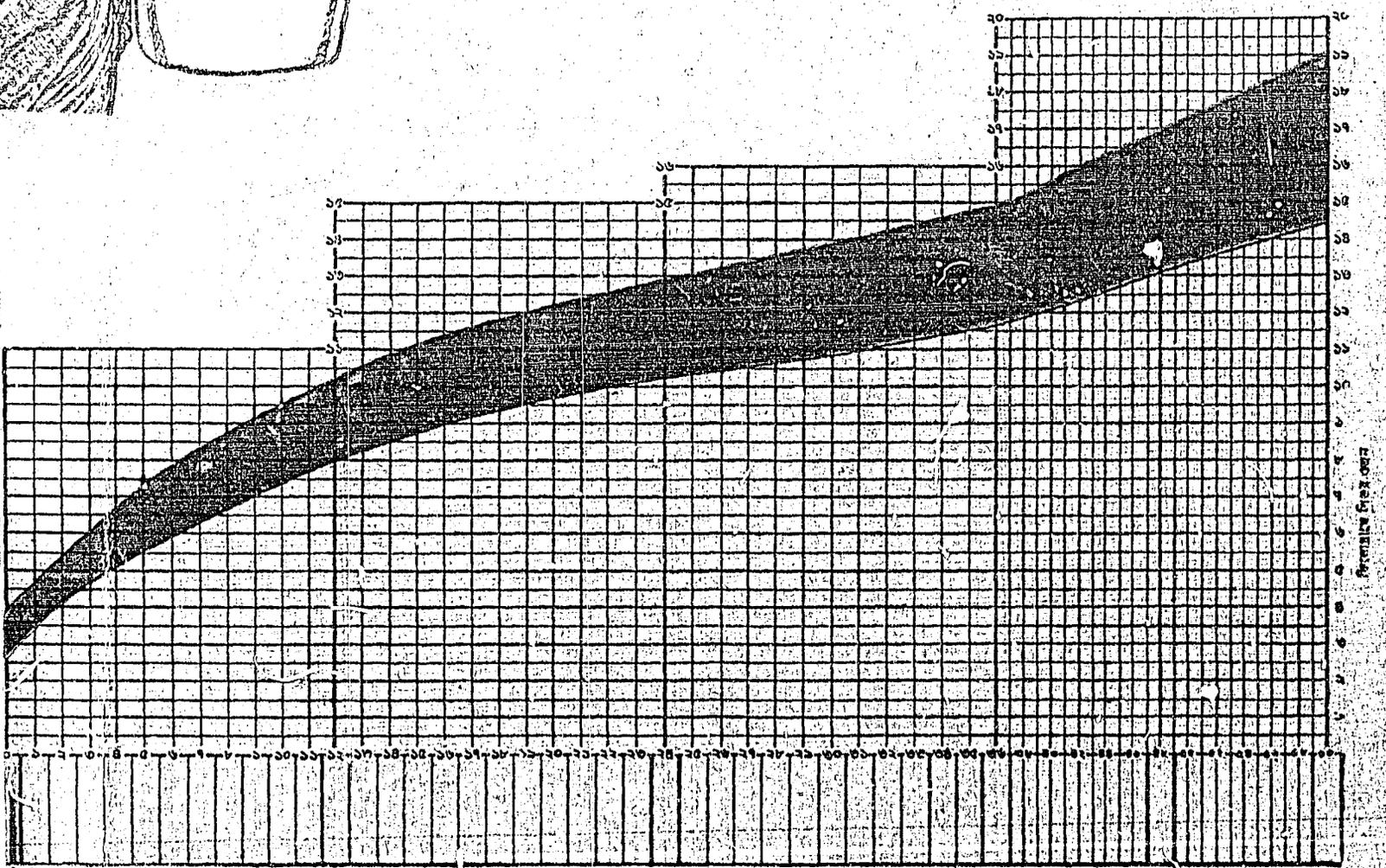
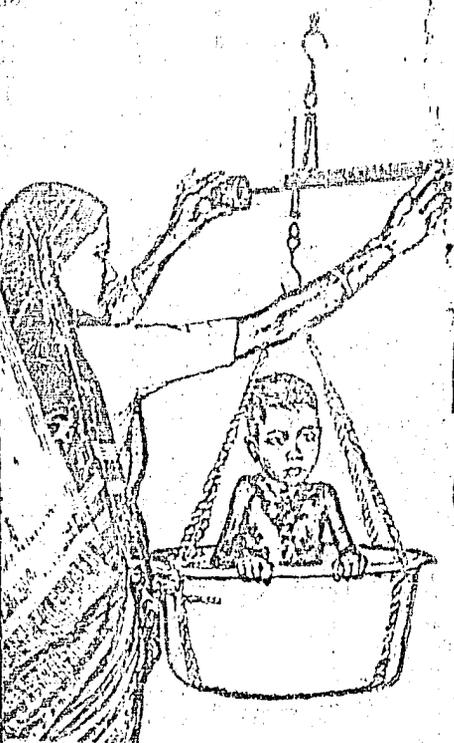


PH-KRW 9876 21  
REV 2 4997L

# Proceedings of the Workshop on Growth Monitoring in Children



**National Nutrition Council  
Bangladesh**

WORKSHOP ON GROWTH MONITORING IN CHILDREN  
SPONSORED BY THE NATIONAL NUTRITION COUNCIL, BANGLADESH  
IN COLLABORATION WITH UNITED NATIONS CHILDREN'S FUND

