if there is any significant improvement in nutrition after repeated deworming of the helminth infected children.
2. However, the data obtained during the course of the study will, also be available for answering the following secondary questions.
  - (a) determination of prevalence and incidence of ascaris and hookworm infections in children 2-3 years age.
  - (b) determination of the magnitude of association between malnutrition and intestinal parasites using the initial prevalence survey data.
  - (c) correlation of fecal egg excretion with the number of worms expelled and weight of the worms (biomass) and
  - (d) identification of species (*Ancylostoma* and *Necator*) of hookworm.



## C. METHODS AND PROCEDURES (REVISED):

### C.1 Study village:

The study will be conducted in the Matlab field surveillance area of ICDDR,B. This field unit has an excellent organizational set up to conduct field surveys, particularly those requiring frequent home visit. Matlab hospital will provide all clinical facilities and will act as a centre for patients referral. The demographic surveillance system at Matlab keeps an updated record of all vital events from which an accurate base line data including the age of the child can be determined. A recent survey indicates that the area has high infection rates of intestinal parasites, 70% of children below 4 years has ascaris, 36% hookworm and 33% trichuris, only 22% were helminth free (Hossain et al 1981).

### C.2 Patients selection:

#### C.2.1 Sampling frame:

The sampling frame for selection of patients will comprise 8-10 villages under the Matlab VTS area. From these villages all children aged between 2-3 years will have their stool examined to select 750 study children.

#### C.2.2 Eligibility:

Eligibility criteria for the study subjects will include.

- (a) age between 24-36 months.
- (b) nutritional status (weight for height) below 80% of the Harvard median.
- (c) stool examination yielding either ascaris or hookworm ova.
- (d) subjects will be excluded from the study if severe malnutrition is evident i.e. below 60% of Harvard median or if the stool specimen is positive for cyst or trophozoites of E. histolytica or G. lamblia. Subjects will not be included into the study if consent for participation is not given.

### C. 3 Recruitment of patients:

1100 appropriately aged children from the designated villages will be screened for the following information after appropriate consent is given.

- (a) Nutritional status (height, weights, triceps skin-fold thickness, mid-arm circumference and cranial diameter):
- (b) Single-stool examination for ova and parasites.

For children meeting the eligibility requirements mothers will also be questioned about:

- (a) medical histories regarding recent illnesses effecting nutrition (i.e., measles, diarrhoea, serious respiratory infections).
- (b) current dietary history, as well as any recent changes in dietary habits.
- (c) family socio-economic status.
- (d) family size, birth order of child, and mortality experience of other children in the family.

These data will serve to characterise the base-line status of the children participating in the field study. In addition, a consecutive subsample of 320 children will be similarly characterized for the purpose of assessing the magnitude of association between worm infection and malnutrition. This will detect an odds-ratio for the association of at least 2, with adequate (0.8) statistical power. It should be noted here that the measure of nutrition used to ascertain eligibility (wt for ht) is thought to represent acute wasting and hence should be a suitable measure of response to both worm-infestation and chemotherapeutic deworming.

### C. 4 Allocation to therapy:

Screening should yield 750 children with ascaris alone and similar number with both ascaris and hookworm only. Each etiologic subgroups will then be allocated, according to a balanced random number scheme to the following therapies:

- A. children with ascaris only  $\left\{ \begin{array}{l} \text{pyrantel} \\ \text{placebo} \end{array} \right.$
- B. children with ascaris and hookworm  $\left\{ \begin{array}{l} \text{pyrantel} \\ \text{placebo} \end{array} \right.$

Children in each group will be further subdivided into three subgroups on the basis of intensity of infection.

Intensity of infection will be defined as light, moderate and heavy depending on the number of eggs per gram of feces.

C. 5 Therapeutic regimens and monitoring:

C.5.1 Treatment procedures:

After the completion of preparatory phase administration of deworming drugs and placebo will take place at 3 monthly intervals. On the first week of the month, 750 children will be treated, during the second week stool will be re-examined and over the third and fourth week anthropometric measurements will be taken.

<u>Preparatory phase</u> (3 months)	<u>1st visit (0 month)</u> Rx 1	<u>2nd visit (3 month)</u> Rx 2
- base line data	- stool exam.	- stool exam.
- anthrop.	- worm counting	- anthrop.
- stool screening		
- staff training		
<u>3rd visit (6 month)</u> Rx 3	<u>4th visit (9 month)</u> Rx 4	<u>5th visit (12 month)</u> Rx 5
- stool exam.	- stool exam.	- stool exam.
- anthrop.	- anthrop.	- anthrop.

