

Principal Investigator W.F.J. HENRY
 Application No. 86-029
 Title of Study Epidemiological Studies of Morbidity + Malnutrition in Urban + Rural Bangladesh

Trainee Investigator (if any) _____
 Supporting Agency (if Non-ICDDR,B) FAO
 Project status:
 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).

- Source of Population:
 - (a) Ill subjects Yes No
 - (b) Non-ill subjects Yes No
 - (c) Minors or persons under guardianship Yes No
- 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
- 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
- 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

- Will signed consent form be required:
 - (a) From subjects Yes No
 - (b) From parent or guardian (if subjects are minors) Yes No
 - Will precautions be taken to protect anonymity of subjects Yes No
 - Check documents being submitted herewith to Committee:
 - Umbrella proposal - Initially submit an overview (all other requirements will be submitted with individual studies)
 - Protocol (Required)
 - Abstract Summary (Required)
 - 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)
 - Informed consent form for subjects
 - Informed consent form for parent or guardian
 - 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:
- 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.
 - Examples of the type of specific questions to be asked in the sensitive areas.
 - An indication as to when the questionnaire will be presented to the Committee for review.

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

W.F.J. Henry
 Principal Investigator

 Trainee

REF
WI 407.JB2
H521e
1986
SECTION I:

86-029
26/8/88

RESEARCH PROTOCOL

(1) Title: Epidemiological Studies of Morbidity and Malnutrition in Urban and Rural Bangladesh.

(2) Principal Investigator: Dr. Fitzroy Henry

Co-Investigator: Dr. K.M.A. Aziz

(3) Starting date: As soon as possible

(4) Completion date: 15 months after starting date

(5) Total Cost: \$68470

(6) Scientific Programme Head

This protocol has been approved by the
Community Health Division

Signature of Scientific Programme Head

Date 15.8.76.

H. Henry

Abstract Summary:

A cohort of 500 children under 5 years old from urban and rural Bangladesh will be followed for one year to study the pathogens associated with acute and prolonged (more than 14 days) diarrhoea episodes; the important underlying risk factors; and the consequences of these episodes on subsequent morbidity and growth. This study will also permit the quantification of prolonged diarrhoea in terms of its incidence and other epidemiological characteristics. Health status of the children will be monitored through questionnaire, fortnightly; anthropometry (weight and height) monthly; and social and environmental

conditions seasonally (climatic). A faecal sample will be collected at the onset of diarrhoea in young children for microbiological examination. Data analysis will examine the interaction of morbidity and malnutrition in relation to the environmental conditions that exist in the two communities.

SECTION II: RESEARCH PLAN

A. INTRODUCTION

One-third of all deaths in Bangladesh results from diarrhoeal disease often in association with malnutrition. The ICDDR,B's role in this context is both curative and preventive. But prevention is surely the long-term goal of research in this field. Treatment can be based on symptoms but prevention requires a better understanding of causes. Of the three main strategies to prevent diarrhoeal diseases i.e., immunization, improvement of nutritional status and the interruption of transmission, the latter two areas have not been emphasised enough in research activities.

If we accept that the diarrhoeal/malnutrition syndrome is not an enigma in itself but rather a reflection of various ecologic and social factors that affect the family, then for effective control of these diseases the relationship between the socio-economic, environmental and health factors warrants investigation.

8. REVIEWS

(i) ETHICAL REVIEW COMMITTEE

(ii) RESEARCH REVIEW COMMITTEE

(iii) DIRECTOR

1. Objective

The objectives of this study are to (1) determine the incidence of acute and prolonged diarrhoea (2) identify the etiologic agents of the diarrhoea episodes in young children and (3) determine their respective associations with nutritional state, in urban and rural Bangladesh.

2. Background:

The association between morbidity and malnutrition has been recognized for centuries, but specific, quantitative relationships have been studied only recently (1). For example, studies in Guatemala (2) demonstrated that children's weight and length measurements depended in part on the extent to which they have suffered from diarrhoea. On the other hand Black et al. (3) showed that the effect of diarrhoeas on weight increments was significant for 60-day intervals and that the effect of diarrhoea on height increments was significant over one-year intervals but not significant for 60-day intervals. Contrary to this, Condon-Paoloni et al. (4) found diarrhoea to have a significant effect on yearly weight increments but not on height increments.

The impact of malnutrition on diarrhoeal morbidity is uncertain. Hospital based studies show that diarrhoea occurs more frequently and with greater severity in children with severe protein-energy malnutrition (5,6). This has been attributed to their lower resistance to infection. In the community, however, a majority of children suffer from mild to moderate grades of malnutrition where the immune functions are not compromised. Recently field

studies have been undertaken to see whether milder grades of malnutrition modify diarrhoea morbidity (7-10). These results are conflicting and in most of them no attempts have been made to determine the etiology of the diarrhoea - a factor which can be crucial in understanding these relationships. Few workers have studied the magnitude and duration of weight loss for specific pathogens; for acute vs chronic; and for watery vs dysenteric diarrhoeas.