**Venue ; Institute of Post Graduate Medicine and Research  
Shahbag, Dhaka.**

**Dhaka, July 18, 1985**

*Publishes by :*

National Nutrition Council (NNC), Bangladesh.  
Mohakhali Health Complex. Dhaka-12,  
Bangladesh.  
Telephone : 606425, 605225, 600257

*Cover designed by :*

Ms, Syeda Rayhan,  
Artist, National Nutrition Council (NNC), Bangladesh

*Printed at :*

Sheba Printing Press,  
64/66, Mohakhali Rail Gate,  
Dhaka-12, Bangladesh.  
Telephone : 325660, 602118

# PROCEEDINGS OF THE WORKSHOP ON GROWTH MONITORING IN CHILDREN



**National Nutrition Council, Bangladesh**  
Mohakhali Health Complex, Dhaka-12

## NATIONAL NUTRITION COUNCIL, BANGLADESH

National Nutrition Council ( NNC ), Bangladesh was established in May, 1975 consisting of the senior administrators, policy makers, nutritionist and experts in the allied fields of the country with the Hon'ble Minister for Health and Population Control as its Chairman by the order of the President. The functions of the National Nutrition Council as laid down in the order are :-

1. To formulate national nutrition policy.
2. To help in the development of nutrition programmes including research programmes of the related Ministries and organisations in the light of National Nutrition Policy.
3. To co-ordinate nutrition research and other programmes of the different related ministries and organisations.
4. To carry out other responsibilities to solve national nutrition problems according to the need the Government.

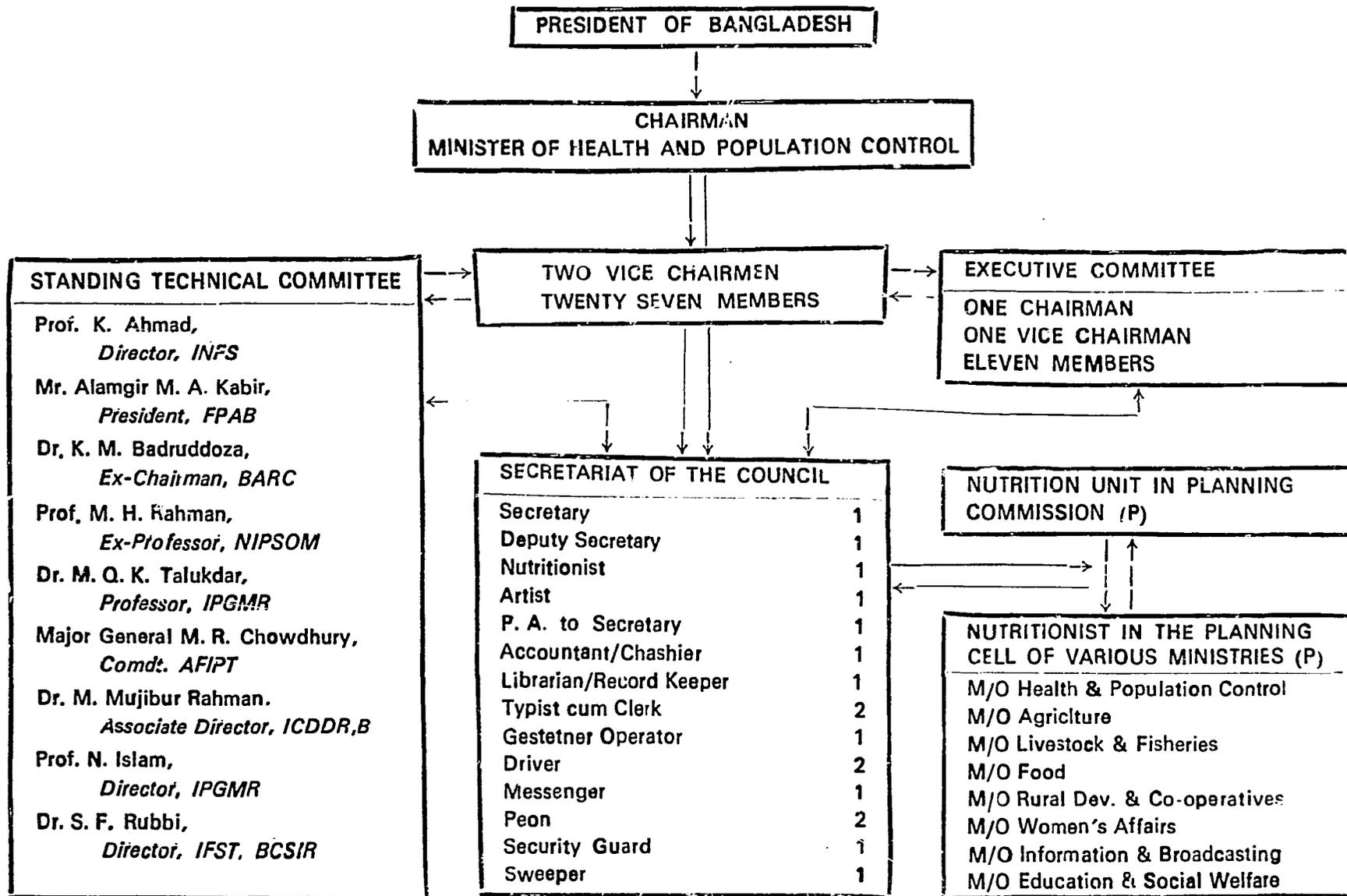
The National Nutrition Council is authorized to form Sub-Committee (s) with related Scientists and Government Officers for taking necessary action.

