SECOND ANNUAL SCIENTIFIC CONFERENCE

(ASCON-II)

of the

INTERNATIONAL CENTRE FOR
DIARRHOEAL DISEASE RESEARCH,
BANGLADESH

16 - 18 JANUARY 1993

PROGRAMME & ABSTRACTS

INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH
Mohakhali, Dhaka 1212

The **INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH (ICDDR,B)** is an autonomous, non-profit organisation for research, education, training and clinical service. It was established in December 1978 as the successor to the Cholera Research Laboratory, which began in 1959 in response to the cholera pandemic in southeast Asia.

The mandate of the ICDDR,B is to undertake and promote research on diarrhoeal diseases and the related subjects of acute respiratory infections, nutrition and fertility, with the aim of preventing and controlling diarrhoeal diseases and improving health care. The ICDDR,B has also been given the mandate to disseminate knowledge in these fields of research, to provide training to people of all nationalities, and to collaborate with other institutions in its fields of research.

The Centre, as it is known, has its headquarters in Dhaka, the capital of Bangladesh, and operates a field station in Matlab thana of Chandpur District which has a large rural area under regular surveillance. A smaller rural and a large surveyed urban population also provide targets for research activities. The Centre is organised into four scientific divisions: Population Science and Extension, Clinical Sciences, Community Health, and Laboratory Sciences. At the head of each Division is an Associate Director; the Associate Directors are responsible to the Director who in turn answers to an international Board of Trustees consisting of eminent scientists and physicians and representatives of the Government of Bangladesh.

Printed by BRAC Printers Bangladesh

SECOND ANNUAL SCIENTIFIC CONFERENCE

of the

International Centre for Diarrhoeal Disease Research, Bangladesh

16 – 18 January 1993

Programme and Abstracts

Venue: Sasakawa International Training Centre
ICDDR,B
Mohakhali, Dhaka 1212

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Desktop Publishing:

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Manuscript Typing:

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Cover Design:

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January 1993

Special Publication No. 29

Published by:

International Centre for Diarrhoeal Disease Research, Bangladesh
GPO Box 128, Dhaka 1000, Bangladesh
Telephone: 600171 (8 lines); Cable: CHOLERA DHAKA; Telex: 675612 ICDD BJ;
Fax: 880 – 2 – 883116

ACKNOWLEDGEMENTS

The ICDDR,B is supported by countries and agencies which share its concern for the health problems of developing countries. Current donors include: the aid agencies of the Governments of Australia, Bangladesh, Belgium, Canada, Denmark, France, Japan, the Netherlands, Norway, Saudi Arabia, Sweden, Switzerland, the United Kingdom and the United States; international organisations including the United Nations Development Programme, United Nations Population Fund (UNFPA), the United Nations Children's Fund and the World Health Organization; and private foundations including the Ford Foundation and the Sasakawa Foundation.

Sponsoring organisation

International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B)

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Donor agencies
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INTRODUCTION

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) was established in 1978 as an autonomous, non-profit organisation, succeeding the former Cholera Research Laboratory which was founded in 1960. The ICDDR,B has, through the years, conducted research in three major areas: diarrhoeal diseases, nutrition, and maternal and child health, including family planning. The findings of this research have been extensively reported in the scientific literature and have made a vital impact on health research worldwide.

As the research activities of the Centre have developed and expanded, so too have the Centre's efforts to effectively disseminate important research findings. Through the Diarrhoeal Diseases Information Service (DISC) our publications, such as the JDDR (the Centre's journal), the Glimpse (a bimonthly newsletter) and other scientific reports, keep the international community currently informed of all important discoveries and activities. True to it's commitment to share these research results, and to provide a forum for the exchange of ideas, the ICDDR,B presents the Second Annual Scientific Conference.

Conference Objectives

ICDDR,B's annual conferences are designed to continue and to improve the dissemination of information and thus influence public health policy for the improvement of human health. In keeping with this general objective, the theme of this year's conference is "Health Research and Policy Perspectives". While giving an overview of recent and exciting scientific accomplishments at the Centre, this year's programme is designed to strengthen communication with those working in the programme and policy arenas. Those invited for this interchange with Centre scientists include health care providers, health planners, administrators, medical educators, policy and decision makers, the donor community, and representatives of other international development organisations.

There will be time for inquiry, constructive criticism, discussion, and an overview of future planning. The implications of research findings for programmes and policies will be discussed. Likewise, those primarily concerned with programme and policy issues will have the opportunity to discuss their needs for further information, with implications for future research directions.

Programme Highlights

This year's annual conference is the first to be held in the recently completed Sasakawa International Training Center at ICDDR,B. Also new this year is the "Annual Lecture", a keynote address to be delivered by a distinguished guest. This year's Annual Lecture, titled "A Simple Solution", will be delivered by Prof. William B. Greenough, III, ICDDR,B's former director. Prof. Greenough is a Professor of Medicine at the Johns Hopkins University School of Medicine.

Three Symposia are planned, one in each of the broad areas of ICDDR,B activities – Diarrheal Diseases, Population and Family Planning, and Maternal and Child Health and Nutrition. Each symposia will begin with a presentation on the scientific issues. There will follow a presentation on programme and policy issues, presented by a representative of the Government of Bangladesh. Finally, three discussants, representing NGO's, donor organisations, and other health and development organisations, will present their reactions, as well as perspectives on future directions.

In nine free paper sessions, the findings of recent research at ICDDR,B will be presented. These sessions are organised into related groups of presentations, as indicated by the titles of the sessions. Related posters are presented in the poster viewing area in the lobby. The poster presenters will be available to discuss the results displayed in the poster presentation at specified times.

On the last day of the conference, three working sessions will be held with a group of selected participants. The working session participants, including symposia participants and chairpersons and co – chairpersons of the free paper sessions, will meet to discuss the findings that have been presented. They will develop a list of comments and recommendations to be presented at the concluding session. These recommendations will include the implications of research findings for programmes and policies, as well as suggestions for future research directions from a programme and policy point of view. Professor Demissie Habte, Director of ICDDR,B, will formally close the conference with his concluding remarks.

PROGRAMME

Second Annual Scientific Conference of ICDDR,B

16 – 18 January 1993

Sasakawa International Training Centre
International Centre for Diarrhoeal Disease Research, Bangladesh
Mohakhali, Dhaka 1212

DAY 1: January 16, 1993

Time	Event	Venue*
8:00 a.m.	**Registration of Delegates**	Lobby, Ground Floor
9:00	**Opening Ceremony** – Welcome address by the Director, ICDDR,B – Addresses by the representatives of donor and international agencies – Address by the Special Guest – Address by the Chief Guest.	Auditorium
10:30	**Tea**	Lobby, 2nd Floor
11:00	**Annual Lecture – 1993** A Simple Solution Prof. William B. Greenough, III, Professor of Medicine, The Johns Hopkins University, USA	Auditorium
12:30	**Lunch**	Lobby, 2nd floor
1:00 – 3:15	**Symposium I: Diarrhoeal Diseases** Theme: Diarrhoeal Diseases – Biomedical and Nutritional Perspectives Chairperson: Dr. R. Bradley Sack Associate Director, Community Health Division, ICDDR,B	Auditorium

*All venues are in the Sasakawa International Training Centre.

Lecture I: 30 minutes

Topic: Nature and Scope of Laboratory Research on Diarrhoeal Disease in the Context of ICDDR,B

Speaker: Prof. Derrick Rowley, Consultant (Biotechnology), University of Adelaide, Australia
Former Chairman, ICDDR,B Board of Trustees

Lecture II: 30 minutes

Topic: Nutritional Perspective of Diarrhoeal Disease.

Speaker: Drs. S.K. Roy and I. Kabir
Clinical Sciences Division, ICDDR,B

Lecture III: 30 minutes

Topic: Policy Perspectives in Laboratory and Clinical Research on Diarrhoeal Diseases.

Speaker: Dr. M. Khalilullah
Joint Secretary, Ministry of Health and Family Welfare, Government of Bangladesh

Panel Discussion:

Discussant I: Dr. A.N.A. Abeyesundere
WHO Representative, Bangladesh (10 minutes)

Discussant II: Dr. Philip Gowers
World Bank, Dhaka (10 minutes)

Discussant III: Mr. Syed Ahmed
Secretary of Health & Family Welfare
Government of Bangladesh (10 minutes)

Chairman's concluding remarks: Dr. Sack (10 minutes)

3:15 **Tea** Venue: Lobby, 2nd floor

3:30 – 5:00 **Free Papers:** Venue: Auditorium

Theme: NUTRITION DURING DIARRHOEA

Chairperson: Prof. Demissie Habte, Director, ICDDR,B

Co – chairperson: Dr. Shafiqul Alam Sarker, ICDDR,B

3:30	Breastfeeding Practices of Mothers of Young Infants Admitted with Diarrhoea: Reasons for Early Complementary Feeding and Discontinuation of Breastfeeding.	Rukhsana Haider A. Islam, I. Kabir D. Habte
3:45	Misuse of Drugs and Withdrawal of Food in the Home Management of Persistent and Acute Diarrhoeas.	Asma Islam D. Mahalanabis, S. Rahman, S. Sultana, F.C. Patra
4:00	Interaction of Zinc Supplementation with Growth and Diarrhoea.	S.K. Roy S.M. Akramuzzaman R.H. Berhens A.M. Tomkins
4:15	Effects of Feeding a High – protein Diet to Children Recovering from Shigellosis: A 3 Months Follow – up Study.	Iqbal Kabir M.A. Malek, M. Rahman, R. Haider D. Mahalanabis
4:30	Increased Calorie Intake in Severely Malnourished Children Recovering From Diarrhoea: Effect of an Amylase Treated Weaning Diet.	Mujibur Rahman M.A. Islam D. Mahalanabis E. Biswas, N. Majid M.A. Wahed

Related Posters: Venue: Lobby, 1st Floor

Gastric Emptying of Liquids in Children Suffering from Persistent Diarrhoea.	P.K. Bardhan N.H. Alam S. Akramuzzaman D. Mahalanabis
Mechanism of Short – chain Fatty Acid Transport: Evidence of Active Butyrate Butyrate Absorption by Rat Distal Colon under Voltage – clamped Conditions.	G.H. Rabbani H. J. Binder

DAY 2: January 17, 1993

9:00 – 10:45 **Symposium II: Population and Family Planning** Venue: Auditorium

Theme: Population and Family Planning: Policy and Programmatic Challenges for the 1990s.

Chairperson: Dr. R. Bairagi, Project Director, Population Study Centre, ICDDR,B

Lecture I: 30 minutes

Topic: The Relevance of Research to the Family Planning Programme.

Speaker: Dr. John Haaga
Director, MCH – FP Extension Project, ICDDR,B

Lecture II: 30 minutes

Topic: Family Planning Programme Priorities in the 1990s.

Speaker: Mr. A.K.M. Rafiquzzaman
Director General, Directorate of Family Planning, Government of Bangladesh

Panel Discussion:

Discussant I: Mr. William Goldman
Director,
Office of Population & Health, USAID (10 minutes)

Discussant II: Mr. M. Alauddin
Country Representative,
Pathfinder International (10 minutes)

Discussant III: Prof. Barkat – e – Khuda
Advisor,
University Research Corporation, Bangladesh (10 minutes)

Chairman's concluding remarks: Dr. Bairagi (10 minutes)

10:45 **Tea** Venue: Lobby, 2nd floor

Poster Presentations Venue: Lobby, 1st floor

11:00 – 1:00 **Concurrent Free Papers:** ***Session A*** Venue: Seminar I

Theme: ANTIBIOTICS AND ORS IN THE MANAGEMENT OF DIARRHOEA

Chairperson: Prof. M.R. Khan, Consultant, ICDDR,B

Co – chairperson: Dr. Asma Islam, ICDDR,B

11:00	Role of Antimicrobials in the Management of Diarrhoeal Diseases.	M.A. Salam
11:15	Drug Resistant Shigellae: A Serious Problem for the Clinician in Choosing a Proper Antibiotic for Treatment.	Hafizur R.Chowdhury Md. Yunus, E.H. Khan R. Rahman
11:30	Changing Antibiotic Sensitivity Patterns and the Emergence of Multiple Antibiotic Resistance in *Vibrio cholerae* in Rural Bangladesh.	Md. Yunus O.M. Bateman, K. Zaman E.H. Khan H.R. Chowdhury A. Rahman, R. Rahman
11:45	Comparative Trial of Tetracycline, Erythromycin, Nalidixic Acid, Pivmecillinam and Ciprofloxacin in the Treatment of *V. cholerae* in Adults.	Wasif Ali Khan M. Begum, M.A. Salam P.K. Bardhan, M.R. Islam
12:00	Management of Acute Diarrhoea in Diabetics Using Three Types of Oral Rehydration Solution.	Rukhsana Haider A.K. Azad Khan, S.K. Roy N. Dewan, D. Mahalanabis
12:15	Determinants of Cholera Deaths in Bangladesh: A Case Control Study.	A.K. Siddique K. Zaman, K. Akram P. Mutsuddy, I. Bashir Y. Majumder, A.H. Baqui A. Eusof, R.B. Sack
12:30	Mothers' Perceptions of Rice Packet and Glucose Packet Oral Rehydration Solutions for Treatment of Diarrhoea in Young Children.	Sandra Laston A. Uzma, A.H. Baqui

Related Posters: Venue: Lobby, 1st floor

Oral Rehydration Therapy without Bicarbonate for Management of Dehydrating Diarrhoea.	Shafiqul Alam Sarker D. Mahalanabis

	Glutamine is Superior to Glucose in Stimulating Water and Electrolyte Absorption Across Rabbit Ileum.	Sufia Islam D. Mahalanabis, A.K.A. Chowdhury, M.A. Wahed, A.S.M.H. Rahman
	Community Perception of Diarrhoea and its Treatment in a Rural Setting of Bangladesh.	Md. Yunus K.M.A. Aziz, A. Bhuiya M. Strong
	Mothers' Knowledge and Use of Oral Rehydration Therapy in Three Health Delivery Areas in Matlab, Rural Bangladesh.	Md. Shafiqul Islam V. Fauveau, Md. Yunus

11:00 – 1:00 **Concurrent Free Papers:** ***Session B*** Venue: Auditorium

Theme: ORGANISING FOR EFFECTIVE FAMILY PLANNING SERVICES

Chairperson: Mr. M.A. Shaheed
Joint Secretary (FW), Ministry of Health and Family Welfare, Government of Bangladesh

Co – chairperson: Dr. Rushikesh M. Maru, ICDDR,B

11:00	Access of Rural Women to Family Planning Services: A Study in Bangladesh.	Md. Mafizur Rahman J.G. Haaga, R.M. Maru M.B. Hossain
11:15	Family Planning Performance in Chittagong Division: A Diagnostic Study.	Cristobal Tunon R.M. Maru, J.G. Haaga
11:30	Satellite Clinics in Rural Bangladesh: Issues in Implementing Decentralised Health and Family Planning.	Amy Sullivan J.G. Haaga, M.B. Hossain, F. Rahman, I.U. Ahmed A. Wazed
11:45	Performance Improvement Through Local Planning: An Action Research Project.	M. Yousuf Hasan R.M. Maru
12:00	Supervision: A Missing Link in the Bangladesh Family Planning Programme	Ali Ashraf R.M. Maru, Y. Hasan
12:15	The Role of Interpersonal, Mediated and System Level Communication in Raising MCH – FP Status in Matlab.	Md. Tawhidul Anwar A. Bhuiya, M.G. Rahman M.N. Hassan

Related Poster: Venue: Lobby, 1st floor

Overlap in the National Family Planning Management Information System. — Mahidul Islam, R. Maru, A. Ashraf

1:00 **Lunch** Venue: Lobby, 2nd floor

2:00 – 3:45 **Symposium III: Maternal and Child Health and Nutrition** Venue: Auditorium

Chairperson: Dr. O. Massee Bateman
Community Health Division, ICDDR,B

Lecture I: 20 minutes

Topic: Safe Motherhood and Nutrition in Pregnancy.