C. 6 Follow-up:

Total follow-up period for the trial will be one year after initial implementation of therapy. Follow-up will be conducted so that neither the investigator team nor the subjects are aware of the identity of the therapeutic agents employed. A code for the agent will be kept in a locked file in the Matlab pharmacy. In case of a suspected serious reaction to therapy, the patient will be withdrawn from the trial at the time.

## C. 7 Field procedures:

### C.7. 1 Field questionnaires:

Standardised questionnaire composed in Bengali will be administered to appropriate subjects to determine dietary habits, socio-economic status and medical histories. All field-workers will be trained in the use of the questioner and a random sample of the question, will be repeated by the supervisors to ascertain its accuracy.

### C.7. 2 Anthropometry:

Weight, height, arm-circumference and triceps skin-fold thickness will be measured by the field-workers after an initial training period. (Appendix 1). All weights will be measured to the nearest 50 gm using a 25 gm salter scale calibrated daily. Body length will be measured to the nearest 1 cm on a locally constructed two track length board. Left mid-arm circumference will be measured by oil-cloth tailor's tape to the nearest 0.1 cm. Triceps skin-fold calipers will be employed to measure skin fold thickness. Two-person teams will perform all measurements.

### C.7. 3 Method of stool examination:

KATO thick smear technique: (WHO 67, KATO 68): For egg excretion studies, Kato thick smear technique will be used to count number of eggs present per gram of stool. Kato technique is a very simple but efficient method for ova counting and had been extensively used for schistosomiasis surveys in Japan and African countries. In this technique an estimated amount of faeces (50-70 mg) is placed on a glass slide and covered with a glycerin soaked cellophane paper cut into the size of a cover slip and examined under the low power microscope. The count in the whole field can be expressed as number of eggs per gram of faeces (Appendix V, VI).

At the ICDDR,B pathology laboratory, I have standardised this technique using commercially available test kits OVA-FEC (Bohringer Lab, Riode Janeiro). The method gave satisfactory and reproducible results with Hookworm, Ascaris and Trichuris ova. In the fields stool will be collected in pre-marked containers and examined the same day.

### C. 8 Treatment and benefit of the subject:

Children who are heavily infected and having symptomatic disease such as vomiting of worms or intestinal obstruction due to the presence of Ascarids will be given appropriate form of therapy. If required hospitalized care will be provided. In addition, general health care facilities will be provided to the members of the family or the study children free of cost. All control children will be dewormed at the end of the study.

### C. 9 Data Analysis:

#### C.9. 1 Prevalence survey:

To assess the association between worm infestation and malnutrition, each child in the prevalence study will be categorized as significantly malnourished ( $\leq 79\%$  of Harvard median weight for height) or not, and as infested or not. Association between specific infestations and malnutrition will be assessed as a prevalence odds ratio. Control for confounding variables such as age, sex, socioeconomic status and dietary history will be made using multivariate modelling with logistic regression.

#### C.9. 2 Deworming trial:

The basic analysis will assess whether antihelminthic therapy provides a significant increase in the nutritional status (defined as  $\geq 10\%$  of Harvard median of weight for height over the one year period. Simple analysis will employ chi-square test for this comparison. Multivariate analysis accounting for any baseline inequalities in the compared groups will employ a logistic regression model.

We will also examine transition of other nutritional measurements (weight/age, height/age, arm circumference/age, arm-circumference/height, Wt/Q, Ht/Q etc) using similar statistical techniques.

#### C.9. 3 Relationship between egg-count and worm burden:

A correlation co-efficient ( $r$ ) will be calculated to examine the relationship between these two variables. The value of  $R^2$  will indicate the proportion of the variance in worm-load explained by egg counting. Linear regression will also be performed to assess the magnitude of the coefficient ( $p$ ) describing the prediction of worms burdens by egg counts.

D. Significance:

(- See Rationale).

E. Facilities required:

Office space	: Present office space will be used.
Laboratory space	: Existing laboratory space will be utilized.
Hospital source	: Matlab Hospital will be used.
Animal resources	: None.
Logistic support	: Data processing at the ICDDR,B Computer centre will be done.
Major equipment	: None.
Others	: None.
Transport.	: Transport will be needed to move between the field and the Laboratory.