A permanent Secretariat of the Council was also established in 1980 by a Presidential Order for smooth functioning of the Council. The activities of the Council and its Secretariat are increasing day by day.

### Activities

- o Nutrition Policy and Programmes for Bangladesh has been formulated, approved by NNC and Published in 1984.
- o NNC has developed a standard growth chart for under-5 children. It was field tested and finally approved by NNC for national use. USAID has printed the approved growth chart and distributed it to the organisations concerned.
- o A National Workshop on Iodine Deficiency Disorder (IDD) in Bangladesh was organised by NNC on 26th April, 1984.
- o Proceedings of the workshop on IDD was published and distributed to all participants concerned, and other relevant organisations/institutions.
- o A draft legislation for universal iodisation of salt has been prepared and submitted to Ministry of Law and Justice through the Ministry of Health and Population Control for promulgation of ordinance.
- o A draft manual for use of Growth Charts has been prepared. It will be field tested in eight selected areas before final approval of NNC.
- o A NNC-Weighing scale for growth monitoring of under-5 children of Bangladesh has been developed.
- o Nutrition Syllabus and reading materials upto primary school level have been prepared and approved by the Chairman, NNC. It is now under active consideration of the Ministry of Education and Bangladesh School Text Book Board.

- o A follow up workshop on maternal and child nutrition was held at Mymensingh Medical College, and proceedings of that workshop was published and distributed.
- o 'Nutri-News' a newsletter on Nutrition of NNC Secretariat have been published and distributed.
- o IDD News Letters ( bimonthly ) are being published and distributed regularly.
- o A simple book on nutrition messages is being published ( In press ).
- o Telop messages on nutrition have been prepared and approved by the Standing Technical Committee ( STC ) of NNC for telecast.
- o Organised a seminar on food balance sheet in Bangladesh.
- o Fourteen Television Programmes on Nutrition have been completed and 40 Radio programmes on nutrition topics have been broadcasted through the initiative of NNC Secretariat.
- o Proposals have been given to Bangladesh Television for providing more programmes on nutrition in their farm programmes, Jibon Niye, womens programme etc.
- o Attempts have been made to broadcast nutrition messages everyday through the Radio Bangladesh.
- o NNC Secretariat actively participated in the 10th Annual Science Conference of Bangladesh Association for the Advancement of Science ( BAAS ) and its Science Exhibition.
- o Other activities :-
  - Several Standing Technical Committee meeting were held.
  - A number of sub-committee meetings were held.
  - Participated in 23 IDD working group meetings at UNICEF and 10 sectional committee meetings of Bangladesh Standard Institute.
  - Participated two meetings of Advisory Group on Nutrition in Diabetic Association of Bangladesh and two meetings of JGUAG at Planning Commission.
  - Taken several classes on nutrition topics at Islamic Foundation, Bangladesh.
  - Participated in workshops at Voluntary Health Social Services, Bangladesh Association for the Advancement of Science, Integrated Family Planning, Nutrition and Parasite Control etc. and presented papers.
  - Arranged IDD Slide Sound show in different organisations.
  - Discussion meetings on 'Nutrition Policy and Programmes for Bangladesh' and 'Growth Chart' were organised by VHSS in collaboration with National Nutrition Council, Bangladesh.



P-PROPOSED

ORGANOGRAM OF THE NATIONAL NUTRITION COUNCIL, BANGLADESH



## FOREWORD

I am happy that National Nutrition Council, Bangladesh has organised the workshop on Growth Monitoring in Children and has now undertaken to publish the proceedings of the workshop containing important research papers, deliberations and recommendations of experts.

The Government is committed for the 'health for all' by the year 2000. Being one of the poorest countries of the world, we must use simpler and cost effective health technology so that we may solve the pressing health problems at the primary health care level.

Weighing of children and recording their growth on the weight chart is a simple and inexpensive way of preventing malnutrition. National Nutrition Council of Bangladesh has developed a growth chart and a weighing scale for use in the primary health care level. The growth chart also include other important components such as oral rehydration solution for the treatment of diarrhoea, messages on the importance of breast feeding, maternal nutrition, additional family food for the infants, immunisation and family planning - all these are integral part of primary health care. The distinguished participants of the workshop had come out with some useful recommendations. The National Nutrition Council wishes to field test the use of growth chart in eight areas of the country before it finally recommends for use extensively in the primary health care level.

I feel confident that the use of growth chart in the community shall go a long way for the success of primary health care in the country,

**M. SHAMSUL HAQ**  
Major-General  
Minister for Health & Population Control  
and  
Chairman, National Nutrition Council, Bangladesh.