The mechanism by which diarrhoea act is not completely understood but some factors are clearly important for example (1) malabsorption of nutrients (2) catabolic loss from the illness (3) anorexia and vomiting (4) withdrawal or alteration of food. Studies even suggest that altered food intake is more important than catabolism (11,12). Furthermore, one study found reduced intake associated with illness in the second year of life but not in the first or third (12). An investigation into the alteration of quality and quantity of food can therefore lead to a better understanding of the nutritional consequences of diarrhoea. Ultimately, the exact relationship of morbidity with growth can be studied only longitudinally in terms of increment.

In Bangladesh, comprehensive laboratory investigations reveal potential pathogens in 66% of diarrhoea patients. (13,14). Recently, an unpublished report showed 13% of the remaining cases with Aeromonas (15). However, the proportion of the latter agent that can cause diarrhoea is still unknown. Many separate morbidity studies have been done by ICDDR,B in the Teknaf, Matlab

and Dhaka centres. For example, comparisons of Dhaka (13) and Matlab (14) data reveal prevalence rates for Enterotoxigenic *E. coli* 20.0 vs 26.9%; Rotavirus 19.4 vs 4.7%; *Shigella* 11.6 vs 15.8%, *V. cholerae* 5.5 vs 0.3%. It is striking that parasites were not considered-perhaps because severe hospitalized patients are usually negative for parasites. Studies from other countries (16,17) also show large rural-urban differences in prevalence rates of etiologic agents in diarrhoea. The prevalence rates from these various studies reflect differences in the methods used, in geographic, ecologic, seasonal and social conditions of the communities studied. Furthermore, the prevalence of etiologic agents are mainly derived from hospital patients who are severely ill and microbiological cultures are often done several days after onset of symptoms - a procedure that could greatly underestimate certain enteric pathogens. Clearly, there is a need for a systematic comparison of morbidity in urban and rural Bangladesh using the same definitions, the same protocol and the same field and laboratory methods.

With the development and application of oral rehydration which is most effective against acute diarrhoea, chronic forms of diarrhoea have merged as an important health problem. The association of chronic diarrhoea with severe protein-energy malnutrition increases this importance. The difficulty in handling chronic diarrhoea in the field and hospital, its high fatality and its inconsistent etiologic picture give much scope for urgent research. Many of the agents found in chronic diarrhoea are also diagnosed in acute diarrhoea but their

relative frequency varies (18). These relative rates in urban and rural areas, having different hygienic status, warrants investigation.

It is important to understand the social and environmental conditions within which the relationship between morbidity and malnutrition is assessed. Knowledge of the principal socio-economic determinants of diarrhoeal disease in a community is essential in formulating short and long term strategies towards prevention. Below we review some of the issues.

Studies undertaken in this region point to important gaps in our knowledge of intricate socio-medical relationships. Although several useful studies have been done on the slums in Dhaka, they merely describe the economic situation of these settlements and their inhabitants (19,20). In June 1983, the Centre for Urban Studies at the University of Dhaka completed a detailed socio-economic survey of the Dhaka slums (21). Again, the objective was to describe the demographic, social, educational, economic, housing, health and cultural characteristics of the slum dwellers. The analysis did not associate the different socio-economic variables to the health state. Without this, it is difficult to understand and appreciate the entangled relationship between specific aspects of poverty and disease.

Studies in India demonstrate a general relationship between socio-economic status and childhood illnesses. For example, in a prospective study Gupta and Srivastava showed the prevalence of throat and skin infections of children was positively related to

the size of the family (22). In a cross-sectional study Khan et.al. reported that gastroenteritis, skin, worm and respiratory infections and malaria were all higher for children in families with four or more children than in families with 3 or less (23). But little work has focused on the social and economic determinants of morbidity and growth in the slum areas. Because the slum dwellers are under a different set of stresses from rural populations, it is important to determine, for example, whether higher income families in a crowded area have lower disease rates, or better intake or faster growth. Does high income affect nutrition but not infection? Should intervention measures emphasise environmental or income generating activities or health education, etc. or all equally ?

In one of the few studies which relate health status to different ecological groups, Agarwal et.al in Varanasi India (24) showed overall child morbidity to be lower in urban as distinguished from rural or urban slum households. Unfortunately, mother's education was the only socio-economic variable considered. One question that needs to be answered is whether the polarization in economic status in the slums is wide enough to reflect different health status or should these communities be treated as one homogenous group.