Speaker: Dr. A. de Francisco
Matlab MCH – FP Project Director, ICDDR,B

Lecture II: 20 minutes

Topic: Child Health and Nutrition

Speaker: Prof. M.Q – K. Talukder
Project Director, Institute of Child and Mother Health, Dhaka

Lecture III: 20 minutes

Topic: GOB Policies and Present Activities on MCH and Nutrition

Speaker: Prof. Masihur Rahman
Director – General, Health Services, Government of Bangladesh

Panel Discussion:

Discussant I: Dr. Aminul Islam
Director, MCH Services, GOB (10 minutes)

Discussant II: Dr. Rolf Carriere
UNICEF Country Representative, Dhaka (10 minutes)

Discussant III: Dr. A.I. Begum
MCH Coordination Cell, MOHFW, GOB (10 minutes)

Chairman's concluding remarks: Dr. Bateman (10 minutes)

3:45 **Tea** Venue: Lobby, 2nd floor

4:00 **Concurrent Free Papers:** ***Session A*** Venue: Seminar I

Theme: DIARRHOEA PATHOGENS: ROLE AND DETECTION

Chairperson: Maj. Gen. M.R. Choudhury, Ex – Commandant, Armed Forces Institute of Pathology, Dhaka

Co – chairperson: Dr. M.S. Islam, ICDDR,B

4:00	Isolation of Enterotoxigenic *Bacteroides fragilis* from Bangladeshi Children with Diarrhoea: A Case – control Study.	R. Bradley Sack M.J. Albert K. Alam, M.S. Akbar
4:15	Differentiation of Pathogenic Isolates of *Entamoeba histolytica* by Enzyme – Linked Immunosorbent Assay (ELISA).	Rashidul Haque
4:30	Detection of *Shigella* in Faecal Samples by Immunomagnetic Separation followed by DNA Amplification	Dilara Islam S. Tzipori, M.M. Islam A.A. Lindberg

Related Posters: Venue: Lobby, 1st floor

A Semi – quantitative Polymerase Chain Reaction Assay for Toxigenic *Vibrio cholerae* 01.	Shah M. Faruque A.R.M.A. Alim Q.S. Ahmad A.H. Talukder K.M.B. Hossain R.B. Sack, M.J. Albert
A Study of Detection of Shigellae Using Polymerase Chain Reaction and Culture Techniques on Stools of Dysentery Patients in Dhaka, Bangladesh.	M.S. Islam M.K. Hasan, M.A. Miah M.J. Albert M. Venkatesan M.M. Rahman M.S. Hossain D. Mahalanabis, R.B. Sack
Determination of Rotavirus Subgroups and their Clinical Correlation in Children with Diarrhoea.	G.H. Rabbani G. Zissis, S. Sarker K.S. Anwar
Prevalence of Shigellosis among Young Children in a Rural Community of Bangladesh.	Kh. Zahid Hasan K.M.A. Aziz, B.A. Hoque

	Clinical Characteristics of Diarrhoea Associated with Enteric Adenovirus Infection, Compared with Group A Rotavirus Diarrhoea.	Leanne Unicomb K. Jarecki – Khan
4:00 – 5:00	**Concurrent Free Papers:** ***Session B***	Venue: Auditorium
	Theme: SAFE MOTHERHOOD: ANTENATAL CARE AND DELIVERY PRACTICES	
	Chairperson: Ms. Fiona Duby Coordinator, Bangladesh Population and Health Consortium	
	Co – chairperson: Dr. Therese Juncker, ICDDR,B	
4:00	Provision of Antenatal Care by National Family Planning Field Workers.	Tanjina Mirza T. Juncker, R. Mita
4:15	Risk Approach of Antenatal Care in the Matlab Maternity Care Programme (1987 – 1990).	Anna – Maria Vanneste
4:30	The Influence of Birth Delivery Practices on Neonatal Survival in Matlab.	Golam Mostafa M. Strong

DAY 3: January 18, 1993

9:00 – 10:30	**Concurrent Free Papers:** ***Session A***	Venue: Seminar I
	Theme: ISSUES IN PREVENTION OF DIARRHOEA	
	Chairperson: Prof. R.B. Sack Associate Director, Community Health Division and Laboratory Sciences Division, ICDDR,B	
	Co – chairperson: Dr. F. Qadri, ICDDR,B	
9:00	Children who are at High Risk of Diarrhoea in Early Years of Life: Evidence from a Community Study in Bangladesh.	Nurul Alam
9:15	Hygiene Practices in Cleaning After Defaecation and Disposing of Stool of Young Children with Diarrhoea in Rural Communities of Bangladesh.	K.M.A. Aziz Md. Yunus, A. Bhuiya M. Strong

9:30	Studies on Thermal Stability of an Oral Cholera Vaccine Containing Killed Cells and Recombinant B – subunit of Cholera Toxin.	M. Hoque, Z.U. Ahmed A.S.M.H. Rahman R. Bradley Sack A – M. Svenerholm
9:45	Heterologous Protection of Monkeys after Oral Immunisation with an Attenuated Mutant of *Shigella flexneri.*	M.M. Ashraf D.K. Giri Zia Uddin Ahmed
	Related Posters:	Venue: Lobby, 1st floor
	Local and Systemic Immune Responses to Shigellosis in Adult Bangladeshi Patients.	Rubhana Raqib S. Tzipori, P.K. Bardhan M. Islam, A.A. Lindberg
	Immune Response of Children with Shigellosis and Leukaemoid Reaction.	Tasnim Azim F. Qadri, J. Hamadani M.S. Sarker, A. Chowdhury M.A. Salam

9:00 – 10:30 **Concurrent Free Papers:** ***Session B*** Venue: Auditorium

Theme: CAUSES AND CORRELATES OF MORTALITY AND NUTRITIONAL STATUS

Chairperson: Prof. M. Kabir
Department of Statistics,
Jahangirnagar University

Co – chairperson: Dr. Abbas Uddin Bhuiya, ICDDR,B

9:00	Infant and Child Mortality among High – and Low – Risk Bangladeshi Mothers in Relation to Socioeconomic Variables.	A.I. Chowdhury A. de Francisco K.M.A. Aziz
9:15	Deaths Due to Violence and Accidents to Women of Reproductive Age in Rural Bangladesh.	F. Rahman Md. M. Rahman Mian Bazle-Hossain
9:30	Epidemiology and Causes of Death among Children in the Slums of Dhaka.	A.H. Baqui Quamrun Nahar S. Amin, A. Uzma, S.E. Arifeen

9:45	Birth Intervals in Determining Nutritional Status of Children in Matlab, Bangladesh.	Nikhil C. Roy Md. S. Rahman J.G. Haaga
10:00	Maternal Malnutrition as a Predictor for Developing Severe Malnutrition in Children: A Case – control Study.	M. Aminul Islam M.M. Rahman D. Mahalanabis
	Related Posters:	Venue: Lobby, 1st floor
	Levels and Correlates of Maternal Nutritional Status in Urban Slums of Dhaka.	A.H. Baqui S.E. Arifeen, K. Alvi A. Uzma, S. Amin N. Paljor
	Longitudinal Demographic Surveillance in Matlab.	M. Strong, A.M. Sardar Kapil Ahmad, DSS Staff
	Childhood Mortality Differentials in the Maternal and Child Health and Family Planning Programme in Matlab, Bangladesh.	Lutfun Nahar F. Rajulton
	Did a Fertility Control Programme Change Infant Mortality in Matlab?	Lutfun Nahar A.K.M.A. Chowdhury
10:30	**Tea**	Venue: Lobby, 2nd floor
	Poster Presentations	Venue: Lobby, 1st floor
10:45 – 1:00	**Concurrent Free Papers:** ***Session A***	Venue: Seminar I
	Theme: IMMUNISATION AND INFECTIOUS DISEASES	
	Chairperson: Dr. Lutfor Rahman Talukder Project Director, EPI	
	Co – chairperson: Dr. A.H. Baqui, ICDDR,B	
10:45	Community – based Management of Childhood Pneumonia: Home – based Treatment or Referral?	A. de Francisco M.K. Stewart, V. Fauveau J. Chakraborty
11:00	Factors Affecting Immunisation among Children in a Rural Area of Bangladesh.	A.K. Majumder S.M.S. Islam, A.U. Bhuiya

11:15	Measles in Rural Bangladesh: Issues of Validation and Age Distribution	A. de Francisco H.R. Chowdhury A.M. Sarder, V. Fauveau J. Chakraborty, Md. Yunus
11:30	Safety and Efficacy of Vitamin A Supplementation in Infancy Using the EPI as an Entry Point in a Rural Community.	A. de Francisco H.R. Chowdhury Md. Yunus, A.H. Baqui J. Chakraborty
	Related Poster:	Venue: Lobby, 1st floor
	Epidemic Measles in Rural Bangladesh: The Need for Intensification of Measles Vaccine Coverage and an Effective Vaccine.	S.M. Akramuzzaman H.R. Chowdhury A.J. Hall, A. de Francisco
10:45 – 1:00	**Concurrent Free Papers:** ***Session B***	Venue: Auditorium
	Theme I: GENDER ISSUES IN HEALTH DEVELOPMENT	
	Chairperson: Dr. Sajeda Amin Bangladesh Institute of Development Studies	
	Co – chairperson: Dr. Kanta Alvi, ICDDR,B	
10:45	Is Gender Preference an Obstacle to the Success of Family Planning Programmes in Rural Bangladesh?	Radheshyam Bairagi
11:00	Excess Female Child Mortality in Matlab, Bangladesh: The Role of Birthspacing and Public Health Interventions.	Mizanur Rahman
11:15	The Invisibility of Women in a Bangladeshi Hospital: The Implications of a Qualitative Study to Investigate Low Coverage of Tetanus Toxoid Vaccination.	Sushila Zeitlyn A.K.S.M. Rahman M. Gomes D. Mahalanabis
11:30	Empowering Women in Dhaka Slums.	Kirk Dearden G.N.I. Faisal, J. Khatun

Theme II: FERTILITY REGULATION BEHAVIOUR

Chairperson: Dr. Halida H. Akhter
Director, BIRPERHT

Co – chairperson: Dr. R. Bairagi, ICDDR,B

12:00	Fertility Behaviour and Pregnancy Outcome among Rural Adolescent Women in Bangladesh.	Fazilatun Nessa
12:15	`No Need For Contraception': Perceptions of Pregnancy Risk Among Women in the Slums of Dhaka.	Sarah Salway K. Alvi, Q. Nahar
12:30	Determinants of Contraceptive Method Choice Among Urban Slum Women.	Kanta Alvi S. Salway
	Related Poster:	Venue: Lobby, 1st floor
	Contraceptive use in Teknaf, A Remote, Conservative Area in Bangladesh: Success of a CBD Programme.	M.H. Munshi Md. Umra A.K.M.R. Karim Sk. Md. M. Rahman
1:00	**Lunch**	Venue: Lobby, 2nd floor
2:00	**Concurrent Working Sessions** (attendance by invitation)	
	I. MCH/Nutrition Research	Venue: Seminar II
	II. Population/FP Research	Venue: Seminar I
	III. Diarrhoeal Disease Research	Venue: Clinical Conference Room
2:00	Poster Presentations	Venue: Lobby, 1st floor
3:15	**Tea**	Venue: Lobby, 2nd floor
3:45 – 5:00	**Concluding Session**	Venue: Auditorium
3:45	MCH/Nutrition Working Session Report	
4:10	Population/FP Working Session Report	
4:35	Diarrhoeal Disease Working Session Report	
5:00	Closing Remarks by Prof. Demissie Habte, Director, ICDDR,B	

SECOND
ANNUAL SCIENTIFIC CONFERENCE

16 – 18 January 1993

Summaries of Lectures and Abstracts of
Free Paper and Poster Presentations

LECTURE SUMMARIES

ABSTRACTS

FREE PAPER AND POSTER PRESENTATIONS

Day 1. **Nutrition During Diarrhoea**

Day 2. **Antibiotics and ORS in the Management of Diarrhoea**

Organising for Effective Family Planning Services

Diarrhoea Pathogens: Role and Detection

Safe Motherhood: Antenatal Care and Delivery Practices

Day 3. **Issues in Prevention of Diarrhoea**

Causes and Correlates of Mortality and Nutritional Status

Immunisation and Infectious Diseases

SECOND ANNUAL SCIENTIFIC CONFERENCE

16 – 18 January 1993

ABSTRACTS

1

A SIMPLE SOLUTION

William B. Greenough, III

The Johns Hopkins University, Baltimore, USA

Advances in molecular biology have driven much of modern medical education and research for half a century. Too often brilliant insights into molecular structure and function have not translated into better treatment. For example, the therapy of sickle cell disease has not been changed by exact knowledge of gene code and its product. In contrast, precise understanding of intestinal salt and water transport and definition of the way enterotoxins alter cell transduction of humoral and neural signals has resulted in highly successful, simple, low cost, preventive, and curative methods for cholera and acute diarrhoeal diseases. The discoveries of research in cholera and diarrhoea have depended on connecting basic laboratory science in physiology, biochemistry, and molecular biology to the bedside of patients with diarrhoeal illnesses. Although many of the higher technology research workers were from wealthy countries, several of the most important observations were made by scientists in India. The evolution of laboratory science to low cost effective therapies for patients from the most deprived settings required physicians and technical staff who thoroughly understood the basic sciences to become involved at the bedside of poor patients. Success was achieved by support for institutions and individuals from many parts of the world in a sustained effort of more than 30 years. The challenge is now to understand the ingredients of this success and project it into the future to make further gains not only in diarrhoeal illnesses but other diseases now threatening an increased global toll of illness and death.

2

NUTRITIONAL PERSPECTIVE OF DIARRHOEAL DISEASE

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There is enough evidence now to show that malnutrition is directly and indirectly the most important determinant of morbidity and mortality related to infectious diseases. Diarrhoea causes malnutrition and contributes to the 60% – 70% undernourished children less than five years old with similar magnitude of stunting and wasting. Risk factors for diarrhoea and malnutrition are inseparable and their synergistic action only trebles the mortality risk. Children with poor nutritional status suffer more from diarrhoea and its consequences. Recent works suggest that better case management of severe diarrhoea requires adequate intake of both macronutrient (energy, protein) and micronutrients (zinc, vitamin A, folate). Improvement in nutritional status or micronutrient status has shown reduction in subsequent diarrhoeal morbidity and growth faltering. Home – based intervention or nutrition education has reduced diarrhoeal attacks only with improved breastfeeding practices. Severely malnourished children with invasive diarrhoea, persistent diarrhoea and diarrhoea are at higher risk of subsequent malnutrition and death. Recent works in this field suggest a better dietary tool can enhance recovery and overcome malnutrition. Zinc, vitamin A and folate supplementation during diarrhoea has shown reduced severity and early recovery. Excess mortality occurs in malnourished children even after diarrhoeal treatment, warranting a policy on appropriate nutritional rehabilitation. The basis of the nutrition policy with regard to diarrhoeal disease should consider: firstly, improve and sustain better nutrition of children through food security and breastfeeding at the household and community level; secondly, during and after diarrhoeal and dysenteric illness, frequent feedings with additional energy, protein and micronutrients should be continued; thirdly, severely malnourished children should receive appropriate nutritional rehabilitation as required.

3

THE RELEVANCE OF RESEARCH TO THE FAMILY PLANNING PROGRAMME

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Family planning, along with immunisation, has been one of the notable, and almost unexpected, success stories in Bangladesh in the 1980s. Both "demand – side" and "supply – side" pessimists have had their arguments partially disproved by experience.

Nationwide, 40% of married women of reproductive age use contraceptives. In small areas like Matlab, where the ICDDR,B's MCH-FP project operates, more than 60% use contraception. Increased contraception has brought about a decrease in fertility rates, from about seven births per woman on average in the mid-1970s to below five births per woman in the early 1990s. No comparably poor country has ever started its fertility decline.

What has been the contribution of research to this success? Which types of research have been most relevant to policy making? And how can research help the national family planning programme reach its demographic and health targets for the year 2000? This paper reviews the experience of ICDDR,B since 1977 to answer these questions. It finds that research has been useful in three areas: 1) assessing factors affecting utilisation of services and documenting effectiveness in field trials; 2) demonstrating that an achievement is possible in a particular setting, thus mobilising support for its extension; and 3) uncovering the less obvious barriers to service delivery and field-testing ways to overcome them within existing administrative systems. Research has been weak in finding ways to improve quality, as opposed to coverage, of services; in assessing efficiency; and in testing changes in management style and administrative structure.

To deal with the latter issues, future research on the family planning programme will have to deal more with cost, management, and structural issues. This will require more active partnership between research and service delivery organisations, and new styles for planning, conducting, and reporting research.

4

SAFE MOTHERHOOD AND NUTRITION IN PREGNANCY

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Maternal and child health activities have been integrated into the primary health care strategy for achieving the goal `Health for All by the Year 2000'. Although certain activities directed towards child survival have proved successful, less clear is the impact of safe motherhood activities on maternal mortality and morbidity in the developing world.

Maternal mortality has been reported at levels up to a hundred times more in developing than in developed countries. A maternal death is not only a tragedy at the household level, it is also associated with an increased risk of neonatal and infant mortality of the resulting offspring. It has been reported in Matlab that up to 30% of deaths in women of reproductive age are related to direct obstetrical complications, a further 30% to infectious diseases and the rest to injuries and other causes. Maternal

mortality rates have been reduced in the intervention area as a result of the family planning programme which, by reducing the chances of a woman being pregnant, reduces the possibility of dying of pregnancy related factors. However, the maternal mortality ratio, or the possibility of dying once pregnant, continues posing problems for its reduction. Nurse midwives have the potential of reducing the maternal mortality ratio. However, interventions increasing the utilisation of trained personnel on obstetrical care, improving the referral system and increasing the effectiveness of the referral centres to deal with caesarean sections and blood transfusions are required if any impact is to be achieved.

Repeated pregnancies and short birth intervals are associated with wasting of the mother. Maternal morbidity and malnutrition during pregnancy result in low birth weight of the newborn, posing it to a higher risk of death. It is, therefore, important to view activities towards reduction of maternal mortality, morbidity and malnutrition during pregnancy, not only as isolated maternal activities, but also as keystones of child survival.

5

CHILD HEALTH AND NUTRITION

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The presentation attempts to review the current scientific research which has policy implications for child health and nutrition in Bangladesh.

`Health for All by the Year 2000' demands effective implementation of primary health components in the community. Although Bangladesh has a unique primary health care infrastructure, it has yet to launch and implement all the important programmes across the country to achieve this goal.

The high mortality and disease load of children is largely preventable. By many parameters Bangladesh has the worst nutrition situation in the world. Malnutrition significantly contributes to morbidity and mortality in children. It is crucial that the country spend its scarce resources on cost – effective, priority programmes.

Breastfeeding is a magnificent example of disease control, caring practices and food security. A child who is breastfed has 25 times and 4 times less chance of dying from diarrhoea and ARI respectively than a child who is bottle – fed. One – third of the deaths in the age range of 18 – 36 months in rural Bangladesh are attributable to lack of breastfeeding. Studies have shown that the development of lactation management skills of health – care providers in hospitals has had a positive impact on breastfeeding practices.