F. Collaborating Arrangement: None.

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## SECTION - III

BUDGET

## PERSONNEL SERVICES:

Personnel services	Position	% effort	Annual salary (Taka)	Project requirement (Taka)
Dr. G.H. Rabbani	Principal Investigator	20%	6,700.00	20,000.00
Dr. John Clemens	Co-Investigator	5%	-	-
Field supervisor (Matlab)		20%	-	10,000.00
Dr. R. Muller (Helminthologist, London)			No cost involved	
Dr. B. Kirkwood (Statistician, London)			No cost involved	
Dr. M. Rahaman	Consultant		No cost involved	
			Sub Total:	Tk. 30,000.00

Field staffs:

Microscopist (one)	Tk. 1000.00/month	Tk. 18000.00
Field worker (one male)	Tk. 750.00/month	Tk. 13500.00
Field worker (one female)	Tk. 750.00/month	Tk. 13500.00
Field Asstt. (one)	Tk. 750.00/month	Tk. 13500.00
Boatman (one)	Tk. 500.00/month	Tk. 9000.00

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 Sub Total: Taka = 67,500.00

SUPPLIES:

Microscope slides (1000 pc)	\$ 200.00
Laboratory reagents/supplies	\$ 200.00
Pyrantel palmoate (1200 doses) plus Placebo	Provided by Pfizer
Plastic stool cups (200 pcs, reusable)	\$ 200.00
Printing and publication	\$ 200.00
Weighting balance/Measuring board (Existing) Skinfold calipers	\$ 1000.00
Piperazine + Placebo	\$ 200.00
Stool-test kits (from Brazil)	\$ 1000.00

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Sub Total \$ 3,000.00

EQUIPMENTS:

Microscope 1 (one) \$ 2000.00

PATIENT HOSPITALIZATION:

50 pts X 2 day X Tk. 160 = Tk. 16000.00

OUTPATIENT CARE: None

TRANSPORT:

Dhaka-Matlab trip + Boat trip in Matlab = Tk. 5000.00

TRAVEL AND TRANSPORTATION OF PERSONS: None

TRANSPORTATION OF THINGS: None

IMPORT: None

RENT, COMMUNICATION & UTILITIES: None

PRINTING AND REPRODUCTION: = Tk. 3000.00

CONTRACTUAL SERVICES:

Computer time \$ 1000.00

D. BUDGET SUMMARY

<u>Category:</u>	<u>US \$</u>	<u>Taka</u>
1. Personnel services	-	97,000.00
2. Supplies	3,000.00	-
3. Equipments (microscope one)	2,000.00	-
4. Patients Hospitalization	-	16,000.00
5. Out patient care	-	-
6. Transport	-	5,000.00
7. Travel of persons	-	-
8. Transport of Things	-	-
9. Rent/Communication	-	-
10. Printing/Reproduction	-	3,000.00
11. Contractual services (Computer)	1,000.00	-
	<u>US \$ 6,000.00</u>	<u>Tk. 1,21000.00 = \$ 4,850.00</u>

Grand Total = US \$ 10,850.00

Appendix - I

Deworming study

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Case No. \_\_\_\_\_

Complaint	Date	Date	Date	Date	Date	Date
Diarrhoea						
Loose						
Liquid						
Watery						
Blood						
Mucus						
Vomiting						
Dehydration						
Fever						
Temp.						
Nasal disch.						
Cough						
Skin rash						
Ear pus						
Anorexia						
Measles						

Treatment: Physician /\_\_\_/ Quack /\_\_\_/ Homopath /\_\_\_/  
CRL Hospital /\_\_\_/ Others /\_\_\_/

Deworming drugs from other sources: \_\_\_\_\_

Appendix - II

DIETARY HISTORY

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Case No. \_\_\_\_\_

Drug code: \_\_\_\_\_ Date of visit: \_\_\_\_\_ Location: \_\_\_\_\_

No.s of meals cooked per day: \_\_\_\_\_ Breast milk: \_\_\_\_\_

Snacks consumed per day: \_\_\_\_\_

	<u>Food item</u>	<u>Estimated amount</u>
1. <u>Breakfast:</u>	Rice (panta)	____/____/____
	Bread	____/____/____
	Muri	____/____/____
	Chira	____/____/____
	Milk	____/____/____
	Banana	____/____/____
	Curry	____/____/____
	Egg	____/____/____
2. <u>Lunch:</u>	Rice	____/____/____
	Veg. curry	____/____/____
	Bread	____/____/____
	Dal	____/____/____
	Fish	____/____/____
	Meat	____/____/____
	Gur	____/____/____
	Other specify	_____
3. <u>Supper:</u>	Rice	____/____/____
	Veg. curry	____/____/____
	Bread	____/____/____
	Dal	____/____/____
	Fish	____/____/____
	Meat	____/____/____
	Milk	____/____/____
	Others (specify)	_____

Appendix - IITIME SCHEDULE FOR FIELD WORKERS(No.s Field staffs = 3, Supervisor = 1)1st week of the month: (Drug administration):

One worker will treat 33 children in one day

3 workers will treat 100 children/day

3 workers will treat 600 children in 6 days.