# Proceedings of the Workshop on Growth Monitoring in Children

## WORKSHOP ORGANISING COMMITTEE

Chairman	: Mr. Alamgir M. A. Kabir	President, FPAB.
Co-Chairman	: Prof. M. H. Rahman	NIFSOM, Mohakhali, Dhaka.
Member-Secretary	: Dr. S. F. Rubbi	Director, IFST, BCSIR, Mirpur Road, Dhaka.
Member	: Prof. M. O. K. Talukder	IPGMR, Shahbag, Dhaka.
	Dr. M. Mujibur Rahman	Assoc. Director, ICDDR,B Mohakhali, Dhaka.
	Late Mr. A. I. Md. Shamsul Alam :	Ex-Secretary, NNC, Mohakhali, Dhaka.
	Dr. A. Rahim	Director, (Nut) BARC, Farmgate, Dhaka.
	Dr. A. H. M. Abdur Rahman	Director, IPHN, Mohakhali, Dhaka.
	Dr. A. Malek	INFS, Dhaka University, Dhaka.
	Dr. K. Jahan	INFS, Dhaka University, Dhaka.
	Dr. M. Kabirullah	Director, BIRTAN, Medical Road, Jurain, Dhaka.
	Mr. M. A. Mannan	Deputy Secretary, NNC, Mohakhali, Dhaka.
	Ms. Nancy J. Terreri	Programme Coordinator, UNICEF, Dhanmondi R/A, Dhaka.
	Mr. A. K. M. Ashrafal Alam	Programme Officer, UNICEF, Dhanmondi R/A., Dhaka.
	Mr. M. Baquer	Programme Officer, UNICEF, Dhanmondi R/A., Dhaka.

**Proceedings of the Workshop on  
Growth Monitoring  
in Children**

**BOARD OF EDITORS**

**Prof. M. Q. K. Talukder**

**Prof. M. H. Rahman**

**Dr. S. F. Rubbi**

**Dr. M. M. Rahman**

**Mr. M. A. Mannan**

**Mr. A. K. M. Ashraful Alam**

# Proceedings of the Workshop on Growth Monitoring in Children

## CONTENTS

	Page
1. Workshop Methodology	XII
2. Summary Recommendations of the Workshop	XIII
3. Programmes of the Workshop	XIV
<b>4. Inaugural Session</b>	
i. Welcome Address — Mr. Alamgir M. A. Kabir	1
ii. Keynote Address — Dr. M. Q. K. Talukdar	3
iii. Address by UNICEF Representative — Dr. Minto J. Thapa	6
iv. Address by the Chief Guest — Mr. A. B. M. Ghulam Mostafa	7
v. Address by the Chairman of the Inaugural Session — Prof. Kamaluddin Ahmad	8
vi. Vote of Thanks — Dr. S. F. Rubbi	9
<b>5. Technical Session</b>	
i. Health Care Implications of Growth Chart — Dr. M. G. M. Rowland	11
ii. Longitudinal Study of Growth Chart in Exclusively Breastfed Infants from 0-5 Months — Dr. C. A. Kawsar and Dr. M. Q. K. Talukdar	14
iii. Nutritional Impact of Diarrhoea and other Infections — Dr. A. Mazid Molla and Dr. Ayesha Molla	23
iv. Experience on the Use of Growth Chart in Jurain Nutrition Project, Dhaka — Dr. M. Kabirullah	29
v. Experiences on the Use of Growth Chart in the Community — Dr. (Mrs.) M. Malakar	35
vi. Experiences on the Use of Growth Chart in the Community — Dr. M. Abdullah	42
vii. Address by the Chairman of the Technical Session — Prof. N. Islam	45
<b>6. Closing Session</b>	
i. Group Discussion and Recommendation	47
ii. Address by the Chairman of the Closing Session — Major General M. R. Chowdhury.	51
<b>7. Annexure</b>	52
i. List of Participants	
ii. Abbreviations	56

PROCEEDINGS OF THE  
WORKSHOP ON GROWTH MONITORING IN CHILDREN

**WORKSHOP METHODOLOGY**

Growth monitoring in children is a simple, inexpensive and affordable tool in the communities to prevent malnutrition and to promote better growth for children. Bangladesh National Nutrition Council (NNC) has developed a growth chart, a growth chart manual and a weighing scale for use in the communities. The growth chart, apart from the growth monitoring portion, also contains a package of messages, which are essential and cheap technologies for the promotion of better health and nutrition in children. Experiences in other developing countries show that growth monitoring is possible and in many communities has shown to be entry point for the programmes in the primary health care. The NNC decided to hold a workshop for the growth monitoring of children in Bangladesh. The specific aim of the workshop was to develop strategies for the implementation of the growth monitoring system in 8 representative areas of the country for a period of one year. It was further aimed that with the experiences, and successes of the growth monitoring in the field testing areas it shall be possible to extend the system in wider scale in the primary health care of the family welfare centres.

The workshop on growth monitoring in children was held in the auditorium of the Institute of Post Graduate Medicine and Research, Dhaka on 18 July, 1985. The workshop had three main sessions: Inaugural session, Technical session and Closing session. Seventy seven distinguished persons drawn from various disciplines in the country, those who are particularly involved and interested in child Nutrition participated in the workshop. Mr. A. B. M. Ghulam Mostafa, Secretary, Ministry of Health and Population Control attended the function as the Chief Guest of the inaugural session which was chaired by Prof. K. Ahmad. Mr. Alamgir M. A. Kabir, Chairman, Organizing Committee gave the address of welcome and the keynote address was given by Prof. M. Q. K. Talukdar. The session was also addressed by Dr. Minto J. Thapa of UNICEF and Dr. S. F. Rubbi. All speakers emphasised on the importance of growth monitoring in children.