ARI programmes seem a priority considering the study finding that the combination of specific and nonspecific interventions can reduce acute lower respiratory tract infection mortality by 50% and overall mortality among children less than 5 years old by 30%.

Low-cost health and nutrition `package' interventions in the community have been shown to drastically reduce mortality in children.

The research on positive deviants and caring capacities is likely to provide important health and nutrition policy guidelines in a developing country.

6

BREASTFEEDING PRACTICES OF MOTHERS OF YOUNG INFANTS ADMITTED WITH DIARRHOEA: REASONS FOR EARLY COMPLEMENTARY FEEDING AND DISCONTINUATION OF BREASTFEEDING

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To assess the breastfeeding practices of mothers of infants 6 months old and younger, hospitalised with diarrhoea, a survey was carried out from October 1991 to April 1992. One hundred and thirty-two mothers were randomly selected for interviews; a pretested structured questionnaire was used to record the relevant information. Breastfeeding was seen to be continuing in 70.5% of mothers at the time of admission, but 24.2% had already stopped and 5.3% said they had never breastfed. The median (range) age at which breastfeeding had been stopped was 30 (2-150) days. Exclusive breastfeeding was almost non-existent. Complementary feeding with other milk or foods was started at 27 (1-210) days in 120 cases. The majority of mothers reported the reasons to be perceived insufficient breastmilk and diarrhoea (44.0% and 16.4%). Powdered milk was most commonly selected to complement breastmilk (54.5%), the next being fresh cow's milk (24.5%). The infant's grandmother was the decision-maker in 32.8% of the cases, followed by the mother (27.7%) and the doctor (18.5%). Baby's refusal to suckle the breast was the reason for stopping breastfeeding in 11 of 32 mothers (34.3%), and lack of confidence to produce sufficient breastmilk in 6 of 32 mothers (18.7%). The results show an alarming trend in breastfeeding practices, which is likely to contribute towards increased morbidity and mortality from diarrhoea and other infectious diseases. To discourage early complementary feeding and discontinuation of breastfeeding, promotional programmes should give more emphasis to building up the mother's confidence in her ability to breastfeed and to supporting her in her efforts to do so.

7

MISUSE OF DRUGS AND WITHDRAWAL OF FOOD IN THE HOME MANAGEMENT OF PERSISTENT AND ACUTE DIARRHOEAS

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To better understand the home management of persistent and acute diarrhoea, we interviewed mothers of 153 hospitalised children 5–24 months of age enrolled in a study of dietary management of diarrhoea over a period of one year. Sixty-six children had persistent diarrhoea (>14 days) (PD) and 87 had acute diarrhoea (<3 days) (AD). The results of the interview indicated that the characteristics of the two groups of patients were comparable with regard to age, gender, nutritional status, maternal education, family income, age of introduction and type of weaning food. There was no difference in ORS-use rates between the PD and AD groups. However, the number of PD children given antimicrobials (metronidazole, furazolidone, nalidixic acid, trimethoprim-sulphamethoxazole, ampicillin, erythromycin, and tetracycline) was significantly higher than the number of children with AD given the same drugs (68% vs 21%, $P<0.0001$). Predominant breastfeeding was significantly less in the PD group than in the AD group (14% vs 37%, $p<0.002$). Supplemental milk, cereal-gruel and weaning foods were withdrawn in about 50% of children in both groups during diarrhoea.

These results indicate that in the home management of persistent and acute diarrhoea, emphasis should be given to appropriate feeding practices, and the random use of antimicrobial drugs should be discouraged. This information is useful to design health education messages and to plan intervention for health practitioners and health workers in the community.

8

INTERACTION OF ZINC SUPPLEMENTATION WITH GROWTH AND DIARRHOEA

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Zinc has been shown to enhance skeletal growth when supplemented in deficient patients. It is not known whether zinc retention is adequate during diarrhoea and if it is able to overcome post-diarrhoeal growth faltering and affect growth rate due to diarrhoeal morbidity. To address these questions, 54 children given placebo and 57 children given zinc supplementation at twice the RDA for 2 weeks during an acute diarrhoeal episode were followed up for linear growth and morbidity at weekly intervals for 8 weeks after discharge from the Diarrhoeal Treatment Centre of ICDDR,B. On follow-up there was a significant reduction of diarrhoeal episodes (0.6 vs 0.07 attacks) and respiratory (2.4 vs 1.4 attacks) illness among the stunted children who received zinc supplementation. All children receiving zinc supplementation increased in length significantly greater than those in the placebo group (19 vs 14.5 mm). Post-diarrhoeal follow-up showed a significant relationship between the growth rate and initial growth deficit in the zinc supplemented group ($r=0.5$). The rate of length gain was significantly higher than that of the placebo group (slope = -0.2 vs 1.08, $p<0.05$). Children of the placebo group also did not show any relationship between growth rate and initial stunting ($r=0.02$). There was also a significant relationship between the days of illness with diarrhoea and growth faltering in the placebo group ($p<0.05$). The study clearly demonstrates that moderate zinc supplementation during an acute diarrhoeal phase sustains skeletal growth which is interrupted in diarrhoea.

9

EFFECTS OF FEEDING A HIGH-PROTEIN DIET TO CHILDREN RECOVERING FROM SHIGELLOSIS: A 3 MONTHS FOLLOW-UP STUDY

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To evaluate the impact of a high-protein diet on growth, 69 malnourished children recovering from shigellosis were fed either a high-protein diet or a standard protein diet for three weeks in the hospital. Children were followed up at home every 2 weeks for a period of 3 months after discharge from the hospital. During follow-up their body weight, height, mid-upper-arm circumference and skinfold thickness were measured. Parents were also asked to report their children's illnesses, if any, such as diarrhoea, fever and respiratory infections. Thirty-one children in the high-protein diet group and 27 in the standard protein group completed the 3-months follow-up. The mean ± SD increases in height were 3.1 ± 0.7 cm vs 2.2 ± 0.7 cm for the high-protein and standard protein groups respectively ($p < 0.001$). The mean ± SD increases in body weight were 1.05 ± 0.48 kg vs 0.82 ± 0.59 kg respectively for high-protein and standard protein groups ($p = NS$). The number of diarrhoeal episodes per child were 1.9 in the high-protein group and 2.3 in standard protein group during the follow-up. There were 22.8% more diarrhoeal episodes in the standard protein group than in the high-protein diet group. These results suggest that feeding a high-protein diet to malnourished children during convalescence from shigellosis results in reduction in diarrhoeal episodes and enhanced linear growth, which persisted even after 3 months. The public health implication of this study is that the nutritional status of these malnourished children suffering from shigellosis may be improved by appropriate dietary intervention.

10

INCREASED CALORIE INTAKE IN SEVERELY MALNOURISHED CHILDREN RECOVERING FROM DIARRHOEA: EFFECT OF AN AMYLASE TREATED WEANING DIET

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To evaluate the role of an energy-dense diet liquidised with amylase from germinated wheat (ARF) in increasing the energy intake and its acceptability by mothers, 78 severely malnourished children 5-18 months of age recovering from diarrhoea were studied. They were randomly given either an ARF mixed liquid porridge (study diet) or an unaltered thick porridge (1st control) or a liquid porridge with additional water (2nd control). Mothers were interviewed on the acceptability of the study diets. A preweighed amount of porridge was then served to the children, and mothers were advised to feed their children within half an hour. The intake of porridge was calculated by subtracting the left-over amount from the amount offered. The porridge was offered 4 times a day for 5 days. In addition, children were given 3 milk-cereal feedings daily and breastfed children were allowed to take breast milk *ad libitum*. The intake of breast-milk was recorded from 10 a.m. to 4 p.m. by test weighing. The mean ± SD intakes (g/kg/d) of porridge in the three groups were 61 ± 18, 46 ± 15, and 65 ± 21 respectively. The mean ± SD energy intake from porridge was significantly ($p < 0.001$) higher in the ARF group than in either of the controls (97 ± 27, 69 ± 22, and 63 ± 22 kcal/kg/d respectively). Feeding of the study porridge was not associated with any significant adverse effect. All diets were equally acceptable to almost every mother (100%, 96%, and 96% respectively). The results suggest that ARF-treated porridge is acceptable to mothers, and can be used to increase calorie intake by severely malnourished children during convalescence from diarrhoea.

11

GASTRIC EMPTYING OF LIQUIDS IN CHILDREN SUFFERING FROM PERSISTENT DIARRHOEA

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The total gut transit time has been observed to be markedly shortened in children suffering from persistent diarrhoea (diarrhoea continuing for >15 days) suggesting

abnormal gastrointestinal motor functions. This study examines whether gastric emptying of liquid is impaired in children suffering from persistent diarrhoea. Gastric emptying was measured in 10 patients (aged 6 – 12 months) suffering from persistent diarrhoea and 10 healthy controls (aged 7 – 12 months) using the dye – dilution double – sampling technique of George. The test meal used was 5% dextrose in water, the volume being 20 ml/kg body weight.

The median (range) of the percentages of the liquid meal remaining in the stomach at 10, 20, 40 and 60 minutes after instillation of the test meal were 72 (63 – 88), 54 (39 – 78), 29 (16 – 52) and 14 (3 – 32) respectively in the patients, whereas in the controls the values were 58 (49 – 63), 33 (24 – 40), 11 (2 – 16) and 3 (1 – 7) respectively, the differences being statistically significant ($p < 0.001$) at each time point. The half – times of gastric emptying ($T_{1/2}$) were 21 (15 – 32) minutes in the patients, and 13 (10 – 15) minutes in the controls ($p < 0.001$).

It is concluded that persistent diarrhoea in children is associated with abnormal gastric motor function, as manifested by delayed emptying of a liquid meal.

12

MECHANISM OF SHORT – CHAIN FATTY ACID TRANSPORT: EVIDENCE OF ACTIVE BUTYRATE ABSORPTION BY RAT DISTAL COLON UNDER VOLTAGE – CLAMPED CONDITIONS

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Short – chain fatty acids (SCFA) are the major anions in stool water and are synthesised by colonic bacteria from non – absorbed carbohydrates. The mechanism of SCFA absorption in the mammalian large intestine has not been established. To provide evidence that SCFA absorption is, at least in part, an active transport process these experiments determined unidirectional and net ^{14}C butyrate (used as a model SCFA) fluxes across isolated intact colonic mucosa; established methods to study unidirectional fluxes under voltage – clamped conditions were employed. In Ringer's solution at 0.5 mM and 1.25 mM butyrate concentrations, mucosal – to – serosal butyrate movement was significantly greater than serosal – to – mucosal butyrate movement, so that net butyrate absorption (mean±SE) was observed: 21±2.9 and 50.9±4.8 nmoles/h.cm^2, respectively. At higher butyrate concentrations (2.5, 5.0, 12.5, 37.5 mM) net butyrate movement was not significantly different from zero. These results suggest that butyrate is absorbed by an active transport process but that butyrate diffusion is also substantial, since at higher butyrate concentrations net butyrate movement is zero. There was additional evidence of active butyrate absorption in that net butyrate absorption was abolished by incubation in 100% nitrogen and removal of sodium from the bathing solution; net butyrate

absorption was inhibited by 50% by reducing the incubation temperature from 37°C to 25°C. Butyrate absorption was not altered in Cl-free Ringer's solution and unidirectional butyrate fluxes were similar at pH 7.4 and 6.4. These studies provide evidence that butyrate absorption from the rat distal colon is an active, energy-dependent, Na-dependent transport process. These results do not establish the specific transport mechanism responsible for colonic SCFA absorption. Whether the transport mechanism responsible for active butyrate absorption is a sodium co-transport process or an anion exchange process will require further study.

13

ROLE OF ANTIMICROBIALS IN THE MANAGEMENT OF DIARRHOEAL DISEASES

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Diarrhoeal diseases are important causes of childhood illness and death in developing countries. The majority of diarrhoeal episodes are caused by bacterial pathogens. In terms of incidence, infection due to enterotoxigenic *Escherichia coli*, *Campylobacter jejuni*, *Shigella* spp., *Vibrio cholerae*, and *Salmonella* spp. are important. Rehydration and maintenance of hydration using appropriate intravenous and/or oral fluids form the cornerstone in the management of diarrhoeal diseases. The objectives of antimicrobial therapy for infectious diseases include reduction of mortality, reducing the duration, prevention of complications, prevention of and limiting disease transmission, etc. Currently, therapy with appropriate antimicrobials is indicated for the treatment of infections due to *Vibrio cholerae*, *Shigella* spp. and *Salmonella typhi*. Generally, enterotoxigenic *Escherichia coli* causes mild watery diarrhoea of shorter duration, and antimicrobial therapy is not indicated. In the treatment of infections due to *Campylobacter jejuni*, and *Salmonella enteritidis*, antimicrobials have either failed to demonstrate clear benefit, or such therapy has been associated with undesirable effects. Other than safety, the most important problem of antimicrobial therapy is its association with the emergence of drug-resistant organisms. The factors that contribute to this problem include: use without proper indication, inadequate dose and duration of therapy, and non-compliance. The problem of antimicrobial resistance necessitates monitoring of susceptibility patterns and continued search for effective alternatives. Determination of the need for and selection of proper antimicrobials requires a combination of epidemiologic information, clinical experience, adequate information on antimicrobial susceptibility patterns of different pathogens, etc. Additional factors that must be considered include: safety profiles of antimicrobials, availability, cost of therapy, drug formulation, and patient compliance. This paper addresses the current problems regarding antimicrobial therapy and antimicrobial options.

14

DRUG – RESISTANT SHIGELLAE: A SERIOUS PROBLEM FOR THE CLINICIAN IN CHOOSING THE PROPER ANTIBIOTIC FOR TREATMENT

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Antibiotic treatment is considered to be the cornerstone of therapy for shigellosis which is a leading cause of morbidity and mortality in Bangladesh. However, the predominant *Shigella* species have developed resistance against commonly used antibiotics, including tetracycline, ampicillin and cotrimoxazole. Nalidixic acid has been the effective alterna – tive drug for treating shigellosis, but resistance to this drug is also increasing.

Faecal specimens from patients admitted to the Diarrhoea Treatment Centre (DTC) of ICDDR,B in 1991 were cultured, as usual, for the isolation of *Shigella* with standard microbiological techniques. All isolates of *Shigella* spp. were tested for their sensitivity to ampicillin, cotrimoxazole, nalidixic acid and pivemecillinam by disc diffusion method. Minimum inhibitory concentration (MIC) of a few pivmecillinam resistant and sensitive *S. dysenteriae* type 1 and *S. flexneri* was determined using standard technique. The *Shigella* serotypes isolated were predominantly *S. flexneri* (58.6%) followed by *S. dysenteriae* type 1 (28.7%) and other shigellae (12.6%). Almost 100% of *S. dysenteriae* type 1 was resistant to ampicillin, cotrimoxazole and nalidixic acid. 5.1% of *S. flexneri* was resistant to nalidixic acid. The pivmecillinam resistant *Shigella* strain was first detected in July 1991. During the year, 5.7% of *S. dysenteriae* type 1, 9.6% of *S. flexneri* and 11.5% of other shigellae were resistant to pivmecillinam. Pivmecillinam may lose its effectiveness in shigellosis within a short period of time since high grade resistance was observed as revealed by the very high MIC value of the resistant strains. Monitoring of antibiotic sensitivity of *Shigella* isolates should continue for rational choice of antibiotics. Research should continue to find effective alternative antibiotics for the treatment of shigellosis.

15

CHANGING ANTIBIOTIC SENSITIVITY PATTERNS AND THE EMERGENCE OF MULTIPLE ANTIBIOTIC RESISTANCE IN *VIBRIO CHOLERAE* IN RURAL BANGLADESH

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Vibrio cholerae continues to be a very important pathogen causing acute dehydrating diarrhoea and death. Adequate fluid and electrolyte replacement is the mainstay of treatment, but use of an appropriate antibiotic can reduce the volume and duration of diarrhoea, the duration of excretion of vibrios, and the amount of fluid replacement required. Tetracycline has been the antibiotic of choice, but the vibrios being isolated in 1992 are showing resistance to multiple antibiotics including tetracycline. The ICDDR,B continually monitors cholera through clinical and laboratory surveillance at the Matlab Health and Research Centre (MHRC) from a demographically defined population of 200,000 persons. Diarrhoea patients admitted from the surveillance area to MHRC routinely have a stool specimen cultured for *V. cholerae* using standard techniques. Since 1987, sensitivity of all *Vibrio* isolates against common antibiotics including tetracycline, ampicillin, furazolidone, cotrimoxazole and nalidixic acid was determined by the disc diffusion method. During 1987 - 1989, 99% of 1217 *V. cholerae* isolates were sensitive to tetracycline but they showed high resistance to furazolidone (69%) and ampicillin (43%). In 1990, 6% or less of 50 such isolates were resistant to these drugs. In 1991, only 1% of 250 isolates were resistant to tetracycline and ampicillin but 40% and 31% of these were resistant to furazolidone and cotrimoxazole, respectively. A total of 462 isolates tested up to September 30, 1992 showed multiple antibiotic resistance to tetracycline (61%), ampicillin (24%), furazolidone (31%), cotrimoxazole (70%) and erythromycin (4%). Emergence of multiple antibiotic resistance of *V. cholerae* to all four common drugs, particularly to tetracycline, has important therapeutic and public health implications. Monitoring of the sensitivity of *V. cholerae* should be continued for the rational choice of antibiotics.