Much more work has been done on the relationship between nutrition and socio-economic status. Studies in Madras state (25) Uttar Pradesh, India (26) the Philippines (27) indicate that low income groups spent a large proportion of their total income on food. As incomes rose a smaller percentage was spent on food

but the total quantity was larger. As incomes continued to rise expenditure on cereals was less while more money was allocated to animal products such as meat, milk and eggs. Levinson (28) points out that in Punjab, India, even children under 2 years consumed better food with increased family income. In rural Bangladesh, Becker et.al (29) showed a clear relationship between education and the variety of foods consumed while income was more associated with the quantity of specific foods eaten. While these studies indicate a significant positive effect of maternal education and per capita income on nutrition in rural communities, the extent of this relationship is not known for slums, where economic survival is at a premium.

A study in Noakhali, Bangladesh (30) showed that above a certain level of income an improvement in mother's education was important to improve nutritional status. Other studies of the effect of socio-economic level on growth have revealed differing results. Some show no difference in anthropometric measurements in pre-school children (31,32). On the other hand, increased family income was shown to be associated with better growth in Guatemala (33), Nigeria (34), India (35) and Sri Lanka (36). These studies, however, have not examined the effect of other environmental factors which might be affecting morbidity in these children at the same time so that the relative effect of income can be determined.

In rural Bangladesh, the seasonal pattern of various diseases was reported by Black and others (37). They also showed a striking

correlation of E.Coli diarrhoea with environmental temperature through a one-year period (38). Brown and co-workers showed that nutritional status changed significantly by month of year. Respiratory illnesses were more common during the cool dry months while diarrhoea was more frequent in the hot rainy period. Skin infections occurred most frequently in the hot dry months (39). Clearly, seasonal factors have considerable influence on morbidity and average nutritional status. In this study the relationships between socio-economic status, morbidity and growth will be examined over a 12-month period so that the seasonal effect on these relationships can be revealed.

3. Rationale

Diarrhoeal diseases and growth retardation are important problems in developing countries. Although a synergism between infection and nutrition is recognized the strengths of the interaction between different types of diarrhoea and different types of malnutrition have not been clearly understood. (Most of the diarrhoeal patients presenting for treatment at the ICDDR,B's hospital, and similarly, 90% of the severely malnourished children seen at the Children's Nutrition Unit Rehabilitation Centre come from the slum areas of Dhaka city.) ✓ The rural population of Bangladesh has similar problems, perhaps from different causes. Because the ideal all-encompassing interventions involving massive financial inputs will not be soon forthcoming to these areas it seems imperative that the causative factors for these high morbidity rates be identified in the field so that existing technologies can be utilized and targeted to

specific interventions.

B. Specific Aims.

1. To determine the incidence, duration and etiology of watery and dysenteric diarrhoea in rural and urban Bangladesh.
2. To study the nutritional consequences of acute vs prolonged diarrhoea.
3. To investigate the role of nutritional status and etiology at onset, in the development of prolonged diarrhoea.
4. To investigate the effects of socioeconomic, environmental and seasonal factors on morbidity and growth in the two communities.

C. METHODS OF PROCEDURE

This study is based on an intensive investigation of two distinct communities.

1. The urban community is located at Zinzira, about 6 miles south of the centre of Dhaka. This area is typical of the slum areas in Bangladesh with regards to housing, crowding, education, sanitary facilities etc. It is a muslim community and the men work mainly as labourers and rickshawpullers.
2. The rural community is located at Mirzapur, about 40 miles north of Dhaka city. This area is typical of most of rural Bangladesh. The villages consist of clusters of huts

surrounded by lower lying paddy fields which are flooded during the monsoon.

Both the rural and urban areas are served by nearby medical facilities. Children with severe illnesses will be taken to these facilities for treatment. A census was recently done in each of these areas and this would be utilized to cross-check dates of birth and other household information. Families with children under 5 years old will be studied.

SURVEYS AND ANALYSIS

Two questionnaire schedules will be use for data collection. The first schedule (1) will be for general household information dealing mainly with physical and socio-economic environment. The second schedule (2) will be done fortnightly and concerns the variables which differ with family members and which may change from time to time (eg. health indicators). Schedule (2) will include questions about illnesses during the previous 24 hours.

For this under 5 year old population of about 1000 having a diarrhoea prevalence of 15%, to be 95% confident that the difference between the true population rate and the sample rate is less than 5%, a sample size of 164 children is required.

However, to detect a 10% difference between the two areas at the .05 significance level, *231 children will be required in each area.* In this 12 month longitudinal study a much smaller difference can therefore be detected, if it exists.

250 children from several communities in Zinzira and 250 children from several villages in Mirzapur will be randomly recruited. The families of these children will be surveyed (schedule 1) for their socioeconomic and environmental characteristics. This

survey of households will be done at three times during the year corresponding with three seasons - monsoon, cool dry and hot dry. These households will have intensive fortnightly investigations schedule (2) of their health status throughout the year. Diagnoses of severe illnesses will be confirmed by the project physician who will visit the homes periodically and provide treatment when appropriate.