The technical session was chaired by Prof. N. Islam. Six scientific papers on various aspects and in relation to growth monitoring were presented by distinguished workers in the field. The papers has highlighted the experience, merits and pitfalls in the growth monitoring of children. There was lively discussion on the papers at the end of each paper presentation. The papers and discussion in technical session had provided useful information for the group. After scientific/technical session, the closing session began with Major General M. R. Chowdhury in the chair. The participants were divided into 6 groups, each group taking up individual components of the growth chart for discussion. The topics of the group for discussion were: practice of growth monitoring; prevention and treatment of diarrhoea; immunization; promotion of maternal nutrition, breastfeeding and supplementary feeding; treatment of common childhood illnesses and birth spacing.

The groups had come up with recommendations in their respective component subject which were finally drafted as final recommendation. The session was closed with a speech by the chairman Major General M. R. Chowdhury.

## SUMMARY RECOMMENDATIONS OF THE WORKSHOP

The workshop felt that growth monitoring of children is an inexpensive method for preventing malnutrition and promoting health of children. The workshop also felt that the practice of growth monitoring and its support system is a key factor to the success of primary health care in Bangladesh. As the country does not have experience in the growth monitoring system, before it is being introduced at the primary health care level throughout the country a pretesting should be done. As such the workshop recommended that eight areas in four administrative divisions of the country ( Two from each division ) will be selected for field testing the growth monitoring system. The NNC sponsor the growth monitoring system and this must be taken in association of the other components of the growth chart as a comprehensive health package for children. All children in the study areas shall be covered with programme of providing oral rehydration solution (ORS) in cases of diarrhoea. Mothers shall be preparing the ORS as demonstrated on the growth chart. Immunization ( against the six illnesses of EPI ) must be provided to the children. Nutrition education to the mothers shall focus on the nutrition during pregnancies and lactation ; breastfeeding must begin at birth with increasing suckling frequencies and on demand and exclusively continued for 5 months, and locally available additional foods (based on cereals, legumes, oils, vegetables etc.) should be given from 5 months. The children shall be provided with treatment of common childhood illnesses. There shall be advocacy on family planning. The parents and the people in the community shall be taking part in this programme.

It is expected that the growth monitoring and the logistics in these field testing areas shall be inexpensive, and cost effective to provide health and nutrition of children in the community.

# PROGRAMME OF THE WORKSHOP

Date : 18 July, 1985  
Venue : IPGMR, Auditorium

## INAUGURAL SESSION

- 0900 : Registration.  
1000 : Guests will kindly take their seat.  
1005 : Telawat-e-Quran.  
1010 : Welcome address by Mr. Alamgir M. A. Kabir, Chairman, Workshop Organising Committee.  
1015 : Key note address by Prof. M. Q. K. Talukder, IPGMR.  
1025 : Address by Dr. Minto J. Thapa, Representative a. i., UNICEF, Bangladesh.  
1030 : Address by Chief Guest, Mr. A. B. M. Ghulam Mostafa, Secretary, M/O Health and Population Control, Govt. of Bangladesh.  
1040 : Address by Session Chairman, Prof. K. Ahmad, Director, INFS, D. U.  
1050 : Vote of Thanks by Dr. S. F. Rubbi, Member-Secretary, Workshop Organising Committee.  
1055 : Tea break.

## TECHNICAL SESSION

- CHAIRMAN : Prof. N. Islam, Director, IPGMR.  
RAPPORTEURS : Dr. A. J. M. Omar Faruque, Principal Scientific Officer, IFST (BCSIR)  
Mr. M. A. Mannan, Deputy Secretary, NNC  
1115-1125 hours : Health Care Implications of Growth Chart. —Dr. M. G. M. Rowland, ICDDR,B.  
1125-1130 hours : Discussion/Questions & Answers.  
1130-1140 hours : A longitudinal study of Growth of Dhaka Infant from 0-5 months.  
—Dr. C. A. Kausar, IPGMR.  
1140-1145 hours : Discussion/Questions & Answers  
1145-1155 hours : Nutritional Impact of Diarrhoea and other infection.  
—Dr. A. Mazid Molla, ICDDR,B  
1155-1200 hours : Discussion/Questions & Answers.  
1200-1210 hours : Experience on the use of Growth Chart in the Jurain Nutrition Project, Dhaka.  
—Dr. M. Kabirullah, BIRTAN.  
1210-1215 hours : Discussion/Questions & Answers.  
1215-1225 hours : Experience on the use of Growth Chart in the Community.  
—Dr. (Mrs.) Mina Malakar, CHCP.  
1225-1230 hours : Discussion/Questions & Answers.  
1230-1240 hours : Experience on the use of Growth Chart in the Community.  
—Dr. M. Abdullah, INFS., D. U.  
1240-1245 hours : Discussion/Questions & Answers.  
1245-1300 hours : Concluding remarks by the Chairman of the session.  
1300-1400 hours : Lunch break.

## CLOSING SESSION

- Chairman : Major General M. R. Chowdhury, Comdt., AFIPT.  
1400-1530 hours : Group discussion for draft recommendation.  
1530-1600 hours : Tea break.  
1600-1700 hours : Specific recommendations and concluding remarks by the chairman of the session.