16

COMPARATIVE TRIAL OF TETRACYCLINE, ERYTHROMYCIN, NALIDIXIC ACID, PIVMECILLINAM AND CIPROFLOXACIN IN THE TREATMENT OF *V. CHOLERAE* IN ADULTS

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This randomised clinical trial compared the efficacy of ciprofloxacin (CIP), tetracycline (TET), erythromycin (ERY), nalidixic acid (NAL), and pivmecillinam (PIV) in the treatment of adults (≥18 years) with cholera. Patients with acute watery diarrhoea of ≤24h duration with moderate to severe dehydration, and who had received no antimicrobial were selected. During a 4h base-line period, patients were rehydrated using intravenous acetate solution. They were enrolled if basal purging was ≥5ml/kg/hr, stool dark-field revealed *V. cholerae*, and written consent was obtained. Following a randomisation procedure, patients received for 3 days either 500mg CIP every 12h; 400mg PIV every 6h; or 500mg TET, ERY or NAL every 6h. Intake and output were recorded every 8h throughout the study, and rectal swab cultures were performed on admission and on each of three subsequent days. Of 75 patients enrolled, 73 were eligible for analysis. Mean total diarrhoeal stool volume per kg was 155ml for those treated with CIP, 212ml for ERY, 293ml for TET, 246ml for NAL, and 212ml for PIV. The differences were significant between the CIP and TET($P=0.037$). At 72h diarrhoea stopped in 93% of the patients in the CIP group and 80% in the ERY compared to 46% in TET ($P=<0.0071$ for both comparisons). Bacteriologic clearance was 100% at 24h in patients treated with CIP compared to 20% and 8% ($P=<0.0001$ for both comparisons) in the ERY and TET groups respectively. However, 12/13(92%) patients in the TET were infected with *V. cholerae* resistant to TET.

The results suggest that ciprofloxacin, in conjunction with appropriate fluid therapy, is best in the treatment of cholera in adults; erythromycin is next best. Nalidixic acid and pivmecillinam are not effective and tetracycline has no role in the treatment of cholera caused by tetracycline-resistant strains of *V. cholerae*.

17

MANAGEMENT OF ACUTE DIARRHOEA IN DIABETICS USING THREE TYPES OF ORAL REHYDRATION SOLUTION

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To assess whether there is significant risk of hyperglycaemia with the presently used oral rehydration solutions (ORS) in diabetics with acute diarrhoea, a prospective randomised trial was carried out with 3 types of ORS. Forty-five diabetics 15-60 years old, with diarrhoea for less than 3 days, were assigned to receive either a glucose containing oral rehydration solution (WHO-ORS), a solution containing complex carbohydrate (rice-ORS), or no carbohydrate (glycine ORS). Intake of ORS and water and output of stool, urine and vomitus were recorded every 8h and total energy intake from diet was calculated daily. Finger-prick blood glucose levels were assessed four times daily by a glucometer during their hospital stay. Results showed that on the first day, after administration of glycine-ORS, there was a reduction in blood glucose levels before supper compared to the admission levels (11.25±1.02 vs 13.41 1.38mmol/L); the opposite occurred in the other two groups (WHO-ORS group having 12.58±1.94 mmol/L before supper and 11.21±1.93 on admission, rice-ORS group having 15.42±1.96 before supper and 12.93±1.16 on admission). The difference was not significant either within or between the three treatment groups (p=NS). However after 24 hours, the fluctuation in blood glucose levels was similar in all groups.

Although duration of recovery from diarrhoea was earlier in the rice-ORS group, again the difference was not significant. It is concluded that oral rehydration solutions containing either glucose, rice or glycine can be safely used in diabetics with acute diarrhoea. This has a public health implication on the safety of currently used oral rehydration solutions in diabetic patients.

18

DETERMINANTS OF CHOLERA DEATHS IN BANGLADESH: A CASE-CONTROL STUDY

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A large number of patients die of cholera in Bangladesh each year. Despite the long history of cholera here, few studies have determined the risk of death factors in epidemic settings. The Epidemic Control Preparedness Programme (ECPP) of ICDDR,B has collaborated with the government of Bangladesh health services in the investigation of and intervention in diarrhoea epidemics since 1985. Between September 1988 and May 1989, six ECPP physicians and eighteen GOB deputed physicians spent 1,185 man-days investigating the epidemics. During this period a case-control study was conducted to determine the association between health-care-seeking patterns, other suspected risk factors and cholera mortality during epidemics.

A total of 452 persons who died of cholera during epidemics were compared with 430 persons who survived the episodes, selected from the same villages or neighbourhoods as the fatal cases. Results show that cholera patients during illness were treated either at home or at the health centres. Those who were treated at home instead of at the health centres were five times more likely to be (95% CI, 3.5-7.6) among the fatal cases than among the survivors. A total of 52 fatal cases and 143 survivors were seen by physicians of the health centres. Of these, only 18 fatal cases and 15 survivors were visited at home and the rest were treated at the centres. Patients treated at home by the health centre's physicians were nearly 5 (OR, 4.5) times more likely to die than those treated by them at the health centres, a risk of dying similar to that of those treated by unqualified practitioners at home. Analysis of the socioeconomic (SE) status showed that patients from households having low status were 2.5 times more at risk of dying (95% CI, 1.9-3.3). The risk of females dying was almost double (95% CI, 1.9-3.3) that of males.

Rehydration methods used within the first 24 hours of illness included the administration of any of the known rehydration fluids, ORT only, intravenous rehydration only, and both ORT and IV fluid therapy. A total of 14 fatal cases and 3 survivors did not receive any of the known rehydration fluids in the first 24 hours of illness compared with 438 fatal cases and 427 survivors who used some of the known rehydration methods. Patients who did not receive any of the known rehydration fluids within the first 24 hours of illness, were nearly 5 times (OR, 4.5;95% CI, 1.4-14.3) more likely to be among the fatal cases than among the survivors. Those who died were more likely to have received ORT only (OR, 2.9) and IV only (OR, 1.7) than both ORT and IV fluids, in comparison to the survivors. Use of any known rehydration method during the first 24 hours of illness tended to be protective (OR, 0.22). Protection seems to have been afforded to those who received ORT only (OR,0.45), IV

fluid (OR, 0.26) only, or oral rehydration and IV fluid (OR, 0.15), compared with those who did not receive any known rehydration therapy. The results of the multiple regression models show that most of the risk factors identified by univariate analysis persisted after adjustments. Patients being treated at home (OR, 4.6;95% CI,3.0 – 7), having low SE status (OR, 2.4;95% CI, 1.8 – 3.2), being ignorant about the correct use of ORS (OR, 2.3;95% CI,1.7 – 3.1) and being female (OR, 1.7;95% CI, 1.3 – 2.3) were more likely to die during cholera epidemics than those who were treated at the health centres, had higher SE status, knew when to use ORS, and were males.

When age groups and confounders were taken into account, the risks for females were consistently higher across all age strata. Females of the older age group (≥50 years) were 4 times more (OR, 4.4;95% CI, 1.8 – 10.8) likely to die in cholera epidemics followed by younger (2 – 9 years) female children (OR, 3.1;95% CI, 1.8 – 5.5), women of child bearing age (OR, 2.4;95% CI, 1.4 – 4.2) and older (10 – 14 years) female children (OR, 1.8;95% CI, 0.8 – 3.9) compared with males between 15 and 49 years of age.

Cholera patients who had not received any of the known rehydration fluids within the first 24 hours of illness were 5 times more (OR, 5.0;95% CI, 1.34 – 18.7) likely to die than those who had ORT and IV fluid. Furthermore, those who received only ORT (OR, 2.1;95% CI, 1.5 – 2.9)) or had only IV therapy (OR, 1.9;95% CI, 0.72 – 5.0) within the first 24 hours of illness were twice as likely to die than those who received both ORT and IV fluid.

19

MOTHERS' PERCEPTIONS OF RICE PACKET AND GLUCOSE PACKET ORAL REHYDRATION SOLUTIONS FOR TREATMENT OF DIARRHOEA IN YOUNG CHILDREN

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A comparative study on the use of rice packet and glucose packet oral rehydration solution (ORS) was conducted in 79 clusters of the areal sample of slum households in five thanas of urban Dhaka included in the Urban Surveillance System. During this study, surveillance of children less than 5 years of age (n = 2000) indicated that only 6% of the children in the rice intervention group received ORS during an episode of diarrhoea, whereas 37% of the glucose group received it. This paper presents the results of focus group discussions (6) with mothers in the two treatment groups to determine reasons for overall low usage rates of ORS and the disparity between the use of glucose packets versus rice packets during diarrhoeal episodes.

Discussion during the focus groups suggest that reasons for low usage rates of ORS include delay of treatment with ORS, especially if the mother felt the diarrhoea was

caused by *batash* (bad wind) or evil eye. Mothers sometimes prepared labon gur or salt sugar solution if the packets were not available from the intervention volunteer during a diarrhoeal episode. Although the mothers said their children preferred the taste and consistency of the rice ORS, preparation time (15 – 20 minutes) and procedure (cook – ing) were the major reasons for usage rates lower than those of glucose ORS.

These data imply that although rice packet ORS is perceived as "good" for children, the barriers to its preparation and use may be too difficult to overcome at the community level in the urban slums. Reinforcement of messages regarding glucose packet ORS and labon gur should remain the major recommendations in programme curricula.

20

ORAL REHYDRATION THERAPY WITHOUT BICARBONATE FOR MANAGEMENT OF DEHYDRATING DIARRHOEA

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To evaluate the clinical effectiveness of bicarbonate – free oral rehydration solution, sixty adult male patients who were admitted to the Clinical Research Centre of ICDDR,B with acute watery diarrhoea were studied. All of them had severe dehydration upon arrival. After correction of initial dehydration with intravenous fluid they were randomly assigned to the standard WHO oral rehydration solution (ORS) containing bicarbonate (Na^+ 90, K^+ 20, Cl^- 80, HCO_3 – 30, Glucose 110 mmol/l) or an identical solution in which bicarbonate was replaced by chloride ions to maintain hydration during on – going stool loss. Groups were matched for age, weight and pre – hospital duration of diarrhoea. ORS intake by each group was similar during their hospital stay of 72 hours. Clinical outcome as judged by maintenance of hydration, stool volume, length of hospital stay and maintenance of body weight was similar in both groups. After 24 hours of ORS intake there was no difference between groups in serum electrolytes and creatinine level as observed in 10 patients of each group. Our findings suggest that ORS without bicarbonate is safe and equally effective as the standard WHO – ORS in maintaining hydration and normal serum electrolytes of acute diarrhoeal patients.

21

GLUTAMINE IS SUPERIOR TO GLUCOSE IN STIMULATING WATER AND ELECTROLYTE ABSORPTION ACROSS RABBIT ILEUM

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Organic substrate is an integral part of oral rehydration solution (ORS) because it enhances the absorption of sodium and water from the intestine. In this study, the effect of glutamine, the primary metabolic fuel of the intestinal mucosal cells, on water and electrolyte absorption was measured *in vivo* in ileal loops of healthy rabbits and compared with glucose. The purpose was to generate physiological information which may be useful in designing better ORS formulations. Polyethylene glycol (PEG) (mol. wt. 4,000) was used as a nonabsorbable marker. Two loops of similar length, separated by an interloop, were constructed in intravenously anaesthetised animals. The loops were injected with 5 ml of a solution that contained (in mmol/l), Na^+ 120, K^+ 4, Cl^- 124, PEG 0.5 and either 50 mmol/l of glucose or glutamine. Forty-eight loops were constructed in thirteen animals. After 45 minutes of intra-abdominal incubation at 37° C, both glucose and glutamine stimulated water, sodium, potassium and chloride absorption. But the absorption of water [1.5 ± 0.28 vs 0.94 ± 0.28 ml/10 cm. 45 minutes, P= 0.000], sodium [119.83 ± 38.88 vs 46.79 ± 37.77 μmol/10 cm. 45 minutes, P=0.002], potassium [5.49 ± 0.89 vs 2.84 ± 1.04 μmol/10 cm. 45 minutes, P= 0.001], and chloride [327.97 ± 26.38 vs 267.26 ± 27.79 μmol/10 cm. 45 minutes, P=0.003] from glutamine electrolyte solution were significantly higher compared to the glucose electrolyte solution. It is concluded that from equimolar solution, the water and electrolyte absorption efficacy of glutamine is superior to glucose. These results suggest that either alone or in combination with glucose, glutamine is a potentially important organic substrate to be tested in oral rehydration solutions for treating diarrhoeal dehydration.

22

COMMUNITY PERCEPTION OF DIARRHOEA AND ITS TREATMENT IN A RURAL SETTING OF BANGLADESH

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Beliefs held by lay community members and the biomedical understanding about causation and treatment of diarrhoeal illnesses differ significantly. The adoption of specific methods of diarrhoeal treatment is influenced by the perceived causes of illness. The perceptions and home management of diarrhoeal diseases were investigated in the rural communities of Matlab. A total of 225 children less than 5 years of age were selected as index cases from the patients admitted to the Matlab diarrhoea treatment centre with acute diarrhoea. Another 450 acute diarrhoeal cases of the same age group were selected from the neighbourhood of index cases through active surveillance.

The caregivers classified diarrhoeal illness into six types based on stool characteristics and specific causation. Their management approach was determined by the type and cause of diarrhoea. The ORT approach to management was not considered for diarrhoeas which were believed to be caused by supernatural and certain other cultural factors. It was believed that recovery could be achieved by correcting the mothers' bodily symptoms, behavioural elements and actions without any therapeutic approach. In the hospitalised index cases during the current episode, overall ORS use prior to the hospitalisation was more than 70%. In the community cases this rate was only 28%. Non-users of ORS sometimes resorted to incantation for the child and mother; imposed restriction of breastfeeding, movement and food intake of the mothers; and favoured the use of herbs and drugs. Almost all the users of ORS believed that it would stop diarrhoea and vomiting.

By using trained traditional practitioners and health workers, educational interventions could be directed toward helping the caregivers make the right choice of treatment approach.

23

MOTHERS' KNOWLEDGE AND USE OF ORAL REHYDRATION THERAPY (ORT) IN THREE HEALTH DELIVERY AREAS IN MATLAB, RURAL BANGLADESH

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This paper presents a comparison of mothers' knowledge and use of oral rehydration solution (ORS) and `labon-gur' solution (LGS) between Matlab MCH-FP Project, its comparison area and a contiguous control area. Ten per cent of mothers with children less than five years old were selected from 12 villages from each of the areas. Mothers were interviewed from July to October 1988 on a pretested questionnaire with the help of experienced health assistants and locally recruited female workers forming teams.

Most of the mothers in all the areas could tell the quantity of water needed to prepare ORS, and one-half to most mothers knew the quantity of common salt and molasses used to prepare LGS. A great majority of mothers in all the areas believed that ORS `cures' or `stops' diarrhoea. Those who believed that it replaces fluid loss were of a significantly higher proportion in the control area than in the comparison area. ORS-use rate was 78% in the MCH-FP Project, 57% in the comparison area and 56% in the control area. LGS-use rate was 49% in the control area, 16% in the MCH-FP Project and 13% in the comparison area. More than one-half the children were treated with medicines in combination with or without ORS or LGS in all the areas. Mainly 'Bari' mothers in the MCH-FP Project and village practitioners in both the comparison and control areas provided treatment to children with diarrhoea.

The rehydration aspect of ORT is less understood by mothers, indicating an inadequacy in the teaching approach. Reinforcement of health-worker training is necessary for effective and sustained ORT use in rural settings.

24

ACCESS OF RURAL WOMEN TO FAMILY PLANNING SERVICES: A STUDY IN BANGLADESH

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The major source of family planning service in rural Bangladesh are the Family Welfare Assistants (FWAs), the female field workers of the government family planning programme, who provide MCH and family planning services to rural women at their doorsteps through bimonthly home visitation. But cross-sectional studies conducted in recent years report a very low coverage of household visitation by the field workers.

The purpose of this study was to investigate the programmatic and non-programmatic factors associated with household visitation of the field workers. The study was conducted in 1991 in four rural thanas; two of them were MCH-FP Extension Project treatment areas and other two were in its comparison area. The data for this study were collected through the longitudinal surveillance system of the project.

Our analysis indicates a very low coverage of household visitation. In the comparison area where only the government programme exists, about half of the women were never visited by the field workers during the second half of the year. However, the rate of visitation in the treatment areas was much higher during the same period, probably because of project interventions. Logistic regression results show that poor, relatively older women, lower parity mothers, non-users of contraceptives and those who do not have any preference for family size are less likely to be visited by the field workers. Women living in larger work-areas or in distant places from the residences of the workers are also likely to be less visited.

The results are expected to provide insight to the programme managers and field supervisors to develop strategies to improve visitation coverage.

25

FAMILY PLANNING PERFORMANCE IN CHITTAGONG DIVISION: A DIAGNOSTIC STUDY

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The family planning programme in Bangladesh is generally considered successful in providing accessible fertility regulation services to rural populations. However, the success of the programme has not been evenly distributed throughout the country. The Chittagong Division programme has consistently trailed behind national figures. Religious opposition and conservative attitudes are often cited as important explanations for low performance in Chittagong. However, a full explanation must include analysis of the demand as well as supply-side factors. The study is designed to understand the reasons for lower performance levels in Chittagong through an analysis of the management of the family planning programme within an unfavourable social context. Another purpose is to recommend strategies to improve performance.