2nd week of the month: (Stool examination):

One microscopist will examine 50 stools/day  
(one Kato test takes 6-10 min)

For 300 stool specimens (treated case only) = 6 days.

3rd week of the month: (anthropometry):

3 workers will cover 50 (approx) children per day

600 children will be covered = 12 days.

4th week of the month:

During the 4th week and in between they will record the clinical data by home visit. The work of the Field staff will be checked by the supervisor twice weekly.



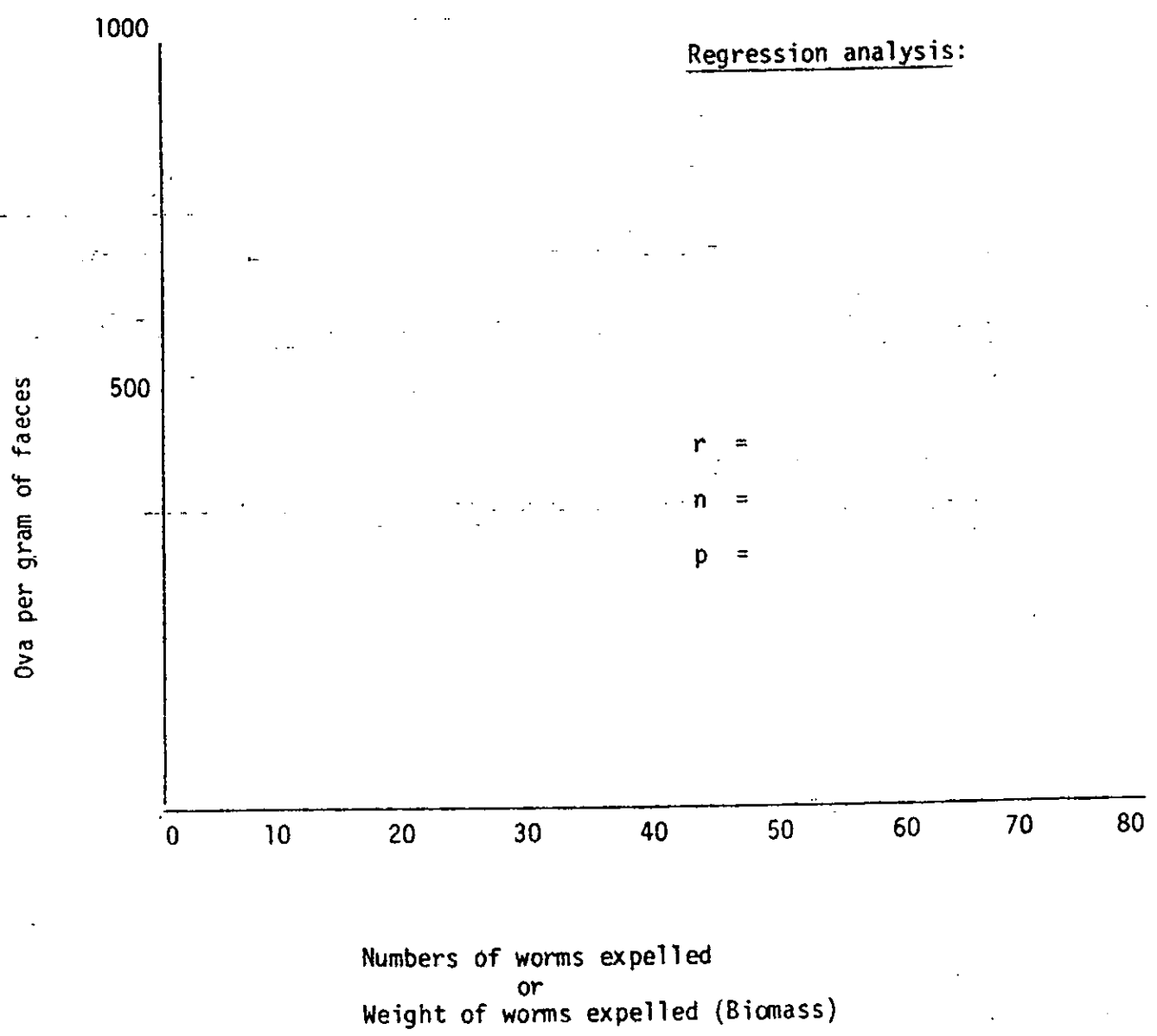
Stool examination for parasites, visits 1-5