XWL

**INAUGURAL SESSION**

# **Welcome Address**

**—Mr. Alamgir M. A. Kabir\***

**Mr. Chairman, Chief Guest, UNICEF Representative, Ladies and Gentlemen.  
Assalamo-alaikum,**

**On behalf of the National Nutrition Council ( NNC ), its Standing Technical Committee ( STC ), Workshop Organising Committee and on my own behalf, I extend a cordial and warm welcome to you all to this workshop on "Growth Monitoring in children."**

**Growth charts are being used in many countries of the world as a means of growth monitoring of small children. The benefits of using growth charts may be seen in terms of the individual child, benefit to the family, specially to the health services. Growth charts are one of the devices used to answer various questions of malnutrition in order for the mother and community health worker to be able to identify the necessary steps/action to be taken.**

**Since the 1970s other indicators such as height for age, weight for height and arm circumference have been used increasingly in growth monitoring projects. Weight for age growth charts have been evolving for over two decades, and have been adopted in more than 80 countries all over the world. Many countries and organizations are now in the process of producing or updating their own growth charts.**

**Attempts to monitor the growth of young children have been going on in the country since after the war of liberation in 1971 when different voluntary organisations came forward to assist and help the destitute children and mothers. A large variety of growth charts were being used by various organisations. Weight for age seems to be the most popular device and there have been some sporadic efforts to introduce some sort of recording system for this. Various growth monitoring cards/charts have come to existence, been used with varying degrees of success, and, in many cases, quickly fallen into disuse.**

**While various institutions, Government and non-Government, have been at their experiments the need for a uniform growth monitoring system with a commonly applicable recording tool has been felt more and more strongly over the last few years. In late 1979, the USAID in Dhaka conducted a short seminar to discuss the use and development of child growth chart in Bangladesh.**

**A working group was formed with the purpose of looking further into the development of a standard growth chart for use of all in Bangladesh. The members of this group consisted of representatives from UNICEF, CARE, INFS of Dhaka University, Ministry of Health, Radda Barnen and USAID. The working group met several times to discuss at great depths the different aspects involved in the development of a standard growth chart. Aspects such as the chart's size, colour, scheme, type of material, type of messages etc. were examined and opinions from individuals, knowledgeable in the field were gathered. Eventually, the working group arrived at a set of messages and format which seemed to be the most appropriate for**

---

**\*Chairman, Organizing Committee and President, Family Planning Association of Bangladesh.**

use in Bangladesh. By late 1982, the working group had developed a sample growth chart under the auspices of the National Nutrition Council of Bangladesh and recommended for immediate printing for pre-testing.

In early 1983, NNC, UNICEF and USAID formed a small committee to develop a plan and strategy for the growth chart pre-testing. The working committee set up a schedule of activities, assigned responsibilities and determined the research methodology to be followed. The pre-test was completed in mid 1984, the result was analysed and forwarded to the Standing Technical Committee (STC) of the NNC. The STC reviewed the result of pre-testing and recommended for few modification and accordingly it was modified and finally approved by the National Nutrition Council in late 1984.

Ideally, growth monitoring programmes form part of continuing health care services operating in all communities. A broad health care strategy that integrates growth monitoring and allows the different administrative and care levels to cooperate can make optional use of growth monitoring in providing comprehensive services. In such a strategy, the central level provides programme guidelines, logistical support, training and supervision.

Learned participants, we believe, out of today's discussion, you will be able to provide us with overall programme guidelines of growth monitoring through the growth chart developed by the National Nutrition Council, Bangladesh.

In conclusion, once again, I would like to say that it has been a privilege for all of us to have so many eminent people here who have responded to our invitation to give us the benefit of their experience in the light of the outstanding work they have been doing in their own fields. I once again extend a respectful welcome to you all.

Khoda Hafez,

# Keynote Address

—Dr. M. Q. K. Talukdar\*

## PREAMBLE :

Growth and development in human include the period from fertilisation of ovum in utero upto about 18 years of life. A child grows every day and over years in a predicted way. It is difficult to measure growth of a foetus. From birth onwards if the child would not grow in the expected way it can be said that the child is not well. The most common cause of growth failure in children in a developing country like ours is malnutrition, which in childhood can permanently affect mental and physical development. Malnutrition is a multirouted problem of which the most important are poverty, ignorance and intercurrent infections. The long term solution of malnutrition depends on economic growth, social justice, peoples education, prevention and treatment of infections, and many others. In the meantime low cost method such as growth monitoring is available to significantly reduce the incidence and severity of malnutrition. Several surveys in Bangladesh have shown that about 80% of the children suffer from various severity of malnutrition. 30000 children are becoming blind every year in the country. There is heavy toll on children's life from infectious diseases like diarrhoea, measles, tuberculosis, whooping cough, tetanus and poliomyelitis.

## WHAT IS GROWTH, GROWTH CHART AND ITS USE :

Growth means change in the size of an individual. A child's growth can be measured by means of monthly weighing. The growth chart offers a simple and inexpensive means of monitoring child health and nutritional status in the community. The slowing down of normal growth occurs long before the malnutrition is visible. The experience of hundreds of primary health care and nutrition projects in countries throughout the developing world shows that regular monthly weighing and the use of a child growth chart can make the growth failure (malnutrition) visible and so provide an early warning to mothers and health workers. The growth chart can be utilised with minimal instruction and supervision. By means of a growth chart, growth faltering and malnutrition can be early detected. The growth chart, because of its visual character, provides the health workers with a useful instrument for educating the mother and the family. With basic advise on matters of health and nutrition, growth monitoring can help mothers themselves to prevent most child malnutrition. It provides an easier understanding of the nature of growth and shows clearly the consequences of inadequate food, infections and infectious diseases. The use of growth chart shall indentify malnourished children, predict mortality and morbidity risk in time to save lives. It shall show the current nutritional status and the trends in growth performance and thus provide reliable data for evaluating intervention programmes in the community. Growth monitoring involves mothers, families and the community — and this may be the starting point of the community participations in matters of health. It enables health workers and the community to target limited food supplies to the most vulnerable children and to recommend other interventions.