The study was carried out during June-September, 1992. It relied on three sources of information: (1) recent data from service statistics and contraceptive prevalence surveys to analyse trends in programme performance and the client environment; (2) structured interviews and focus group discussions with district, thana, and union level officials, paramedics, and NGO managers in the four greater districts of Comilla, Feni, Cox's Bazar and Sylhet; and (3) observation of field operations in selected thanas of these districts. The last two sources were used to analyse service delivery and management processes as well as intradivisional variations.

The results indicate that despite an unfavourable client environment, there is considerable scope to improve performance through design of appropriate service delivery strategies, filling of large gaps in input such as field worker and paramedic positions, and improvement in supervision and monitoring. There is a need to vary programme strategies by subregions to reduce variation in performance within the division. The divisional office should be made an effective instrument for planning and monitoring a divisional strategy. The study makes a contribution in developing a rapid assessment methodology for diagnosis of low performance areas.

26

SATELLITE CLINICS IN RURAL BANGLADESH: ISSUES IN IMPLEMENTING DECENTRALISED HEALTH AND FAMILY PLANNING

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This paper considers ways to improve effective provision of health and family planning services through satellite clinics in rural Bangladesh. A satellite clinic is an outreach service provided by a family welfare visitor (FWV) eight times monthly in eight different villages throughout her union. These clinics are characterised by erratic performance and limited utilisation. Reviewed are present government policies, interventions implemented by the MCH – FP Extension Project in Abhoynagar and Sirajgonj, and issues targeted for future attention.

In Project areas, approximately 26% of planned satellite clinics were not held. The most prevalent reasons were FWVs on leave, transportation difficulties, limited equipment and pharmaceutical supplies, and scheduling difficulties. Viable alternatives for transport have been developed, but the absence of FWVs on leave had not yet been addressed. Regarding drugs and equipment, inadequate distribution systems accounted for much of the difficulty. The EPI/satellite clinic scheduling conflicts discussed are important because of the potential benefits of linking these two programmes. Unclear supervisory structures for satellite clinic workers also must be addressed. Other problems included utilisation and quality of functioning clinics. Utilisation appeared seriously affected by low public awareness; quality, by inadequate supervision, MIS, and technical knowledge.

Issues to address centrally include FWV's leave, equipment supplies, suitability of MIS structures, and increased technical training. Issues better resolved using a decentralised approach include FWV's transport, tailoring drug supplies to specific community needs, coordination of satellite clinics and EPI programmes, improving supervision, and increasing community awareness. Improving relations between the health and family planning wings must be addressed at all levels.

27

PERFORMANCE IMPROVEMENT THROUGH LOCAL PLANNING: AN ACTION RESEARCH PROJECT

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The family planning programme in Bangladesh has succeeded in establishing a good service infrastructure, but its productivity is still low. The Extension Project has implemented an action research project in two thanas to improve management through local level performance review, planning and monitoring. The main hypotheses are: (1) performance improvement is possible through improvement in supervision and management capabilities at the thana and district levels, (2) the systematic process of performance review helps managers and supervisors diagnose problems and seek solutions; and (3) linkages between the union, thana, and district help resolve problems that cannot be solved at lower levels.

The intervention has taken place in two thanas – Abhoynagar and Monohardi. The first one is the project thana where the Extension Project has a large supporting staff, and the second one is a non-project thana with very limited project support. The non-project thana was included to test how such a management process can be sustained in a normal government setting. An organisational diagnosis was conducted. It was followed by feedback and training workshops for thana and district programme managers to train them in problem diagnosis, performance assessment, planning, problem-solving techniques, leadership and supervisory styles. The participants identified poor performing unions of their areas and decided to implement the planning process in these areas before extending it to other better performing unions. Microlevel action planning workshops were held in each of these unions to identify problems, find solutions, and develop action plans. A monthly performance review process was initiated.

The paper describes the conceptual framework, the process of research implementation and the methodology of performance review and planning. It then discusses the results in terms of performance output and activities as well as the management process. Finally, it presents the major lessons learned. A review conducted shows that by institutionalising systematic performance review and planning processes at the union and thana levels it is possible to improve performance.

28

SUPERVISION: A MISSING LINK IN THE BANGLADESH FAMILY PLANNING PROGRAMME

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The family planning programme in Bangladesh is characterised by weak supervisory support, specially from the first-level field supervisors, Family Planning Inspectors (FPIs). The FPIs are considered to be under-utilised, demotivated, and ineffective. The study proposed (1) to understand the type, frequency and quality of supervisory activities performed by the FPIs; (2) to analyse their own perception of their role and work environment; and (3) to develop recommendations to improve FPI's role effectiveness.

The data for this study were mainly drawn from a field trial of an FPI Diary, a supervisory record-keeping system implemented in the Extension Project areas for six months in early 1991. The diaries were analysed, and the results discussed in group meetings. The investigation also drew on on-going observations of field activities of the FPIs over the past five years in the two field sites.

The results show a big gap between the planned and actual frequency of supervisory visits. Also, most supervision tended to be an inspection, rather than an occasion to resolve problems or train the workers. Supervisors were also not clear about their own roles. However, there has been no serious effort to support the FPIs through training, record-keeping, or other types of incentives. They have not been empowered through delegation, nor held accountable for programme performance. The popular stereotypical image of the FPIs and the lack of management efforts to strengthen their role have reinforced each other in a vicious circle.

The paper makes recommendations to improve effectiveness of the FPIs through redefinition of their role, and development of measurable indicators of supervisory activities, training, and incentives.

29

THE ROLE OF INTERPERSONAL, MEDIATED AND SYSTEM LEVEL COMMUNICATION IN RAISING MCH – FP STATUS IN MATLAB

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To ascertain the role of communication in raising MCH – FP status in Matlab a study was conducted in two comparable villages in treatment and comparison areas in 1991. A total of 116 and 160 respondents, both husbands and wives, were selected through a snowball sampling method from the two villages.

Data on family planning, diarrhoea, and MCH were collected through a sociometric questionnaire. Information on socioeconomic characteristics of all household members was collected. Sociograms on social, family planning, diarrhoeal and MCH message flows (communication network) were charted out, and network scores for respondents were calculated. Inter – network relationships and the influence of communication variables on behaviour change were examined.

It was revealed that social network leaders in the treatment area replicated their role positions in family planning and diarrhoeal message dissemination, and emergence of new leaders for family planning and diarrhoeal message flow could also be discernible. In the comparison area a new set of leaders other than those in social network emerged to take up the role of family planning and diarrhoeal message dissemination.

The bivariate correlations among the variables showed that family planning adoption had a very high positive relationship with husband and wife communication on family planning in the comparison area. This relationship was relatively weaker in the treatment area. The interpersonal communication network on family planning had a positive relation with the education of women and husband and wife communication in the treatment area, whereas in the comparison area the relationship existed only with education. Radio exposure also came as a correlate of husband and wife communication on family planning in the comparison area only.

These results imply that there are indications of consistent internalisation of the family planning message flow and the emergence role of new leaders along with that of social leaders in the treatment area. In the comparison area this pattern did not emerge. The paper also examined the situation in relation to diarrhoea and MCH.

30

OVERLAP IN THE NATIONAL FAMILY PLANNING MANAGEMENT INFORMATION SYSTEM

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Besides the Government of Bangladesh's (GOB) efforts, many non-government organisations (NGO) supplement the national family planning programme in Bangladesh. In many places, both NGO and government workers provide services in the same community and thus clients can receive services from both sources. There is a possibility that a client may be counted as a user by each service provider, thereby inflating performance data. The objective of this study is to ascertain the extent of overlapping of records of eligible couples and that of contraceptive use status.

We selected two family welfare assistant units in each of Monohardi Thana of Narshingdi District and Bagerpara Thana of Jessore District where both NGO and GOB activities exist, to compare workers' lists of eligible couples and the records of contraceptive use status. We then interviewed unmatched eligible couples to know their contraceptive use status. This was followed by another interview of both matched and unmatched users to determine the association of use with socioeconomic characteristics.

Our findings reveal that both NGO and GOB workers provide services to the same community. A substantial variation of records of contraceptive use maintained by two types of workers was observed; contraceptive use varied by 28% and 64% in Monohardi and Bagerpara, respectively. In contrast, only 4% and 12% of differences in the records of couples were observed. A negative correlation between the distance of residences of service providers and clients was found. Contraceptive use was not associated with education and land holding of clients.

Development of a sense of partnership between the NGO & GOB officials and workers may make the national family planning programme activities more effective and enhance optimal use of scarce resources as well.

31

ISOLATION OF ENTEROTOXIGENIC *BACTEROIDES FRAGILIS* FROM BANGLADESHI CHILDREN WITH DIARRHOEA: A CASE-CONTROL STUDY

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Enterotoxigenic *Bacteroides fragilis* (ETBF) have recently been shown to be associated with acute diarrhoeal diseases in domestic animals and small children in the United States. Although the organism has been isolated previously in Bangladesh, no epidemiological studies have been done to demonstrate its association with diarrhoeal disease. We, therefore, did a case-control study in which children less than 5 years of age admitted to the ICDDR,B hospital with acute diarrhoea were matched with children of the same age admitted to Dhaka Shishu Hospital at approximately the same time with non-diarrhoeal illnesses. Stools were assayed for all known enteric pathogens by standard methods; *B. fragilis* was isolated by using selective agar media (PINN and BBE) and enterotoxin production using morphologic changes in human colonic tissue culture (HT/29). A total of 368 children with diarrhoea and 440 children without diarrhoea were studied.

The isolation rate of all *B. fragilis* was approximately 20% in both children with and without diarrhoea. In children under 12 months of age, there was no difference in the isolation rate of ETBF between the two groups: 4/181 (2.2%) vs 3/161 (1.9%). In children 13-48 months of age, however, there was a significantly higher isolation rate of ETBF in children with diarrhoea, 11/160 (6.9%) than in children without diarrhoea, 2/218 (0.9%), $P = 0.004$.

These results support the role of ETBF as a diarrhoeal pathogen in Bangladeshi children; the results are similar to previous studies in the U.S., in that ETBF are associated with diarrhoea only in children over one year of age. The rates of isolation of ETBF are less, however, suggesting that the selective media used may not be adequate for this part of the world, or that Bangladeshis do not carry *B. fragilis* as a usual part of their normal faecal flora.

32

DIFFERENTIATION OF PATHOGENIC ISOLATES OF *ENTAMOEBA HISTOLYTICA* BY ENZYME-LINKED IMMUNOSORBENT ASSAY (ELISA)

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A recent research effort has resolved a prolonged controversy surrounding the pathogenicity of *Entamoeba histolytica* infection. It is now clear from molecular comparison that *E. histolytica* is comprised of two genetically distinct but morphologically similar species, in which only the pathogenic species has been found to cause disease. In light of the evidence supporting the existence of two morphologically indistinguishable parasites within *E. histolytica*, WHO recently established the research priorities for amoebiasis, which include the reassessment of the epidemiology of the infection using serological and molecular probes and the development of simple diagnostic methods for field laboratories. Pathogenic isolates have been distinguished by their electrophoretic patterns of isoenzymes (zymodemes), monoclonal antibody-based tests (indirect fluorescent-antibody test and radioimmunoassay), DNA probe assay and PCR test. We sought to develop a simple, economic and rapid test that distinguishes pathogenic from nonpathogenic *E. histolytica*.

Monoclonal antibodies to six non-overlapping epitopes on the 170 kDa subunit of the pathogenic adhesin have been produced by Petri *et al.* (Infection and Immunity, June 1990). An anti-adhesin monoclonal antibody-based ELISA was developed to detect pathogenic-specific amoebic antigen in cultured isolates of *E. histolytica*. Forty-one clinical isolates of *E. histolytica* that were classified as pathogenic (21) and nonpathogenic (20) by isoenzyme analysis have been tested by this assay. The results were recorded as the ratio of optical density at 405 nm of the well containing the cultured parasites over wells containing no parasites. The cut-off point of the assay has been defined as the mean ± 2 standard deviations of the optical density ratios for the 20 nonpathogenic *E. histolytica* isolates tested. The monoclonal antibody-based ELISA detected 100% of all pathogenic isolates of *E. histolytica* (21/21); positive results appeared in about 5% (1/20) of nonpathogenic isolates. The monoclonal antibody-based ELISA could be a substitute for isoenzyme analysis and other methods currently used to distinguish pathogenic from nonpathogenic *E. histolytica* and, thus, a rapid and practical method for diagnosis of pathogenic *E. histolytica* infection.

33

DETECTION OF *SHIGELLA* IN FAECAL SAMPLES BY IMMUNOMAGNETIC SEPARATION FOLLOWED BY DNA AMPLIFICATION

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Shigellae are usually identified from faecal samples by culture techniques, which usually take 48 to 72 hours and the presence of viable bacteria is required for a positive result. Therefore, development of an improved assay for a simpler and more rapid detection of *Shigella* is desirable.

A combination of immunomagnetic particle-based separation assay (IMS) and a polymerase chain reaction (PCR) procedure was used for direct isolation and identification of *Shigella dysenteriae* type 1 and *Shigella flexneri* from faeces. This assay involves 3 steps: (1) isolation of *Shigella* from faeces by using a monoclonal antibody MASFB (which recognises an epitope common to *S. dysenteriae* type 1 and all *S. flexneri*) coated immunomagnetic particles (IMP), (2) the target DNA (320 bp) within the invasion-associated locus (ial) (700 bp) of the large virulence plasmid recovered by boiling the captured bacteria, and (3) amplification of the recovered DNA by PCR with a primer pair specific for a gene sequence of the *ial* in all four *Shigella* spp. and enteroinvasive stains of *Escherichia coli* (EIEC). The amplified product was detected by dot blot hybridisation with an alkaline phosphatase conjugated oligonucleotide probe (AP probe).

The combined IMS-PCR method correctly identified all 57 *S. dysenteriae* type 1 and 68 *S. flexneri* in 238 faecal specimens and also permitted detection of 17 *Shigella* in 113 specimens from diarrhoeal patients where *Shigella* were not detected with conventional culture. It appears that shigellae not detected by conventional culture were also enriched by this technique. Thus, we have found that the IMS followed by the PCR assay was 15% more sensitive than the culture method. The method was simple and rapid (7 hours) with a detection limit of *ca.* 10 *Shigella* cells in faecal samples.

Use of the IMS before the PCR ensures both enrichment of pathogenic bacteria and purification of the sample. IMS in conjunction with the PCR is a potential alternative to traditional techniques for screening a large number of faecal samples.

34

A SEMI – QUANTITATIVE POLYMERASE CHAIN REACTION ASSAY FOR TOXIGENIC *VIBRIO CHOLERAE* 01

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Toxigenic *Vibrio cholerae* 01 is the causative agent of cholera. Studies on its survival and transmission suggest that the organism can exist in a viable (both culturable and non – culturable) state in the environment. Non – culturable but viable cells are pathogenic and can cause diarrhoea. Alternatives to standard culture methods are, therefore, essential to detect *V. cholerae*, in view of the frequent exposure of populations to contaminated surface waters.

A polymerase chain reaction (PCR) – based amplification of a 302 base pair portion of the *ctx* operon of *V. cholerae* 01 was studied under various concentrations of primers, templates and the divalent cation Mg^{++} to standardise conditions for rapid, sensitive and semi – quantitative detection of toxigenic *V. cholerae* 01.

At a concentration of 0.2 μM of each of the primers and 3.6 mM $MgCl_2$, the assay was found to be semi – quantitative for toxigenic *V. cholerae* 01, as determined by DNA fluorimetry and dot blot hybridisation of the PCR products. The assay was specific for toxigenic *V. cholerae* 01, and gave negative results when tested on other bacteria, including strains of heat – labile enterotoxin producing *Escherichia coli*, *V. cholerae* non – 01 and *Shigella dysenteriae* 1. The PCR assay could quantitatively detect about 5 to 600 cells of toxigenic *V. cholerae* 01 in reconstituted samples containing two – fold dilutions of a control strain. The assay was also used successfully to detect less than 10 cells of toxigenic *V. cholerae* 01 in environmental water samples, in which *V. cholerae* 01 could not be detected by conventional enrichment culture techniques using bile – peptone broth. Five out of 12 environmental water samples, which were found culture negative for *V. cholerae* 01 after enrichment, were found positive for toxigenic *V. cholerae* 01 by the PCR assay.

These results indicated that the semi – quantitative PCR assay was applicable in environmental studies that involve the detection and estimation of very low numbers of toxigenic *V. cholerae* 01.

35

A STUDY OF DETECTION OF SHIGELLAE USING POLYMERASE CHAIN REACTION AND CULTURE TECHNIQUES ON STOOLS OF DYSENTERY PATIENTS IN DHAKA, BANGLADESH

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Shigellosis is a major health problem with a high morbidity and mortality in Bangladesh. Due to a lack of enrichment media for shigellae, patients who excrete a low number of shigellae remain unrecognised. Therefore, the present study was undertaken to detect shigellae in stools of patients with dysentery seen at the outpatient department of ICDDR,B, using recently developed polymerase chain reaction and conventional culture techniques. A total of 20 stool samples were cultured onto MacConkeys, *Shigella – Salmonella*, xylose lysine deoxycholate, and Hektoen enteric agar media. Attempts were made to detect shigellae from these stool samples by PCR amplification and subsequent hybridisation with an *ipaH* gene probe. The probe was used to detect the specific 700 bp fragment that is generated as a result of PCR amplification of the highly conserved *ipaH* region from shigellae. Different species of shigellae (4 *S. dysenteriae* 1, 3 *S. flexneri* and 1 each of *S. sonnei* and *S. boydii*) were isolated from 45% (9/20) of the patients. PCR increased the identification of shigellae infections from 45% (9/20) to 60% (12/20). Application of *ipaH* sequences thus identified 15% more *Shigella* cases than the bacteriologic method. It appears that PCR amplification and probe hybridisation can be employed to detect those individuals shedding shigellae in low numbers. These preliminary data seem to suggest the superiority of the PCR technique and imply that morbidity and mortality due to shigellosis could be higher than prevalent estimates based on the culture method.