Children under 5 years and their mothers will be weighed and measured for height every month using carefully checked instruments. In addition, weights and heights of children with diarrhoea will be measured weekly for 4 consecutive weeks starting as soon as possible after the report of diarrhoea. All data will be collected from responsible household members and will be collected by trained health assistants who were working in the areas and already know most of the households. These health assistants will visit the household of each cohort child every two weeks to record any illnesses in the family. In addition, two residents from the communities will be employed as helpers and will report to the field assistants any episodes of diarrhoea found between fortnightly visits. This process will facilitate the early detection of diarrhoea.

Diarrhoea will be defined as three or more motions in 24 hours. Diarrhoea will be termed "watery" if motions are watery or abnormally loose, and "dysenteric" if mucous and/or blood were present in the stool. An episode will be considered new if there is an interval of 48 hours or longer between symptoms.

Supervision will be done by the investigators and the senior

health assistants. Data collection in the field will be checked and validated before being transferred to a personal computer.

For every cohort child below 3 years old with diarrhoea, 2 rectal swabs and where possible 1 stool sample will be taken. One swab will be placed in Cary-Blair transport media and the other in phosphate buffered saline. All swabs/samples will be taken to ICDDR,B laboratory on the day of collection and will be cultured for Shigella, salmonella, vibrios, enterotoxigenic E.coli, Giardia and tested for rotavirus by the ELISA assay. These analyses will be done by ICDDR,B microbiology branch employing standard procedures. The pathogenicity of Aeromonas is not yet known and therefore will not be studied.

Data analysis

The following investigations will be included in the analysis.

1. Comparison of the incidence of diarrhoea, respiratory and skin infections by month.
2. Comparison of the prevalence of etiologic agents in rural and urban communities.
3. Comparison of weight loss in diarrhoea caused by different agents.
4. Comparison of acute and prolonged diarrhoeas according to agent at onset.
5. Proportion of watery and dysenteric diarrhoeas which persist (>2 weeks)
6. Comparison of morbidity and malnutrition in different seasons (climate, food availability) in rural and urban areas.

7. Determination of the factors that predispose children to repeated attacks of diarrhoea.

8. Comparison of the correlations between socio-environmental variables and morbidity at different periods of the year.

Because this study is prospective and longitudinal, weight loss can be detected and quantified for each child and related to each episode of illness - acute as well as chronic.

The above comparisons will be performed using the test of proportions, the chi - square test and the student's t test where appropriate. The important factors revealed in cross tabulations between social and environmental variables and morbidity will be used in a stepwise regression analysis to identify the principal determinants of diarrhoea and malnutrition in urban and rural areas.

Effects of diarrhoea and season on nutritional status:

The traditional method of comparing the proportions of malnourished children with and without diarrhoea will be done during different seasons. We will also do an analysis of variance of the change in nutritional status from the beginning to the end of each climatic season (3-month period). Furthermore we will do an analysis of covariance taking the nutritional status at the beginning of each season as a covariate. Each of these analyses will be done for (1) children without diarrhoea (2) children with diarrhoea (3) children with diarrhoea according to the pathogen isolated.

Analysis is expected to continue for 3 months' after completion of

field data collection.

D. SIGNIFICANCE

Epidemiologic studies on acute and persistent diarrhoeas are necessary to define the magnitude of the problem and to identify the children at high risk. Prevention strategies must be based on these important risk factors. The nutritional consequences of these diarrhoeas form a priority health problem in developing countries. In urban and rural areas, where the ecological conditions are different, it is necessary to compare the above relationships in these settings so that effective interventions can be formulated.

E. FACILITIES REQUIRED

No new infrastructural arrangements will be needed. The Mirzapur Handpump Project and the Terre Des Hommes complex in Zinzira will be used as field offices. The facilities, personnel and transportation arrangements within these projects considerably reduce the budgetary requirements for this protocol.

F. COLLABORATIVE ARRANGEMENTS

This work will be carried out with the cooperation of Terre Des Hommes (Netherlands). Much information exchange will flow between ICDDR,B and this organization. TDH has a physician-run clinic which will serve the population under study in Zinzira.