Parasites	Visit 1 control treated	Visit 2 control treated	Visit 3 control treated	Visit 4 control treated	Visit 5 control treated
<u>Ascaris ova</u>					
Light					
Moderate					
Heavy					
<u>Hookworm ova</u>					
Light					
Moderate					
Heavy					
<u>Trichuris:</u>					

Appendix - LV

Appendix - V

Figure: Relationship of ova count to number of worms expelled after therapy



Appendix - VI

Anthropometric measurement  
(Study and control sample)

Parameter	Group (n)	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5
		Mean ± SD				
Weight (kg)	Control					
	Study					
Wt/Age (%)	Control					
	Study					
Height (cm)						
Ht/Age (%)						
Arm circumf (cm)						
Arm cirf/Age (%)						
Skin fold (mm)						
Skin fold/Age (%)						

Appendix - VIIDeworming studySocio-economic data

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Case No.: \_\_\_\_\_

Tot. Nos. of individuals in the family: \_\_\_\_\_

Level of education: Father /\_\_\_/ Illiterate /\_\_\_/ Prim. school /\_\_\_/  
 Mother /\_\_\_/ Illiterate /\_\_\_/ Primary school /\_\_\_/

Monthly income of Head of Family: \_\_\_\_\_

Occupation: Farmer /\_\_\_/  
 Labour /\_\_\_/  
 Business /\_\_\_/  
 Others /\_\_\_/

Defecation Habits: Open field /\_\_\_/  
 Privy /\_\_\_/  
 Bush /\_\_\_/

Water source: Tube well /\_\_\_/  
 Pond /\_\_\_/  
 Well /\_\_\_/  
 River /\_\_\_/

Type of Housing: \_\_\_\_\_

Table - 1

DISTRIBUTION OF NUTRITIONAL INDICATORS BY WORM LOAD FOR  
CASE-CONTROL GROUPS

Worm load		wt/age				ht/age			wt/ht				
		-2 SD <sup>a</sup>	-2 SD -1 SD	-1 SD Median (P)	X <sup>2</sup>	-2 SD	-2 SD -1 SD	-1 SD Median (P)	X <sup>2</sup>	-2SD	-2 SD -1SD	-1SD Median (P)	X <sup>2</sup>
Severe	Case												
	Control												
Moderate	Case												
	Control												
Low	Case												
	Control												
Total	Case												
	Control												

<sup>a</sup> Classes refer to NCHS Standard.

Table - 2

PREVALENCE OF MALNUTRITION IN CASE AND CONTROL GROUPS  
AT DIFFERENT ROUNDS

Nutritional indicator	Round	Proportion* Malnourished		X <sup>2</sup>	P
		Case	Contr.		
Wt./age	1				
	2				
	3				
	4				
Ht./age	1				
	2				
	3				
	4				
Wt./age	1				
	2				
	3				
	4				

\* Malnutrition is defined as the proportion of children in the population falling below the median - 2 SD by comparison with the reference population.

Table - 3

CENTILE DISTRIBUTION OF NUTRITION INDICATORS

Worm load	wt/age										+	ht/age										+	wt/age									
	10	20	30	40	50	60	70	80	90	10		20	30	40	50	60	70	80	90	10	20		30	40	50	60	70	80	90+			
Severe	Case																															
	Contr.																															
Moderate	Case																															
	Contr.																															
Mild	Case																															
	Contr.																															

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+ Upper bound of centile class.