36

DETERMINATION OF ROTAVIRUS SUBGROUPS AND THEIR CLINICAL CORRELATION IN CHILDREN WITH DIARRHOEA

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To evaluate the clinical severity of diarrhoea due to different subgroups (SG) of rotavirus, we studied 388 children less than 5 years old and assessed their clinical

severity and laboratory findings. The children were studied in the hospital for 7 days and the rotavirus was characterised by the neutralisation/ELISA assay with monoclonal antibodies and polyacrylamide gel electrophoresis of the viral RNA. The results indicate that rotavirus was isolated from 210 (54%) stool samples of which 76 (36%) were SG1, 70 (33%) were SG2, and 63 (30%) were untypable. One specimen had both SG1 and SG2 rotavirus. Most of the rotavirus infections occurred in children between 13 and 24 months of age, 92% in SG1, 90% in SG2, and 91% in the untypable group. SG2 rotavirus infections (62%) occurred significantly more often ($p<0.05$) in children less than 1-year old than in children with SG2 infections (38%). The number of boys significantly ($p<0.05$) predominated in all subgroups, 65% in SG1, 59.4% in SG2, and 64.9% in the untypable group. Most children in all groups presented with watery diarrhoea, vomiting, and fever without any significant differences. The children with SG1 rotavirus infections had significantly more ($p<0.05$) total diarrhoeal stool (mean, litres + SE) than did the children with either SG2 or untypable rotavirus respectively ($3.17+0.56$, $2.4+0.38$, $2.54+0.41$, $p<0.05$). The mean duration of diarrhoea was significantly more in children with SG1 than in the children with SG2 infections (168h vs. 72h, $p<0.05$). Similarly, more SG1 children had significant dehydration, frequency of acid stool, and loss of sodium ions in the stool. We conclude that SG2 rotavirus infection is predominantly a disease of children less than 1-year old and that SG1 rotavirus causes more severe disease than the other subgroups.

37

PREVALENCE OF SHIGELLOSIS AMONG YOUNG CHILDREN IN A RURAL COMMUNITY OF BANGLADESH

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Data from a 4-year prospective diarrhoea morbidity surveillance in a rural Bangladeshi population of about 1,300 children less than 5 years old were analysed. Rectal swabs from 9,626 patients were obtained, constituting 88% of all prevalent diarrhoea cases. During the study period of 1984 to 1987 the yearly isolation rate of *Shigella* was 7.4%, 10.6%, 17.1%, and 17.2% respectively, with an average of 12.6%. The highest (16.9%) and lowest (6%) isolation rates were observed among the children between 24 and 35 months and <12 months of age respectively. Among the isolates, *S. flexneri* predominated, contributing 72% of all isolates. *S. dysenteriae* type 1 (7%), *S. boydii* (10%), *S. sonnei* (6%) and *S. dysenteriae* (2-10) (5%) contributed to the remainder. A seasonal pattern was observed only in the *S. flexneri* group with the highest isolation rate (21%) in the months of November and December. It was observed that 46% of the *Shigella* patients suffered for more than 15 days. In the year 1985 *S. dysenteriae* type 1 was sensitive to ampicillin (86%), chloramphenicol (17%), cotrimoxazole (21%), and tetracycline (7%), and in 1987 it became 100% resistant to all of them. The sensitivity pattern of *S. flexneri* which was over 70% for ampicillin, chloramphenicol

and cotrimoxazole did not change much from 1985 to 1987, but it was always resistant to streptomycin and tetracycline. Gentamycin (100%) and nalidixic acid (100%) were active against all the *Shigella* species. The study results have implications in the prevention and management of *Shigella* cases at the community level.

38

CLINICAL CHARACTERISTICS OF DIARRHOEA ASSOCIATED WITH ENTERIC ADENOVIRUS INFECTION, COMPARED WITH GROUP A ROTAVIRUS DIARRHOEA

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To examine the role of enteric adenoviruses in diarrhoeal disease, a total of 4,409 stool specimens from children less than 5 years of age seeking treatment for diarrhoea in Matlab, Bangladesh, were tested for the presence of enteric adenoviruses by ELISA and cell culture. One hundred and twenty-five specimens were positive for enteric adenoviruses (EAdVs; 2.8%) of which 51 (40.8%) were typed as AdV40, 74 (59.2%) as AdV41 and 12 of 4,409 (0.3%) were identified as non-enteric adenoviruses. Information on age, gender and symptoms was available for 80 infants in whom adenoviruses only were detected in stools. Age distribution was similar for types 40 and 41 and non-enteric adenovirus; the median age was found to be 11, 12 and 12 months respectively. The symptoms experienced by the 80 children were similar for each adenovirus type. The most common clinical features of EAdV infection were watery diarrhoea (87.5%) of more than 8 loose motions per day in the 24h period prior to presentation (68.8%), with vomiting (80.0%), abdominal pain (76.3%) and low grade fever (95.0%). These were compared with the rotavirus infection which gave rise to watery diarrhoea (95.3%) of more than 8 loose motions per day (68.5%), vomiting (90.9%), abdominal pain (65.7%) and low grade fever (84.6%). The degree of dehydration from EAdV infection was identical with that in rotavirus infected infants of the same age range. Three deaths were associated with EAdV infection.

39

PROVISION OF ANTENATAL CARE BY NATIONAL FAMILY PLANNING FIELD WORKERS

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The family welfare assistants (FWA) of the national family planning programme provide antenatal care services to village women through their bimonthly house-to-house visits. The services include: identification of pregnant women; screening and referral of high-risk cases by using check-lists; provision of information about vaccination, nutrition, and safe delivery; availability of the family welfare visitor at family welfare centres and satellite clinics; and the motivation of women to use these services. We undertook a study to document how the FWAs perform these tasks in Abhoynagar where the MCH-FP Extension Project of ICDDR,B maintains a longitudinal data collection system. Qualitative information was collected from all 13 FWAs who provide antenatal care and from 26 community women who were the recipients of the antenatal care services. Observations of the interaction between FWAs and pregnant women were recorded in 25 visits.

The findings suggest that these tasks are not performed satisfactorily. Screening check-lists were not used properly, and the check-list did not help optimally identify the high-risk group; hence, the current risk approach seems to be inefficient. Women were not referred to FWVs, two-thirds of the women did not get proper antenatal care and postnatal care was nonexistent. Technical supervision was inadequate probably because of poor linkages between different levels of health workers and lack of the mechanism of supervision.

Further on-going training of FWAs, development of guidelines for workers, development of mechanisms of supervision, modification of the check-list with appropriate cut-off points and close linkages between FWAs and FWVs may make the national antenatal care services more effective.

40

RISK APPROACH OF ANTENATAL CARE IN THE MATLAB MATERNITY CARE PROGRAMME (1987 – 1990)

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The aim of this retrospective study was to investigate the efficiency of different antenatal scoring methods in predicting maternal and perinatal mortality. The data were 3,355 antenatal midwife records from Matlab, a rural area in Bangladesh. If scoring methods in antenatal care were more efficient, lesser skilled health workers could be trained to select high – risk women and refer them for higher level care.

Two simple scoring methods were tested. The weighted method operated by multiplying the relative risks (RR) of each significant risk factor for each woman to obtain a score. The main constraint for the weighted score was the operational feasibility. To overcome this we constructed an arbitrary score based on the RR values. Both methods had very similar predictive power.

The positive predictive values of the scores were extremely low: 10% – 20% for perinatal mortality and 1% – 3% for maternal mortality. The sensitivity and specificity varied greatly with the selection of high – risk populations. The trade – off for high – risk populations depended on operational factors. The sensitivity for the two scoring methods was very similar but in both cases disappointingly low: 62% for perinatal mortality and 67% for maternal mortality with a high – risk population of 33%. The specificity ranged for all methods and all high – risk selections between 69% and 88%.

With the type of high – risk screening performed in Matlab and the operational feasibility to manage one – third of the women as high – risk women, a risk score still fails to detect 30% – 40% of pregnant women who were actually at risk for perinatal or maternal mortality. Although screening methods can be improved to enhance the predictive power of the score, antenatal care alone will not prevent all adverse pregnancy outcomes or emergency referrals.

41

THE INFLUENCE OF BIRTH DELIVERY PRACTICES ON NEONATAL SURVIVAL IN MATLAB

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Levels of neonatal mortality are extremely high in developing countries, including Bangladesh. The purpose of this study was to examine the influences of various birth delivery practices on neonatal mortality in Matlab, a rural area of Bangladesh. Information about births and deaths in the Matlab area are routinely collected by the Demographic Surveillance System (DSS) of the ICDDR,B. Data for this study are the records concerning the 21,732 live births during 1985 – 1987; the survival status of these births; information about various delivery practices, such as how the umbilical cord was cut and dressed; and control variables, such as age of the mother. Univariate exploratory techniques and logistic regression analysis were used.

Both univariate and multivariate logistic regression analyses identified as high – risk factors: mothers less than 20 years old, labour duration more than 24 hours, complicated labour, gestational age less than 9 months, abnormal presentation, and the use of a bamboo or old metal blade to cut the umbilical cord. This study emphasises the need for trained birth attendants, or at least the use of a safe birth kit, and indicates priority areas for training and intervention.

42

CHILDREN WHO ARE AT HIGH RISK OF DIARRHOEA IN EARLY YEARS OF LIFE: EVIDENCE FROM A COMMUNITY STUDY IN BANGLADESH

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A tool for identifying at an early age those children who would be at high risk of diarrhoea in later ages is crucial to diarrhoea control. The research finding on the issue is not adequate. This study examines the ability of diarrhoea experience in the first 6 months of life to predict diarrhoea episodes in children 6 – 11 and 12 – 23 months of age living in households with different hygienic conditions. A cohort of 196 children, born during July 1980 through June 1981, was observed for two years in Teknaf, Bangladesh. Diarrhoea episodes were recorded through weekly home visits. The mothers' hygiene behaviour, such as hand washing (before handling food and after

toilet use of self and child) and disposal of children's faeces, was observed. Bivariate analyses revealed that children who had repeated (2 or more) episodes during the first 6 months of age were at greater risks of having diarrhoea at 6 – 11 months and 12 – 23 months of age. Mothers' hand washing reduced, on the average, 5.0 (44%) episodes during the age 6 – 23 months period of children who had repeated episodes in the first 6 months of life. Mothers' hand washing, on the other hand, reduced only 1.2 (22%) episodes in the same life span if infants had no or only one episode within 6 months of age. The multiple regression analyses confirmed the above findings. Screening, if required, of children who had repeated episodes in the first six months of age and whose mothers' hygiene was poor may make optimum use of limited resources of poor countries.

43

HYGIENE PRACTICES IN CLEANING AFTER DEFAECATION AND DISPOSING OF STOOL OF YOUNG CHILDREN WITH DIARRHOEA IN RURAL COMMUNITIES OF BANGLADESH

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The cultural practices of washing hands by caregivers after cleansing the anus of young children following defaecation and disposing of their stool often do not fulfil the biomedical criteria in preventing the transmission of diarrhoea – causing pathogens. These practices, being important determinants of preventing transmission, were studied in the rural communities of Matlab, Bangladesh.

Data were collected by observing the practices of caregivers of 373 children with diarrhoea of 580 community cases recruited from the neighbourhood of 293 hospitalised index cases. Observations were made regarding cleansing of the anus of these children, washing of the hands of the caregivers, and disposal of stool.

It was observed that all the caregivers used bare hands and most used only water in cleaning the anus of the child. Also following the cleaning, most of the caregivers used only water to clean the soiled hand. Most of them used water collected in a pot, and only a small proportion used water from the direct source. The majority of caregivers disposed of the faeces in an unhygienic way.

Hygiene education to the mothers and caregivers of children with diarrhoea, emphasising the usefulness of hand washing by adding a cleansing agents, like ash, mud or soap, with water could play an effective role in minimising the level of hand contamination by infected faeces, and thus would be helpful in reducing the diarrhoeal incidence at the community level.

44

STUDIES ON THERMAL STABILITY OF AN ORAL CHOLERA VACCINE CONTAINING KILLED CELLS AND RECOMBINANT B-SUBUNIT OF CHOLERA TOXIN

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Thermal stability is an important aspect of vaccines, particularly relevant to field use in a developing country situation. We studied a killed cholera whole cell vaccine regarding its thermal stability in laboratory conditions.

A liquid formulation of an oral cholera vaccine (similar to the one recently field-tested in Bangladesh) containing killed whole cells and recombinant B-subunit of the cholera toxin was maintained at temperatures of 4°C, 30°C and 42°C for different lengths of time. Antigen content (LPS and CTB) of the vaccine samples was determined at different times by LPS inhibition ELISA and Mancini test, respectively. No changes in LPS and CTB content were detected in samples maintained at high temperatures for up to 12 weeks compared to those kept in the cold (4°C). Immunogenicity of the vaccine samples was studied by immunising rabbits and determining serum anti-LPS and anti-CTB antibody titers by ELISA. High temperatures had no detectable effects on immunogenicity of the vaccine samples.

The results thus indicate that the vaccine may be used in a field situation without the need for a cold chain.

45

HETEROLOGOUS PROTECTION OF MONKEYS AFTER ORAL IMMUNISATION WITH AN ATTENUATED MUTANT OF *SHIGELLA FLEXNERI*

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A live oral vaccine against shigellosis consisting of an attenuated mutant is believed to be a promising approach to control and prevention of the disease. The thymine-requiring (*thyA*) and temperature-sensitive (Ts^-) mutant of *Shigella flexneri Y* strain TSF21 developed at ICDDR,B was evaluated in monkeys at NII as part of a

collaborative study. Oral feeding of monkeys (n = 28) with a dose of 1 x 10^{11} cfu was well tolerated with no detectable evidence of clinical or histological abnormalities. Immunisation of monkeys (n = 38) with two oral doses provided solid immune protection when challenged with virulent *Shigella flexneri* strains of serotype Y and 3a. Immunisation also provided partial protection against challenge by a virulent *Shigella dysenteriae* 1 strain. Challenge by a *Shigella flexneri* 2a strain proved to be avirulent in this study because of the loss of the 'invasive' plasmid from this strain. Titers of serum IgA and IgG antibodies reactive to LPS of the immunising strain increased considerably in all the immunised animals and the increase correlated well with protection. We conclude that *Shigella flexneri* strain TSF21 represents a new route to attenuation of *Shigella* spp. and to the development of a live oral vaccine against shigellosis based on a mutation in the *thyA* gene.

46

LOCAL AND SYSTEMIC IMMUNE RESPONSES TO SHIGELLOSIS IN ADULT BANGLADESHI PATIENTS

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In an attempt to assess the immune responses of adult Bangladeshi patients (n = 32) during the course of natural *Shigella* infection and to compare them with those of healthy adults (n = 20), we studied antigen-specific antibody-secreting cells (ASC) and specific cell-mediated immunity using lymphocytes from peripheral circulation by ELISPOT assay and lymphocyte proliferation assay respectively. We also studied *Shigella*-specific antibodies in serum and in the gut secretion by ELISA and induction of HLA-DR antigens and infiltration of T lymphocyte subsets (CD4, CD8, CD25, CD56) in the rectal mucosa by immunohistochemical staining. Purified lipopolysaccharide (LPS) and O-polysaccharide (PS) from *S. dysenteriae* type 1 or *S. flexneri* Y strains were used as antigens. A significant increase ($P < 0.001$) in the number of circulating LPS-specific ASC was observed reaching a peak 6 to 8 days after the onset of disease, followed by a rapid decline within 12 to 16 days. The pattern of secretory antibody response was similar to the ASC response. The magnitude of lymphocyte proliferation response was highest ($P < 0.001$) 6 to 8 days after the onset of diarrhoea and was short-lived and specific. Serum antibody titres were highest 9 to 11 days after the onset of disease. Amplification of restricted HLA-DR+ cells and infiltration of CD8+ and CD4+ cells in the colonic surface epithelium provide evidence of enhanced cell-mediated immune reactions in gut during acute *Shigella* infection. Our results thus indicate that in addition to humoral immune response, there is a cell-mediated immune response in shigellosis. In addition, there seems to be a correlation between humoral and cellular immune responses during shigellosis.

47

IMMUNE RESPONSE OF CHILDREN WITH SHIGELLOSIS AND LEUKAEMOID REACTION

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Dysentery due to *Shigella dysenteriae* 1 can be accompanied by complications, such as leukaemoid reaction (WBC >35,000) and haemolytic uraemic syndrome (HUS) particularly in children less than 5 years old. The cause for these complications is unknown but their basis could be an inappropriate immune response. This study, therefore, aimed at examining the general immune response of children who recovered from shigellosis without complications and those who developed complications. For this purpose, 47 children with complaints of bloody, mucoid diarrhoea, which was confirmed by microscopy and isolation of *S. dysenteriae* 1 on culture, were enrolled. Five ml of blood were taken from these children on the day of enrolment (d0) and 3–5 days later (d3–5). Twenty–one healthy children matched for age and weight were included as controls. Peripheral blood lymphocytes were then phenotyped by indirect immunofluorescence to assess the proportions of T and B lymphocytes and T lymphocyte subsets. Of the 47 children with shigellosis, 21 had leukaemoid reaction with or without HUS. When compared with healthy children, children with shigellosis had reduced proportions of T lymphocytes (CD3+ cells) ($P=0.001$) and helper T lymphocytes (CD4+ cells) ($P=0.04$). This reduction was more marked in children who developed complications (CD3 $P=0.00007$, CD4 $P=0.00004$). Thus, there is an alteration in T lymphocytes in children with shigellosis.