BUDGET

1. Personnel

Position	% time	US\$
Principal Investigator	50	21600
Co-Investigator (funded MHP)	25	-
Project physician	100	3720
Senior Health Assistants (2)	100	2880
Health Assistants (6)	100	3696
Programmer/Data entry technician (1)	100	1874
Helpers (2)	100	616
Boatmen (4)	4 monsoon month	375

2. Supplies and Materials

Medicines	200
Stationery	70

3. Equipment

Weighing machines (4)	400
Measuring boards (4)	100
1 Tandy 1200 HD Personal Computer	3000

4. Patient Hospitalization Nil

5. Out patient care Nil

6. ICDDR,B Transport (Local) 3600

7. Travel International 2000

(Report presentation and/or Scientific conference)

8. Transportation of things Nil

9.	Rent, communications and utilities	Nil
10.	Information Services	Nil
11.	Printing and Reproduction Stencils, Mimeo, Xeroxing	590
	Publication costs and Reprints	300
	Slides, Illustration etc.	255
12.	Contractual services etc. Microbiology:	
	600 samples at \$15 each	9000
	Data analysis	500
13.	Construction, Renovation, Alterations	Nil
	Total Direct Cost	54776
	25% overhead	13694
	Total	68470

REFERENCES

1. Rowland, M.G.M., T.J. Cole and R.G. Whitehead. A quantitative study into the role of infection in determining nutritional status in Gambian children. *British Journal of Nutrition*. 37, 441-450, 1977.
2. Martorell R., J.P. Habicht, C. Yarbrough, A Lechtig, R.E. Klein and K.A. Western. Acute morbidity and physical growth in rural Guatemalan children. *American Journal of diseases of children* 129, 1296-1301, 1975.
3. Black R.E., K.H. Brown and S. Becker. Effects of diarrhoea associated with specific enteropathogens on the growth of children in rural Bangladesh. *Pediatrics*. 73 (6) 799-805, 1984.
4. Condon- Paoloni D., J. Cravioto, F.E. Johnston, E.R. De Licardie, T. Scholl. Morbidity and growth of infants and young children in a rural Mexican village. *American Journal of Public Health*. 67 (7) 651-656, 1977.
5. Woodruff C.W. Growth and nutrition of Lebanese children. *Nutrition Research*, 23, 97-100, 1965.
6. Palmer D.L., P.T. Koster. A.K.M.J. Alam and M.R. Islam. Nutritional status a determinant of severity of diarrhoea in patients with cholera. *Journal of infectious disease* 134. 8-14, 1976.

7. Ghai. D.P. and V.N. Jaiswal. Relationship of undernutrition to diarrhoea in infants and children. Indian Journal of Medical Research 58 789-795. 1970.
8. Chen. L.C., E. Huq and S.L. Huffman. A prospective study of the risk of diarrhoeal disease according to the nutritional status of children. American Journal of Epidemiology. 114, 284-292, 1981.
9. Stetler. H.C., F.L. Trowbridge and A.Y. Huong. Anthropometric nutritional status and diarrhoea prevalence in children in El. Salvador. American Journal of Tropical Medicine and Hygiene 30, 888-893, 1981.
10. Tomkins A. Nutritional status and severity of diarrhoea among preschool children in rural Nigeria. Lancet 1, 860-862, 1981.
11. Briscoe J. The quantitative effect of infection on the use of food by young children in poor countries. American Journal of Clinical Nutrition 32 648-676, 1979.
12. Mata. L.J., R.A. Kromal, J.J. Urrutia. Effect of infection on food intake and the nutritional status: perspectives as viewed from the village. American Journal of Clinical Nutrition 30 1215-1227, 1977.
13. Stoll B.J., R.I. Glass, M.I. Huq, M.U. Khan, J.E. Holt, H. Banu. Surveillance of patients attending a diarrhoea disease hospital in Bangladesh. British Medical Journal 1982. 285 1185-1188. 1982.

14. Black R.E, K.H. Brown, S. Becker. A.R.M. Abdul Alim, I. Huq. Longitudinal studies of infections diseases and physical growth of children in rural Bangladesh. American Journal of Epidemiology. 115 315,324.1982.
15. Kay.B. Personal communication 1986.
16. Vives. M.L. Mata, C. Castro. A. Simhon, M.E. Garia, P. Jimeney. Estudio de Puriscal. V. Infection enterica en ninos menores de dos anos. Rev Med Hosp Nal Minos (Costa Rica) 17: 57-69, 1982.
17. Mata L.J., A. Simhon, R. Pradilla. Diarrhoea associated with rotaviruses, enterotoxigenic Escherichia coli, Campylobacter and other agents in Costa Rican children 1976-1981. American Journal of Tropical Medicine and Hygiene 32. 146-53. 1983.
18. World Health Organization Scientific Working Group. Parasite-related diarrhoeas. Bulletin of the World Health Organization 58, 819-830, 1980.
19. Guadir S.R. The Bastees of Dhaka. A study of squatter settlements. Local Government Institute, Dhaka, 1975.
20. Hasnath A.S. The resquatting problem in Dhaka city - some policy proposals for resettlement. Local Government Institute, Dhaka, 1976.