---

\*Member, STC, National Nutrition Council and Professor, IPGMR.

#### THE GROWTH CHART OF THE NATIONAL NUTRITION COUNCIL ( NNC ) OF BANGLADESH :

A growth chart has been constructed with an aim to use it at the primary health care level with the help of the members of the NNC and other experts in the country.

The growth chart shall be used for children of either sex from 0-5 yrs. Although called growth chart, it contains different sets of messages related to the child's health and nutrition, and is essentially a card of the recent UNICEF's GOBI-FF concept of child health revolution. The components of the growth chart are,

( 1 ) Growth chart itself for the monthly record of weight for age of the child in kilogram. The road to health band is printed in light green ; the lower line represents the 3rd centile for girls and the upper line represents the 50th centile for the boys of the National Centre for Health Statistics standard. ( 2 ) Six Immunization schedule of the extended programme of immunization. ( 3 ) Instruction on the preparation and use of home made oral rehydration solution for diarrhoea. ( 4 ) Messages on the Nutritional support for the mother during pregnancy and lactation. ( 5 ) Messages on the breast feeding upto 2 years of age ( with exclusive breast feeding upto 5 months ). ( 6 ) Message with pictures start the infant on family food from 5 month of age. ( 7 ) Advise on family planning, ( 8 ) Records of the child's illness and treatment.

#### THE GROWTH CHART MANUAL :

The growth chart manual has been written in Bangali giving the usefulness, the various components and the descriptions of how to use it. The growth chart manual is primarily meant for the trained health workers in the community who in turn hopefully in future shall train the mothers to weigh their children.

#### THE NNC WEIGHING SCALE :

This is a bar scale developed by the NNC and made at BCSIR. This is a relatively inexpensive weighing apparatus with an accuracy of 20g division.

Now, therefore the three things which are required for growth monitoring such as growth chart, growth chart manual and the weighing scale have been developed by the NNC and are now ready for use in the community.

#### OBJECTIVES OF THE WORKSHOP :

As the title suggest the objective of the workshop is to develop strategies how the growth chart can be used in the primary health care level. At this stage of health services and the primary health care ( PHC ) in the country it is not intended that the workshop shall suggest the ways and means of the use of growth chart extensively throughout the country at the PHC level. The growth chart although have been successfully used in many countries it is new in Bangladesh. The growth chart, the manual and the weighing scale are newly developed. There are many components of health care in the growth chart. The successful use of the growth chart demands organisation of certain components of PHC. Therefore it is intended that the workshop shall discuss and recommend ways and means how the use of the growth chart can be implemented in certain field testing areas. After a study period of one year the experience and the data shall be collected and analysed. On the basis of the study and experience there may be many suggestions for improvements of the existing growth chart, growth chart manual and the weighing scale. Because of the inclusion of certain health care components

of the PHC in the growth chart the task of successful growth monitoring shall be a challenge. However, whatever may be the results from the growth monitoring in the field testing areas ( either encouraging or disappointing ) these shall be extremely useful for the implementation of growth monitoring at the PHC throughout the country. The workshop is not intended to discuss on the nature and pit falls/mistakes of the growth chart, the manual and the weighing scale but to suggest ways and means how best these can be used in the community in the field testing areas.

It is expected that the papers of the plenary/technical session shall cover the various aspects of growth chart and the problems of growth monitoring in the community. Following the technical/plenary session the participants shall be divided into groups to discuss on the various components of the growth chart and suggest recommendation on its use in the field testing areas.

#### Further Reading ;

1. Primary Health Care issues; Growth Monitoring : American Public Health Association International Health Programmes 1981.
2. Hendrata L, and Johnston M : Manual for community based underfives weighing programme. Yayasan Indonesia Sejahtera 1978.
3. World Health Organization 1978 : A Growth Chart for International use in Maternal and Child Health Care.
4. The State of World's Children 1982-83, 1984, 1985 UNICEF.
5. Morley D. A Health and Weight Chart for use in developing countries Trop Geogr, Med, 1968, 20 : 101.
6. Morley D, Growth Charts, "Curative" or "Preventive" Archives of Disease in Childhood 1977 : 52; 395

# **Address by UNICEF Representative**

—Dr. Minic J. Thapa\*

Mr. Chairman, Chief Guest Mr. A. B. M. Ghulam Mostafa, Distinguished Guests, Ladies and Gentlemen.

If we were to walk through an average village in the developing world we would probably only recognize about 2 percent of the child malnutrition all around us. Indeed so invisible is the problem that most of the mothers whose children are suffering from malnutrition would probably be under the impression that their children were growing normally and developing well.

Visible malnutrition is rare. It is an invisible malnutrition that touches the lives of approximately one quarter of the developing world's young children. It quietly steals their energy; silently restrains their resistance; and in conjunction with infection manifests itself in the wasted tragedy of approximately 40,000 young child deaths every day.