48

INFANT AND CHILD MORTALITY AMONG HIGH–AND LOW–RISK BANGLADESHI MOTHERS IN RELATION TO SOCIOECONOMIC VARIABLES

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This study investigates infant and child mortality among the offsprings of high– and low–risk mothers according to socioeconomic criteria. A cohort of 7,304 live births in 1983 was matched with death records until December 1987 in the Matlab Demographic Surveillance System, divided into MCH–FP intervention and comparison areas. Results show that the probability of survival of children below five years of age was lower among low–risk mothers than among high–risk mothers in both the MCH–FP and

the comparison areas. Several socioeconomic and demographic factors in the MCH – FP and comparison areas contribute significantly in lowering infant mortality among low – risk mothers compared with the high – risk ones. Child mortality was lower in the MCH – FP area than in the comparison area. It was also lower among the low – risk mothers than among the high – risk ones. Multivariate Analysis revealed that higher infant mortality was related to Hindu religious affiliation, fewer living children, no education of the mother, smaller dwelling space, and residence within the comparison area in addition to very young and old maternal age, a greater number of pregnancies and short birth interval. Child mortality was also significantly related to the child being female, religion being Islam, no education of the mother, and residence within the comparison area. The findings imply that prevention of high – risk pregnancies through better maternal and child health services, discouraging traditional practices related to month – long confinement of the newborn in unhealthy birth rooms, and proper distribution of intra – household food to young male and female children through education will lead to reduction of infant and child mortality.

49

DEATHS DUE TO VIOLENCE AND ACCIDENTS TO WOMEN OF REPRODUCTIVE AGE IN RURAL BANGLADESH

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Analysis of the causes of deaths in the MCH – FP Extension Project areas shows that a high proportion of women of reproductive age (WRA) died due to violence, particularly by suicide, and that most of the violent deaths were from one geographical location, Abhoynagar and its neighbouring comparison thanas. The purpose of this study was to provide an estimate of the magnitude of the problem of violent deaths to WRA in some areas of Bangladesh, and to look at the associated socio – demographic characteristics of those women who died due to violence.

The information was collected through a series of longitudinal surveys, the Sample Registration System (SRS). In this system, interviewers visit sample households every three months to collect information on demographic events, and on causes of death through verbal autopsy. The information on causes of death was reviewed by physicians and diagnoses were made.

During 1982 – 90, there were 265 deaths to WRA 15 – 44 years old in the study area. Among those women, 76 (28.7%) died due to violence or accident and 62 (23.4%) of them committed suicide. There were 65 (24.5%) maternal deaths, including 9 due to violence. The overall death rate of WRA was 290.7, and the death rate due to violence and accident was 83.4 per 100,000 women (139.3 in Abhoynagar and its neighbouring comparison areas and 19.0 in Sirajgonj and its comparison area).

Proportionate mortality due to violence and accidents was higher among teenagers, nulliparous and not currently married women. Higher proportionate mortality was observed among Hindus than Muslims, and among those who were not housewives. It seems that violence is an important cause of death to WRA in rural Bangladesh and is more common in some geographical areas than others. There is a great need for sociological and anthropological research to determine the reasons for the high rate of violent death.

50

EPIDEMIOLOGY AND CAUSES OF DEATH AMONG CHILDREN IN SLUMS OF DHAKA

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The epidemiology and causes of death of children less than 5 years old were analysed using 1991 data from a longitudinal surveillance conducted in a probability sample of a Dhaka urban slum population of about 25,000. To ascertain the cause of death, trained (but not medically qualified) interviewers collected information on the circumstances surrounding the deaths from the immediate relatives of the deceased using a semi-structured questionnaire. Three physicians then independently reviewed the information and assigned causes of death. If at least two physicians agreed on a diagnosis, the diagnosis was retained. If the three disagreed, the questionnaire was returned to the field for additional information and reinserted into the review process.

With the infant mortality rate at 134.1/1,000 live births, the most significant causes of death were tetanus (18.9%), respiratory infections (18.9%), diarrhoea (16.2%; 8.1% due to acute and another 8.1% to persistent diarrhoea), low birth weight (12.6%), birth asphyxia (6.3%), and measles, including post-measles complications (5.4%). Cause of death could not be ascertained in 8.1% of the cases, meaning that either information could not be collected from the relative or the physicians could not agree on a diagnosis. The 1-4 year old mortality rate was 7.3/1,000. In this age group, diarrhoea was the most important cause of death (28.0%); persistent diarrhoea accounted for 20.0% and acute diarrhoea for the other 8.0%. Other important causes of death in the 1-4 year age group were respiratory infections (20.0%), measles (16.0%), and liver diseases (8.0%).

These findings are similar to earlier findings from rural Bangladesh and reconfirm that a few basic health services, such as diarrhoea and ARI case management, immunisation, and appropriate antenatal and obstetric care, could substantially reduce mortality in children less than five years of age.

51

BIRTH INTERVALS IN DETERMINING NUTRITIONAL STATUS OF CHILDREN IN MATLAB, BANGLADESH

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The importance of family formation patterns as determinants of child survival is well known, although much less is known about the intervening mechanisms. Higher infant and child mortality has been found to be strongly associated with short preceding and following birth intervals. Because nutrition and breastfeeding are important intervening mechanisms, we intended to study the possible links between birth interval and malnutrition.

Our sample consisted of about 3500 children between 12 and 36 months of age who were born during the period between July 1985 and June 1986 in the Matlab treatment area. The mid-upper-arm circumference (MUAC) was taken as the measure of nutritional status. Severe malnutrition (defined as a mid-upper-arm circumference of < 120 mm) was analysed in a logistic regression model. Previous birth interval (PBI) and subsequent birth interval (SBI) were the independent variables of focus in the study, and we also controlled for the effects of socioeconomic and demographic variables in the analyses. We found that:

- a child who had a younger sibling born within 24 months of age had a significantly higher risk of malnutrition than a child who did not,
- the length of the previous birth interval did not largely affect the nutritional status of the children, and
- children from large families were more likely to be malnourished than children from small families.

Our findings provide evidence that birth spacing, an important component of the childbearing pattern, improves the nutrition of children. The success of the national family planning programme in Bangladesh is likely to contribute to the improvement of child health and nutrition.

52

MATERNAL MALNUTRITION AS A PREDICTOR FOR DEVELOPING SEVERE MALNUTRITION IN CHILDREN: A CASE-CONTROL STUDY

M. Aminul Islam, M. Mujibur Rahman and D. Mahalanabis

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A case-control study was conducted to examine the relationship between mothers' malnutrition and the nutritional status of their children. The cases were 125 severely malnourished children (weight for age <55% of the National Center for Health Statistics (NCHS) median values), less than 36 months of age, admitted to the nutrition rehabilitation unit after control of diarrhoea. The controls (n=125) were recruited concurrently, matching for gender and disease type (diarrhoea or dysentery), having weight for age >60% of NCHS median values and whose diarrhoea had been controlled in the same hospital. Weight and length of all these 250 children and of their mothers were recorded. Also, mothers were interviewed to record various socioeconomic variables and feeding patterns of their children. Maternal factors like malnutrition (expressed as body mass index ≤19:00), illiteracy and employment status; and selected socioeconomic indicators like poor family income, unsafe latrine, use of surface water and non-breastfeeding all were associated with significantly higher risk for developing severe malnutrition in their children. However, age of the children, mothers with high parity or pregnant as teenagers, and mothers living in slum areas or in thatched roof houses did not show such significant association ($p>0.05$). In logistic regression model, mothers' body mass index remained a significant determinant of severe malnutrition in their children, controlling the effects of other co-variates ($p<0.05$). These findings show the importance of improving maternal malnutrition to prevent malnutrition in children. Child welfare programmes should also have a component to ensure maternal health.

53

LEVELS AND CORRELATES OF MATERNAL NUTRITIONAL STATUS IN URBAN SLUMS OF DHAKA

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Maternal nutritional status is an important determinant of both mother and child health. Using weight, height and mid-upper arm circumference (MUAC) data from a representative sample of 2,417 non-pregnant Dhaka slum mothers this study estimates

the levels of maternal nutritional status in this population. Mothers' mean weight, height, MUAC and body mass index (BMI) were 41.8 kg, 148.8 cm, 232.5 mm, and 18.8 respectively; 26.6% of the mothers had a height of less than 145 cm and 10.6% had a BMI of less than 16.

The association of maternal nutritional status with a standard set of socio – demographic variables, such as age, education, religion and housing material (a proxy measure of household economic status) and their reproductive experiences such as number of pregnancies, child deaths and still births are examined. Socio – demographic information was available for 2,084 mothers, reproductive history information was available from 1,314 mothers, and both kinds of information were available for 1,185 mothers. In multivariate regression analyses, mothers' weight, BMI and MUAC were significantly positively correlated with mothers' years of schooling and household economic status and significantly negatively correlated with number of child deaths. Mothers' height was significantly positively correlated with years of schooling and negatively correlated with number of child deaths and still births. The programmatic implications of these observed associations are discussed.

54

LONGITUDINAL DEMOGRAPHIC SURVEILLANCE IN MATLAB*

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The longitudinal demographic surveillance is a system the principal aim of which involves the actual measurement of different demographic events for each individual on several well defined occasions. The Matlab Demographic Surveillance System (DSS) covers a rural population with a current size of 200,000 in Matlab, a subdistrict 50km southeast of Dhaka. Data from this population provide useful information for comparing Bangladesh and other developing countries. DSS records the population using censuses and the longitudinal registration of births, deaths and migration (since 1966), marriages, and divorce (since 1975). The whole population is under continuous surveillance for demographic events. Using the 1982 census as a starting point, the DSS has constructed a large population database. This database is maintained on the mainframe computer using SQL/DS software.

The poster presents the cyclic procedures of data collection, and the roles of updating, correcting and collating programmes or routines. It also shows how the Matlab data capture system and database loading system work. Finally, the poster gives an idea of how a scientist can easily trace people over time in Matlab using the longitudinal surveillance system.

* The findings represent the collective work of the entire DSS staff.

55

CHILDHOOD MORTALITY DIFFERENTIALS IN THE MATERNAL AND CHILD HEALTH AND FAMILY PLANNING PROGRAMME IN MATLAB, BANGLADESH

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Since the introduction of the maternal and child health and family planning intervention programme in Matlab, Bangladesh in 1978, child mortality has substantially reduced. This study examined the socioeconomic and demographic correlates of childhood mortality in this area. A cohort of 6,690 children born in 1981 – 82 in the area were followed for five years through the Demographic Surveillance System.

Proportional hazard analyses indicate that the education of the mother and of household head, breastfeeding, and the number of family planning workers in a village have a favourable impact on child survival. Boys have a better survival chance than girls and so do the Hindus over the Muslims. Children have a better chance of survival in larger families than in smaller families. In addition, the intervention factors, i.e. measles immunisation and mothers' contraceptive use have a favourable impact on child survival. However, these effects vary throughout the ages of the children.

56

DID A FERTILITY CONTROL PROGRAMME CHANGE INFANT MORTALITY IN MATLAB?

Lutfun Nahar and A.K.M. Alauddin Chowdhury

International Centre for Diarrhoeal Disease Research, Bangladesh

It is believed that fertility reduction due to family planning programmes may lead to a reduction of infant mortality. Concern has been raised that such reduction may not, in fact, be observed, mainly because of a structural change of births in the high – risk groups that have occurred due to successful family planning programmes. The present study examines whether infant mortality has changed in the Matlab family planning programme area where fertility has remarkably declined due to programme activities. Infant mortality was analysed among a cohort of 11,922 children born in 1981 – 1982 in the Matlab demographic surveillance area. In addition to socio – demographic factors, the analysis includes programmatic factors that led to direct reduction of infant mortality. The results indicate that the shift in the distribution of births according to

demographic risk factors of infants is modest. We did not find appreciable changes in infant mortality rates. Further research is required to observe these structural changes with more recent data when fertility declines have been substantial.

57

COMMUNITY-BASED MANAGEMENT OF CHILDHOOD PNEUMONIA: HOME-BASED TREATMENT OR REFERRAL?

A. de Francisco, M.K. Stewart, V. Fauveau and J. Chakraborty

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Pneumonia is a major cause of childhood mortality in non-industrialised countries. Research has documented improvements in child survival where community-based management of pneumonia has been implemented. Less is known about the process by which such interventions succeed. This study exploits a longitudinal surveillance and service data from the ALRI control programme in the MCH-FP treatment area of Matlab to demonstrate patterns of disease, treatment and service use in two comparable populations provided with different levels of care.

In half of the population, home-based therapy for moderate pneumonia was provided by female Community Health Workers (CHWs); in the other half, moderate cases were referred to a community clinic for outpatient treatment. All severe cases were referred to the Matlab hospital for inpatient care.

Passive case detection was higher in the home treatment area. Children in the referral area had more repeated episodes. Over two-thirds of all recorded cases received treatment. Infants, males and children in the home treatment area all had higher rates of treatment for moderate disease. Overall case fatality rates were highest among infants. Mortality among treated cases was rare. Differences on episode distribution according to case detection raise questions on the accuracy of mother's recognition when the symptoms are mild.

The importance of home treatment in settings where infrastructure and referral services are not well developed is emphasised, particularly when considering groups which are less likely to be taken to health centres, as in the case of females.

58

FACTORS AFFECTING IMMUNISATION AMONG CHILDREN IN A RURAL AREA OF BANGLADESH

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This paper examines levels and differentials in childhood immunisation, using survey data from Fatehpur union, a rural community of about nine square miles under Hathazari thana of Chittagong district. A total of 914 ever-married women below the age of 50 years having at least one living child under three years of age were interviewed. Along with socioeconomic and environmental conditions of the respondent, information on the immunisation status was collected for the last child and the penultimate child (if any). Logistic regression analysis reveals that the respondent's years of schooling, current age and number of deceased children in her reproductive history have significant influences on the immunisation status of the penultimate child. The greatest impact has been observed to be associated with the respondent's years of schooling. However, contrary to this, data on the immunisation status of the last child show that the TT vaccine status of the mother during the last pregnancy, the source of the mother's knowledge on immunisation, and her ever-use of contraception are significantly related to the likelihood of immunising the last child. The disappearance of a significant effect of maternal education from the penultimate child to the last child seems to have important policy implications. Intensive immunisation campaigns through the government's available resources (particularly by doctors, nurses, EPI or family planning workers) along with service availability, should be continued to effect a better survival prospect among children in rural Bangladesh.

59

MEASLES IN RURAL BANGLADESH: ISSUES OF VALIDATION AND AGE DISTRIBUTION

A. de Francisco, H.R. Chowdhury, A.M. Sarder, V. Fauveau, J. Chakraborty and M. Yunus

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Measles is the single most important vaccine preventable disease. It strikes about 70 million children worldwide yearly and kills at least two million children. Cases below the age at immunisation cause concern.

A measles surveillance system was placed in the comparison area of Matlab to monitor measles incidence and its occurrence below nine months of age. The population (100,000) has a relatively low immunisation coverage and an excellent demographic surveillance system which allows accurate follow up. The system works through trained community health workers visiting all households every fortnight and reporting possible cases of measles. Medical doctors review a proportion of reported cases.

Eighteen per cent of 4,673 reported cases were visited by medics within 7.1 (SD 5.9) days after onset. Incidence of measles was estimated as 8.6% of children below one year, 8.9% and 8.6% in the second and subsequent years of age respectively. Cases in infants accounted for 22%. Fourteen per cent of cases below five years of age occurred below the age at vaccination.

This first report of a large sub-Asian rural population under an intensive demographical and measles surveillance shows a high proportion of cases below the current age of immunisation with measles vaccine. This pattern resembles the one reported for African communities and calls for reviewing immunisation strategies with vaccines to be applied below nine months of age.

60

SAFETY AND EFFICACY OF VITAMIN A SUPPLEMENTATION IN INFANCY USING THE EPI AS AN ENTRY POINT IN A RURAL COMMUNITY

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Vitamin A supplementation has been shown to reduce mortality in children less than five years of age. Supplementation of 50,000 IU at each EPI contact has been recommended by UNICEF and undertaken by the Government of Bangladesh.

To evaluate the safety of this procedure, we have been asked to carry out a study to evaluate possible side effects. A double-blind, randomised trial comparing vitamin A and placebo supplementation is currently being carried out at Matlab. Three doses of either 50,000 IU of vitamin A or placebo are given at each EPI contact to 184 infants. At the age of six months, infants receiving a placebo will be given vitamin A. All infants are seen on days 1, 2, 3 and 8 after supplementation by a medical doctor, and a physical and neurological examination is performed. The first 20% of the infants were supplemented and observed in the hospital for 24 hours. The Interim Analysis Committee, which has the code of the study and the power to stop the trial if there are any serious medical problems, is constantly reviewing the data.

Thus far, 42 infants have been supplemented at the hospital on three occasions, and a further 160 infants have been enrolled in the community for the first dose, 56 for the

second dose, and 51 for the third dose. This represents 71% of the total doses to be given. The code is still blind to the investigators.