21. Slums in Dhaka city. Centre for urban studies. University of Dhaka, June 1983.
22. Gupta S., G. Srivastava, V. Agarwal, and A.K. Prabhakar. Family size as a determinant of morbidity in children. Indian Pediatrics 13 333 1976.
23. Khan A.Z. Impact of family size on the morbidity pattern in school children. Indian Pediatrics 18 107-111, 1981.
24. Agarwal D.K., G.P. Katiyar, N.S. Yadav and K.N. Agarwal. Morbidity pattern in under five children. Journal of Tropical Pediatrics 28 139-143, June 1982.
25. Devadas R.P., T.M. Usha, L. Sankari, R.S. Rajlakshmi, G. Pathrat and M. Baktiwable. Diet and Nutrition Survey of village community in South India. Journal of Nutritional Dietetics 2 83-87, 1965.
26. Govil K.K., D.P. Bhatnagar and K.C. Pant. Dietary habits in Uttar Pradesh in relation to income. Journal of Indian Medical association. 26 138-141, 1956.
27. Quingue E.S. Comparison between weighing and interviewing methods in food composition surveys. Philippine Journal of Nutrition 23 (2) 18-37, 1970.
28. Levinson J. An economic analysis of malnutrition among young children in rural India. Massachusetts, Cornell- MIT International Nutrition Policy series, 1974.

29. Becker S., R.E. Black, K.H. Brown and S. Nahar. Relations between socio-economic status and morbidity, food intake and growth in young children in two villages in Bangladesh. (In press).
30. Bairagi, R. Is income the only constraint on child nutrition in rural Bangladesh. Bull. W.H.O. 58(5) 767-772, 1980.
31. Munoz de Chavey, M.P. Arroyo, S. Peney-Gil, M. Hernandex, S.E. Quiroz, M. Rodrigues, M.P. Hermelo and A. Chavez. The epidemiology of good nutrition in a population with a high prevalence of Malnutrition. Ecology of Food and Nutrition. 3 223-230, 1974.
32. Taylor C, I. Emmanuel, L. Morris and L. Posterman. Child Nutrition and Mortality in the Rural Philippines. Is socio-economic status important? Journal of Tropical Pediatrics and Environmental Child Health. 24 80-83, 1978.
33. Cravioto J., H.G. Birch, E.R. De Licardie and L. Rosales. The Ecology of Infant weight gain in a pre-industrial society. Acta Paediatrica Scandinavia, 56 71-84, 1967.
34. Janes M.D. Physical growth of Nigerian Yoruba Children. Tropical and Geographical Medicine 26, 389-398, 1974.
35. Hanumantha Rao, D. and K. Satyannayana. Nutritional status of people of different socio-economic groups in a rural area with special reference to pre-school children. Ecology of Food and Nutrition. 4, 237-242, 1976.

36. Cullumbine H. The health of a tropical people. A survey in Deylon. 3. Income and Health. Lancet 1 1193-1196, 1953.
37. Black R.E., K.H. Brown, S. Becker and M. Yunus. Longitudinal studies of Infectious diseases and physical growth of children in rural Bangladesh. 1 Pattern of Morbidity. American Journal of Epidemiology. 115 no.3, 305-314, 1982.
38. Black R.E., K.H. Brown and S. Becker. Epidemiology of acute diarrhoea in childhood in Acute Diarrhoea: Its consequences in children. Edited by J.A. Bellanti. Nestle Veney/Raven Press. New York, 1983.
39. Brown K.H., R.E. Black and S. Becker. Seasonal changes in nutritional status and the prevalence of malnutrition in a longitudinal study of young children in rural Bangladesh. American Journal of clinical Nutrition, 36 303-313, 1982.

Abstract Summary

1. This study will be done longitudinally on 500 children for 1 year. Half of the children will be from rural communities and half from urban. Socioeconomic and environmental conditions will be assessed through the different seasons while the history of illnesses suffered will be recorded. Every month weight and height measurements will be done on mothers and children below 5 years. The purpose here is to study the communities involved in some detail so that a practical intervention strategy can be formulated whereby benefits can be maximized not only for the communities studied but for other settings in rural and urban Bangladesh. Because children less than 5 years are at the greatest risk of disease and death in Bangladesh, focus will be centered on them. However, the household unit will be studied because the circumstances of the family are often reflected in the health state of the child.
2. Apart from the anthropometric measurements and stool analysis, the entire study will be done by interview and observation. Questions relate to social, economic, feeding and hygiene status. No samples of blood or urine will be obtained. There are no overt or covert risks involved in these procedures.
3. Not applicable.
4. Although no risks are involved, all information collected will be secured in locked filing cabinets.
5. Verbal and signed informed consent will be sought in this study.
6. The interviews will be conducted within the premises of the household. During the test of the questionnaire the interview on general and socioeconomic conditions lasted an average of 45 minutes. The fortnightly interview on health lasted 10-15 minutes. (These interviews took the normal conversational form).
7. Individuals will have fortnightly health surveillance. Children found with minor ailments will be treated by the project physician or will be referred to the nearby clinic in the slum or the hospital in the village. If necessary (parents willing) seriously ill children will be taken to hospital. Again, no risks are involved in this study.
8. If medical records are available they will be used to supplement the health data from interviews. Due respect will be given for safeguarding confidentiality.