ABSTRACT SUMMARYField studies to determine the nutritional effect of deworming of preschool children in rural Bangladesh

1. This study will be conducted in 750 children aged 2-3 years in the Matlab field area. 375 children in the village will be periodically treated with pyrantel palmonate 4 times a year while the other 375 will serve as control. Age, height, weight and other anthropometric measurements will be taken and followed up for 12 months period. Stool will be examined for Hookworm and Ascaris ova 4 times a year. In 50 selected children worms will be counted after expulsion in the faeces. Ascaris and/or hookworm infected children will be the subjects of this study.
2. Children will be treated with pyrantel palmoate which is safe drug and has little undersirable side effects. The study involves no risk as to the psychological, social, legal or other aspects of the subject. The fundamental procedure is to collect stool samples and give treatment for the parasites.
3. Ascaris and hookworm infected children under the study surveillance will be closely supervised by the field workers. Medical attention will be provided if there is any need.
4. Data collected will be computerized and confindentiality will be maintained. All data will be abreaviated and will be published without reference to the subjects name and identity.
5. Informed written consent will be obtained from the parents/legal guardian of the children at the time of admitting into the study.
6. No personal interview except relevant history of illness will be taken.
7. The direct benefit to the subject will be the cost free treatment of Hookworm and Ascaris infection. The long term social benefit may be the formulation and implementation of national parasite control program in the country.
8. No retrospective hospital records will be used. No biological specimens except stool will be taken from the subjects.



Deworming study (Matlab)Consent form

I understand that International Centre for Diarrhoeal Disease Research, Bangladesh is carrying out a community research to determine the nutritional effect of periodic treatment of Ascaris and Hookworm infection of children. I also understand that my child has been found infected with intestinal worms (ascaris and/ or hookworm) and may be included into the study if I wish. The child will have his/her height, weight, and body measurements taken at regular intervals of 3 months for one year. Stool samples will be collected and examined for intestinal worms 4 times a year. The child will unpredictably receive treatment with Pyrantel (1 dose). The child may also get treatment with identical preparation as the drugs, but without the active ingredients (Placebo), this will not cure the worms. Each child will be treated for worms 4 times a year at 3 months intervals. All worms, however will be effectively treated using active drug afterwards. At the end of the study all infected children will be dewormed. Expelled worms will be collected. Treatment of diarrhoeal illness and general medical care will be provided free of cost to the study subjects.

I also understand that I always preserve the right to have my child join in the study or withdraw from the study at any time.

I agree that my child be included into the study.

Signature of Investigator:

Signature/Left Thumb impression  
of patient's Guardian.

Date: \_\_\_\_\_

(দৈনিক গুটির উপর কৃষি চিকিৎসার প্রভাব)

সম্মতি পত্র

=====

আমি অবগত হইয়াছি যে আমার সম্মতের (ছেলে বা মেয়ে) পেট কৃষি (জিঙ্ক) দ্বারা আক্রান্ত হইয়াছে (নতুন অথবা বৃদ্ধ কৃষি)। এই গবেষণা প্রকল্পে অংশ গ্রহণ করিলে আমার সম্মতের পায়খানা পরীক্ষা করা হইবে। এবং প্রয়োজন যোতাবেক বৎসরে চার বার কৃষি বিলকামনের ঔষধ দেওয়া হইবে। যদি আমার সম্মত কনট্রোল গ্রুপে পড়ে তবে তাহাকে বৎসরে চার বার এমন ধরনের ঔষধ দেওয়া হইবে, কৃষির উপর বাহার ফল দ্বিগুণ নাই (PLACEBO)। তবে বছরের মধ্যে সবসময়েই ঔষধের দ্বারা সিকিৎসিত করা হইবে। এক বৎসর পর গবেষণা শেষ হইলে সবসময়েই ঔষধের দ্বারা কৃষিহীন করা হইবে। সম্মতের দৈনিক উচ্চতা, ওজন ও শরীরের বিভিন্ন অংশের পরিমাণ বৎসরে চার বার লওয়া হইবে। সম্মতের অন্য কোন প্রকার অনুল্লেখ্য দেরা দিনে তাহারও কিনা বরচে চিকিৎসাদি করা হইবে। আপনার সম্মতের গবেষণায় অংশগ্রহণ করা বা না করা সম্পূর্ণ আপনার ইচ্ছার উপর নির্ভর করে।

ইচ্ছা করলে যে কোন সময় গবেষণা থেকে আপনার সম্মতকে প্রত্যাহার করে নিতে পারেন।

আমার সম্মতকে এই গবেষণায় অংশগ্রহণ করার জন্য আমি স্বেচ্ছায় ও সুজ্ঞানে যত্ন পিতাম।

সম্মতের নাম-----

পিতার নাম/স্বাক্ষর-----

গবেষকের স্বাক্ষর

তারিখ-----