Preliminary results show that bulging of the fontanelle has been present on 13 occasions; 1 was in one supplemented group and 12 in another. The bulging subsided spontaneously within 24 hours and was not accompanied by any other abnormal signs. No other side effects have been documented to date.

By the time of this conference, it is expected that the study will be finished and the code opened. The results of this study have implications for policy decisions about vitamin A – supplementation in Bangladesh, as well as in other developing countries.

61

EPIDEMIC MEASLES IN RURAL BANGLADESH: THE NEED FOR INTENSIFICATION OF MEASLES VACCINE COVERAGE AND AN EFFECTIVE VACCINE

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Measles ranks as one of the leading causes of childhood morbidity and mortality in the developing countries, including Bangladesh. Measles incidence, risk factors, coverage and vaccine efficacy were examined from an outbreak investigation in two villages of the comparison area of Matlab. The epidemic occurred between January and March 1991 and was detected retrospectively due to a high reporting of cases.

Ninety – one cases were reported among 467 children less than five years of age (19.5%). The mean age of onset was 29.9 months. The highest attack rate observed was 26.7% in children 9 to 23 months of age. Rates reported for infants younger than 9 months were 11.1%. Sharing the room with a measles case increased the risk of measles by 20% (95% CI, 0.6 – 2.5), and living in larger households decreased the risk by 50% (95% CI, 0.2 – 1.1), although these differences were not significant. Measles vaccine coverage was found to be very low in the area (30.7%), with the lowest coverage in the 9 – 23 months old children (19.6%). The latter group also presented the highest attack rate.

Female children were 50% (95% CI, 0.3 – 0.8) less likely to be vaccinated than males. Mothers with primary and post – primary education were 1.3 (95% CI 0.7 – 2.2) and 3.7 (95% CI 1.6 – 8.6) times more likely to have their children vaccinated than those who had not been to school at all. Vaccine efficacy was found to be 68.8% when determined using immunisation cards.

This outbreak indicates both the need to improve immunisation coverage, possibly by

targeting specific high-risk groups, and the need for an effective single dose vaccine for children less than nine months of age.

62

IS GENDER PREFERENCE AN OBSTACLE TO THE SUCCESS OF FAMILY PLANNING PROGRAMMES IN RURAL BANGLADESH?

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The purpose of this study was to investigate whether the gender preference would act as an obstacle to the success of family planning programmes in rural Bangladesh.

Data for this study came from three KAP surveys conducted in 1977, 1984 and 1990 in Matlab, Bangladesh. In each of the surveys, data on fertility intention, contraceptive use, and socioeconomic status were collected from couples of reproductive age. In the first survey, data were collected from about 3,000 couples from the MCH-FP area only. But in the other two surveys, data came from about 3,000 couples from each of the MCH-FP and comparison areas. The Arnold 1985 index was used to estimate the effect of gender preference on fertility intention and contraceptive use.

Although gender preference did not change and contraceptive use rose from 16% to 57%, the effect of gender preference on contraceptive use was not substantial in Matlab during the study period. It is concluded that the relative importance of gender preference as a determinant of contraceptive use would decrease with an increase in contraceptive use and gender preference would not be an obstacle to the success of family planning programmes in rural Bangladesh.

63

EXCESS FEMALE CHILD MORTALITY IN MATLAB, BANGLADESH: THE ROLE OF BIRTHSPACING AND PUBLIC HEALTH INTERVENTIONS

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Female children experience substantially higher mortality than their male counterparts in Bangladesh. We undertook a prospective study in Matlab where both child mortality and fertility have remarkably declined due to various innovative and carefully designed public health interventions. In this paper, we ask two questions: (1) is excess female child mortality (EFCM) associated with fertility behaviour, and (2) do public health interventions help reduce EFCM? Discrete – time – hazards analyses of child mortality (6 – 50 months) were carried out in a cohort of about 7,500 newborns who were followed for five years in Matlab. We found that girls have relative risks (RR) between 1.20 and 1.40 compared to boys in the cases when mothers do not subsequently conceive in 50 postpartum months. A subsequent conception (in 50 months) increases the mortality risk of a boy by about 1.6 (RR = 1.6) times. In contrast, a subsequent conception increases the mortality risk of a girl by 3.0 – 3.4 (3.0 < = RR < = 3.4) times. A large part of EFCM seems to be a result of early subsequent birth.

Fertility decline due to family planning programmes may not necessarily reduce EFCM as parents want to have the subsequent birth earlier after a girl than after a boy. However, there is suggestive evidence that maternal and child health activities, when accompanied by family planning programmes as backup, appear to reduce the excess mortality risks of the high – risk groups, including girls. Screening and referral of the girls whose mothers subsequently conceive in four years may be one of the more effective public health strategies for the prevention of excess female child mortality in son – preferring societies.

64

THE INVISIBILITY OF WOMEN IN A BANGLADESHI HOSPITAL: THE IMPLICATIONS OF A QUALITATIVE STUDY TO INVESTIGATE LOW COVERAGE OF TETANUS TOXOID VACCINATION

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The paper discusses access to hospital services by women and the missed opportunity that patients' attendants represent for preventive health care. The paper uses three sources of data: (1) hospital records; (2) eight discussion groups conducted (with hospital staff and mothers by a moderator and an anthropologist) to investigate the reasons for low tetanus toxoid coverage, later transcribed, translated and analysed ; and (3) a point prevalence survey of patients' attendants conducted by the Child Health Programme in ICDDR,B on a monthly basis.

The study highlights a wider, less documented issue which relates to women's access to health services and the important missed opportunity for preventive health care that patients' attendants represent. Hospital records reveal that males significantly outnumber females in the patient population of this and other Bangladeshi treatment centres. Despite the fact that women are less likely to enter health facilities as patients than men, our survey results show that most patients' attendants are women. Interviews in the form of group discussions were held with nursing staff, paramedics and women attendants. The investigation found that though women patients and attendants of child bearing age were eligible for tetanus toxoid (TT) immunisation, there was little awareness of this among the staff. The needs of women attendants were not recognised, despite the fact that patient care within the treatment centre was dependent on them; this represented a missed opportunity for immunisation and other preventive health care.

65

EMPOWERING WOMEN IN DHAKA SLUMS

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This research used qualitative methods to develop a context – specific definition of empowerment for Dhaka slums and to assess the extent to which women from various

groups became empowered. Twenty-two focus groups were held for four groups of women and their husbands: 1) current volunteers from the Urban Health Extension Project, 2) previous volunteers, 3) Women's Empowerment Pilot Project participants, and 4) controls.

Results suggest that women's and men's roles are highly circumscribed: women are seen as homemakers and nurturers and men are seen as protectors and providers. Women's movement in public spaces was also limited. Women did, however, appear to play an important part in decision-making by influencing and/or collectively making choices regarding household affairs.

Work and access to income appear to be particularly empowering in Bangladesh. Work outside the home appears to have fundamentally altered women's perceptions of the world around them. Income earned also appears to have positively influenced women's relationships with husbands and mothers-in-law.

Released volunteers were the most likely to have made major decisions alone, invested resources in daughters, and assumed responsibility for activities normally performed by men. These findings suggest that programmes which stress work, access to income, and mobility outside the household may be considerably more successful in improving women's position in society than those which do not. Adequate assessment of impact will depend not only upon identifying appropriate measures of empowerment but also upon accounting for other pre-existing conditions which could contribute to women's overall status.

66

FERTILITY BEHAVIOUR AND PREGNANCY OUTCOME AMONG RURAL ADOLESCENT WOMEN IN BANGLADESH

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The paper presents findings from a study of adolescent fertility behaviour and its impact on pregnancy outcomes. The study objectives were to assess the fertility behaviour of adolescent women in Bangladesh, the outcome of adolescent pregnancy, and the extent of neonatal and infant mortality, and to make recommendations for prevention of pregnancy wastage among adolescents.

The study is based on data collected by the Sample Registration System (SRS) of the MCH-FP Extension Project of the ICDDR,B on a longitudinal basis in four upazilas of Jessore and Sirajgonj District of Bangladesh. All married women 23 years old and younger of the SRS area in the year 1990 were included in the study.

The results show that outcome of pregnancies was strongly associated with maternal age at pregnancy termination, education (wife and husband), first pregnancy order, occupation of husband, previous outcome of pregnancies, and birth-to-conception interval.

The younger mothers 17 years old and younger had more foetal loss, including abortions, foetal deaths, and neonatal and infant deaths than those who were 18 years or older. The higher the education of mothers, the greater the foetal loss. The outcome of previous pregnancies had an influence on the fate of subsequent pregnancies. Parents' education was associated with infant deaths, and previous birth interval had a direct effect on mortality risk and child survival.

The results also show that childbearing at an early age had a number of risk factors related to maternal health and outcome of pregnancies. To prevent premature maternal death and high pregnancy wastage of teenagers, the government should develop policies to increase the age at marriage, delay early conception, and increase the space between births as well as policies to encourage the use of contraceptive methods among teenagers. This would require a strong emphasis on including younger couples within the national family welfare programme.

67

NO NEED FOR CONTRACEPTION': PERCEPTIONS OF PREGNANCY RISK AMONG WOMEN IN THE SLUMS OF DHAKA

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Despite rising levels of contraceptive use in Bangladesh, many couples fail to effectively plan their pregnancies, and achieved fertility is often higher than expressed desires. Nonusers of contraception who want to avoid or delay birth are often described as representing an 'unmet need' for contraception. This assumes, however, that these women are at risk of pregnancy. This paper explores perceptions of infertility among nonusers selected from the Urban Surveillance System. Women who stated that they had no need for contraception since they were in the postpartum amenorrhoeic period and those who felt they were infertile for other reasons were interviewed.

The majority of women in both groups wanted to delay or to avoid a subsequent birth. In the postpartum amenorrhoeic group almost all women had heard of 'mura baccha', (pregnancy during amenorrhoea), but perceived no real risk of pregnancy to themselves. Many women expressed the belief that starting contraception before the return of menses was pointless, others felt that it was actually harmful. In those cases where women had contemplated adopting contraception during amenorrhoea, support from neighbours and family planning services was lacking.

Many of the women in the 'infertile' group had given birth in the past, and in only a few cases was there any clinical evidence of sterility. In some cases, factors such as infrequent coitus may have been contributing to the belief that conception would not occur. However, a significant proportion of the women appeared to be at risk of pregnancy despite their belief that they were infertile. Older women, nearing the end of their reproductive life, may need special services. They are less well informed about contraception and may have the most to lose by another pregnancy.

The results illustrate the importance of women's perceptions of pregnancy risk in understanding nonuse of contraception.

68

DETERMINANTS OF CONTRACEPTIVE METHOD CHOICE AMONG URBAN SLUM WOMEN

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The paper examines whether the availability of family planning services and the mode of service delivery affect contraceptive prevalence and method choice in the Dhaka urban slums. The analysis focuses on modern reversible methods used, particularly the factors that influence the use of oral pills versus injectables. It uses data from the Urban Surveillance System of a representative sample of the slums in five thanas of Dhaka, and from the Health Facilities Survey conducted in these slums in March through August 1992.

Data show that the number of oral pill users is three times higher than injectable users. Over three – fourths of the slums have access to outreach workers supplying oral pills, while injectables are mostly available in clinics that are accessible to approximately one – third of the slums.

The findings indicate that the areas with outreach workers have a significantly higher contraceptive prevalence rate (CPR) than areas that have no outreach workers. Compared to areas with no clinics and no outreach workers, areas where the only services available are clinics offering injectables there is very little increase in CPR. In areas with both clinics and outreach workers, there is a substantially higher adoption of injectables, although overall CPR is no different from areas where there are only out – reach workers.

Among current users of reversible methods, the choice of methods is unaffected by the presence of outreach workers alone. However when injectables are made available through clinics in areas with outreach workers, there is a major change in the method mix towards larger proportions using injectables.

These findings have important implications for selecting the most effective modes of service delivery for this population.

69

CONTRACEPTIVE USE IN TEKNAF, A REMOTE, CONSERVATIVE AREA IN BANGLADESH: SUCCESS OF A CBD PROGRAMME

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A community-based distribution (CBD) of MCH-FP services was initiated in Teknaf in March 1991. Teknaf is a remote area with a conservative population, and has minimal access to health services. This paper presents the experience of our MCH-FP programme in raising the levels of awareness and acceptance of contraceptives.

Twenty Family Health Visitors (FHV) (female village-based para professional workers with basic MCH-FP training) are primarily responsible for the health outreach programme, home health-care delivery, and vital registration. Their tasks include: providing information, education, and motivation about family planning (FP), EPI, and oral rehydration therapy (ORT); screening of eligible couples for FP methods; providing non-clinical family planning and follow-up and referral services for other methods; providing antenatal checkups; persuading mothers to have their children vaccinated at the EPI camps; monitoring the nutritional status of children less than 6 years old; and half-yearly administration of vitamin A and deworming medication. Necessary backup services are provided by paramedics and physicians in the treatment centre and two sub-centres. The field work is closely supervised.

A baseline survey conducted on the population of 42,000 people in December 1990 showed that about 5% of eligible couples used contraception. The contraception-use rate began to increase steadily after the introduction of our programme, reaching 22% at the end of 15 months. The oral pill was the most popular method (70%) followed by the injectable (15%), IUDs (7%) and permanent methods (5%).

We have shown that contraceptive prevalence can be raised by providing services even in a conservative population.

AUTHOR INDEX*

* Numbers indicate abstract numbers.

SUBJECT INDEX

AN APPEAL

ICDDR,B
Endowment Fund

Each year, ICDDR,B treats over 70,000 patients attending its two hospitals, one in urban Dhaka,the other in rural Matlab. Though they are planted in Bangladeshi soil, they grow because of the dedication of thousands of concerned people throughout the world. The patients are mostly children with diarrhoea and associated illnesses and the services are offered free to the poorer section of the community.

Since these services are entirely dependent on financial support from a number of donors, now we at the ICDDR,B are establishing an entirely new endeavour: an ENDOWMENT FUND. We feel that, given securely implanted roots, the future of the hospitals can confidently depend upon the harvest of fruit from perpetually bearing vines.

To generate enough income to cover most of the patient costs of the hospitals, the fund will need about five million US dollars. That's a lot of money, but look at it this way:

JUST $150 IN THE FUND WILL COVER THE COST OF TREATMENT FOR ONE CHILD EVERY YEAR FOREVER !

We hope you will come forward with your contribution so that we can keep this effort growing forever or until the world is free of life-threatening diarrhoea. IT IS NOT AN IMPOSSIBLE GOAL.

Dr. Dilip Mahalanabis
Chairman, Hospital Endowment Fund Committee
GPO Box 128 - Dhaka, 1000, Bangladesh

Telephone: 600-171 through 600-178
Fax: (880-2)-883116

Asem Ansari

RESEARCH FACILITIES AT THE ICDDR,B

Bangladesh has many major health problems in common with other developing countries, such as diarrhoeal diseases and malnutrition. It too has widespread poverty and illiteracy, an increasing population, and a health system poorly equipped to respond to these challenges. The Centre is in an exceptional position to conduct research in a natural setting on the problems of diarrhoea, nutrition, fertility, and public health relevant to Bangladesh and other developing countries.

Clinical facilities

A large number of patients with diarrhoeal diseases attend the Centre's two hospitals each year, one in urban Dhaka, the other in rural Matlab. The Clinical Research Centre in Dhaka has a 25-bed research ward, a 10-bed metabolic ward, specific wards for persistent and invasive diarrhoea, a nutrition rehabilitation ward for children who have become severely malnourished from diarrhoeal diseases, and a laboratory to provide a wide range of biochemical and microbiological tests. In Matlab, the new two storey hospital complex also provides facilities for medical and maternity care, training, and research.

Research laboratories

There are well equipped and well staffed laboratories for research in bacteriology, bacterial genetics, histopathology, immunology, molecular biology, environmental microbiology, nutritional biochemistry, parasitology, and virology. The Centre has a walk-in cold room and freezer, facilities for growing and isolating pathogens, a large animal house, and many items of test equipment including an atomic absorption spectrophotometer, a cobas-bio analyser, a gas-liquid chromatograph, a high performance liquid chromatograph, a centrifugal analyser, and a polymerase chain reaction machine.

Demographic surveillance

Information collected on vital events concerning 200,000 people in the Centre's Matlab field area over the last 26 years currently provides an unrivalled opportunity to study demographic trends, to investigate the epidemiology of ill-health, and to examine the effect of providing new health services on morbidity and mortality. These data allow a multidisciplinary approach, integrating insights from the social and behavioural sciences with those gained from biomedical research.

Computing facilities

The Centre operates an IBM 4361 mainframe computer with eight megabytes (MB) of real memory and an on-line storage capacity of 3,000 MB. It is connected to 25 terminals. This system provides a capacity to analyse large data sets and is complemented by over 100 personal computers scattered throughout the Centre.

Diarrhoeal Diseases Information Services Centre (DISC)

DISC provides access to the scientific literature on diarrhoeal diseases, nutrition, population studies, and health in general by means of MEDLINE and POPLINE databases on CD-ROMS, and Current Contents on diskettes, 23,970 books and bound journals, over 11,000 reprints and documents, and subscriptions to 360 current journals. DISC publishes the quarterly Journal of Diarrhoeal Diseases Research, a Current Awareness Bulletin, a bi-monthly newsletter - Glimpse, a 4-monthly newsletter - "Shasthya Sanglap" in Bangla, and monographs.

Staff

The Centre currently has over 200 scientific researchers and medical staff from more than nine countries doing research and providing expertise in the many disciplines related to the Centre's areas of research.


ICDDR,B