VERBAL CONSENT FORM

The ICDDR,B is attempting to find the specific reasons why children in this area are so frequently attacked by diseases such as diarrhoea and other illnesses. We will be using this information to determine what practical measures can be implemented in this area to reduce the diseases now present. To do this we are planning to carry out observations on general household conditions and collect information on occupation, education, income, water use, latrine use, habits of hand washing, feeding practices etc. Every two weeks we will be enquiring about any illnesses suffered since the last visit and your family will be visited by a doctor periodically. Weights and heights of children and mothers will be done monthly. If your child has diarrhoea we will ask you to give us one stool sample so that we can try to find out the exact cause. We will not be collecting blood, or urine samples. All information obtained will be treated confidentially. You are at liberty to withdraw from the study at any time.

ঐতিহাসিক সম্বন্ধিতম

বাল্যশিক্ষার ক্ষেত্রে সর্বদা সন্তান সন্তানকে 3
অন্যভাবে পড়া দ্বারা শিক্ষিত হয় এবং অধিক কঠোর
নিয়ন্ত্রণের জন্য বাল্যশিক্ষার অধিকৃত আন্তর্জাতিক
উদ্যোগের মাধ্যমে কেন্দ্র প্রকল্প চালিয়ে যাচ্ছে। বর্তমানে
যে সকল দেশ দেখা দেয় সেগুলোর কঠোরতার জন্য এই
শিক্ষার কি কি কঠোর সাদৃশ্য গ্রহণ করা যায় এবং
নিয়ন্ত্রণের জন্য এই জন্য আয়ের ব্যবস্থা করা। বহু
সমস্যা কঠোর আয়ের হারে অধিক অর্থের সমস্যা
পর্যবেক্ষণ করা হয়, শিক্ষা, আয়, মানবিক ব্যৱস্থা,
সাংস্কৃতিক ব্যৱস্থা, শ্রম কৌশল অধ্যয়ন সমূহ, শ্রমিকদের
নিয়ম ইত্যাদি সমস্যা জ্যেষ্ঠ অধ্যয়ন পরিচালনা করা হয়।
আমাদের আয়ের মত থেকে কোন কোন স্থানে কিনা অধ্যয়ন
আমরা প্রতি দুই অধ্যয়ন অধ্যয়ন জ্যেষ্ঠ মত, আমন্ত্রণ হলে
আমরা আমন্ত্রণ একজন অধ্যয়ন যাচাই। প্রতি আমন্ত্রণ 3
শিক্ষার উচ্চ মত, উচ্চ মত হলে। যদি আমন্ত্রণ শিক্ষার
সাংস্কৃতিক সাংস্কৃতিক হলে উচ্চ অধিক কঠোর নিয়ন্ত্রণ কঠোর
প্রকল্পের জন্য নতুন শিক্ষার মত দেখার জন্য আয়ের
আমন্ত্রণ অনুষ্ঠান করা। আয়ের প্রকল্পের মত অনুষ্ঠান
অধ্যয়ন করা হয়। অধ্যয়ন সকল অধ্যয়ন আমন্ত্রণ করা
করা হয়। এ থেকে আমরা সন্তানকে থেকে নিজেকে প্রকল্পের
কঠোর পরিচালনা আমন্ত্রণ যাচাই।

Schedule 1a

Name of Head of Household _____

Household no.
1 2 3

House code
4 5 6 7 8

Registration date
9 10 11 12 13 14

Visit no.
15 16

Visit date
17 18 19 20 21 22

Interviewer _____

1. Where were you living before?

District _____

Thana _____

Distance away (km)
23 24 25

2. How long have you been living here?

Months

26 27 28

3. How much rent do you pay per month

29 30

4. Household living space

Length
Metre
31 32

Width
33 34

Height
35 36

Number of rooms

37 38

Roof material

39

tin = 1, thatch = 2 Both = 3

5. Where do you obtain your water for:

handpump = 1 rain water = 4

river = 2 open well = 5

pond/tank = 3 other = 6

Source	Distance away (Metre)
Drinking	<input type="text"/> <input type="text"/> 40 41 42
Cooking	<input type="text"/> <input type="text"/> 43 44 45
Washing	<input type="text"/> <input type="text"/> 46 47 48
Bathing	<input type="text"/> <input type="text"/> 49 50 51

Schedule 1

1b

6. How much water do you (family/household) use per day?

(Exclude bathing or washing clothes in river, pond etc.)

_____	x	_____	=	_____	gals	<u>52</u>	<u>53</u>	<u>54</u>
Container		times						litres

7. Do household members wash their hands before eating?

55

- Always 1
- Frequently 2
- Sometimes 3
- Never 4

8. Method of waste water disposal

56

- On the ground 1
- Pond/pool 2
- Soakage pit 3
- River 4
- Other 5

9. Washing after defecation is done with

- Water only 1
- Mud/ash 2
- Soap 3
- Other 4
- Not done 5

57

10. How do you dispose of your faeces?

58

- No fixed place = 1
- Open pit = 2
- Closed pit = 3
- Water-seal latrine = 4
- Other = 5

11. How much extra (per month) do you pay for use of water

and/or latrine:

--	--	--

59 60 61

Schedule 1
12

12. Method of refuse disposal

--

- Burn 1
- Bury 2
- Open dumping near house 3
- Open dumping away from house 4
- Other 5

13. Presence of flies in house

--

- Disturbing number 1
- Present but no problem 2
- Few 3
- None 4

14. What do you burn for cooking

--

- Wood = 1
- Kerosine = 2
- Other = 3

15. What is the fuel cost per month

--	--	--

65 66 67

16. What is the food cost per

--	--	--

68 69 70

17. What types of food were purchased during the last seven days (in frequency order)

--	--	--	--	--	--	--

71 72 73 74 75 76

18. Do you owe money to anyone

--

- No = 0
- Landlord = 1
- Employer = 2
- Relative = 3
- Friend = 4
- Other = 5

19. How much (Total)

--	--	--

78 79 80

Sl. no.	Name of Family Members	Relation to Head of Household	Date of birth	Age	Sex	Marital status	Family type	Religion	Type of school	Years of schooling	Occupation Main and other
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											

Deaths in Household:

Sex	Age

- Married = 1
- Divorced = 2
- Single = 3
- Widowed = 4
- Separated = 5

- Nuclear = 1
- Extented = 2
- Other = 3

- Muslim = 1
- Hindu = 2
- Other = 3

- No school = 1
- Primary = 2
- Secondary = 3
- University = 4
- Religious school = 5
- Other = 6

- Rickshaw puller = 1
- Artisian = 2
- Baby taxi driver = 3
- Trader = 4
- Office = 5
- Labourer = 6
- Unemployed = 7
- Servant = 8
- Other = 9

Schedule 1

Sl. no.	How long in job/ (months)	How far work (km)	Fare cost PER Mo.	No. of days worked last month	Total salary (Mo) from regular jobs	Income source (apart) from regular jobs	How much (mo)	Total earnings (mo)	Previous job	Previous salary (mo)
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										
13.										
14.										

- Land = 1
- House = 2
- Boat = 3
- Remittance = 4
- Other special job = 5

Remarks:

Observations:

Household number

House code

Visit number

Visit date

Sl. no.	Name of Family members	Relation to Head of Household	Diarrhoea Yesterday (state type)	Days with diarrhoea last two weeks	Resp. inf. (cough, cold, fever) Yesterday	Days with resp. inf. last two weeks.	Skin inf. (scabies, conj. etc.) now?	Days with skin inf. last two weeks	Night blindness now	N.B. ever	Other illness now
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											

Illness code

Diarrhoea

- Watery 1
- Loose 2
- Mucoid 3
- Bloody 4
- Mucoid+Bloody 5
- Upper respiratory 6
- Fever 7

- Scabies 8
- Impetigo 9
- Eczema 10
- Other skin infection 11
- Measles 12
- Otitis 13
- Conjunctivitis 14
- Stomatitis 15
- Other (state) 16

Remarks

Observations

Schedule 2

2b

Sl. no.	Days with other illness last 2 weeks	Did you refuse food last two weeks?	Went to clinic last two weeks?	State illness	Total cost for clinic, medicine etc.	Hospitalization last two weeks (state illness)	Vaccination status	Wt. (kg)	Ht. (cm)	No. of meals per day	Foods ate yesterday (in order of quantity)	Feeding	Wt for age	Ht for age
1.														
2.														
3.														
4.														
5.														
6.														
7.														
8.														
9.														
10.														
11.														
12.														
13.														
14.														

Food Stores

Type Quantity

.....

Food code

- Rice = 1
- Dal = 2
- Green veg. = 3
- Milk = 4
- Meat = 5
- Fish = 6
- Fruit = 7
- Tea = 8
- Millet = 9
- Wheat = 10
- Oil for cooking = 11
- Others (state) = 12

Feeding

- Breast only
- Milk powder
- Breast + Milk powder
- Solid food
- Family diet