To allow 40,000 young children to die every day is unacceptable in a world where despite the problems of recession there are simple low-cost techniques that could halve this awesome death rate and protect the health and growth of many more children. The four major techniques growth monitoring with appropriate infant and young child feeding; oral rehydration to combat dehydration from diarrhoeal diseases; breastfeeding; and immunization against tuberculosis, diphtheria, whooping cough, tetanus, polio and measles—have put within our means the possibility of instituting a revolution in child survival and development.

But this revolution for child survival and development needs commitment. It needs the will to recognize the opportunity, to mobilise the resources at hand, and to organize to implement. This will must then be combined with the awareness and participation of the community in general and of the parents in particular.

This workshop will concentrate on one of these interrelated life-saving low-cost techniques that of growth monitoring and the associated appropriate child care practices for which it is an entry point, an indicator, and a motivational factor.

To facilitate growth monitoring the development of a single growth chart acceptable to all the government, non-government and donor organizations active in nutrition surveillance in Bangladesh was completed in 1984. This is a remarkable achievement.

The growth chart is a practical symbol of two changes vital to the child survival and development revolution, indeed to PHC and HFA 2000.

1. It is a symbol of the change from health care as episodic management of disease to health care as an integrated package of community-based activities to promote and safeguard good health.
2. It is a symbol of the change from parents as passive recipients of periodic services to active participants in a continuing process.

The National Nutrition Council is to be commended for its lead role in organizing this workshop to develop strategies for the promotion and use of growth charts on the PHC delivery system.

We wish the Council and the participants here all success in their efforts to introduce a comprehensive and nationwide growth monitoring system in Bangladesh. The system will require some time to establish. This is why the efforts must begin now. UNICEF will stand with you in your efforts in this respect

Thank you,

---

\*The Senior Programme Planning Officer, UNICEF-Bangladesh and is currently the Officer-in-Charge in the absence of the UNICEF Representative,

# Address by the Chief Guest

—A. B. M. Ghulam Mostafa\*

Mr, Chairman, Ladies, and Gentlemen,

I am glad to be here and very grateful to the organisers for inviting me to be the Chief Guest of this workshop on "Growth monitoring in children." This workshop is the first of its kind in Bangladesh. The National Nutrition Council (NNC) was set up in 1975 by the Government to identify nutritional problems of the country and prepare National Nutrition Policies, develop nutrition programmes, co-ordinate such programmes between different institutions/agencies according to the need of the country and in conformity with the policy of the Government. The council, composed of experts drawn from all concerned ministries/agencies is a suitable forum for serious deliberation on the problems of malnutrition and to arrive at a consensus for necessary remedial measures at national level. One of the major problems confronting the country is the malnutrition of the vulnerable groups particularly affecting the children under 5 years of age. The effect of improper nutrition, undernutrition, malnutrition is the slowing down of growth affecting weight and height. A comprehensive growth monitoring system is therefore necessary and requires weighing children at regular intervals. Today growth charts are being used in about 80 countries of the world in growth monitoring systems. Based on the experiences in growth monitoring systems adopted by other countries, the NNC developed a growth chart to suit our own situation.

After preliminary field testing the growth chart has been developed by NNC. In support of these activities, the USAID has printed the growth chart for introduction in the country. The next step is the promotion of this growth chart throughout the country to monitor the growth of the children.

For this a manual and a bar scale are also considered necessary. The NNC has prepared a manual. I am glad to know that NNC has developed a bar scale in collaboration with BCSIR for this growth monitoring programme. Introduction of the growth chart will further require education of the mothers. At this initial stage the NNC is planning to introduce this growth chart, manual and the NNC bar scale in some selected areas of the country. It is expected in future that this NNC growth chart, manual and bar scale will be introduced through the Primary Health Care Delivery system. Such growth monitoring activities when implemented successfully in the country are expected to go a long way to help the NNC and Government to prevent and manage the vast problem of malnutrition. As a policy, the Government will be happy to extend necessary help and support in this programme.

I am also glad to note that the UNICEF is providing necessary financial and technical assistance for various activities of NNC.

With these few words, may I take this opportunity to declare the workshop open.

KHODA HAFEZ  
BANGLADESH ZINDABAD.

---

\*Secretary M/O. Health and Population Control, Govt. of Bangladesh and Vice-chairman, National Nutrition Council, Bangladesh.

# **Address by the Chairman of the Inaugural Session**

—Professor Kamaluddin Ahmad\*

I feel deeply honoured and privileged for having this opportunity of presiding over the inaugural session of the workshop on growth chart, I am thankful to the organisers of this occasion.

During the past two decades or so growth chart has been the subject of great interest to the nutritionists around the world as a tool to determine the nutritional status of small children. When proper nutrition and favourable environmental conditions are available we all know that as children will grow older their weight and height will increase in a set pattern. With accurate measurements of weight at various intervals of time we can monitor if the child is growing in the way it should. Though there are other anthropometric measures that could also be useful, measurements of weight for age have been found to be most acceptable.

For it to be meaningful the weighing has to be done properly by trained persons and also the age of child has to be known with accuracy. The balance has to be simple, yet accurate. In a situation where the two measurements are not accurately carried out the value of the exercise will be compromised. It is also essential that the parents of the children understand what is all about and also the people who take the measurements also realise that a sloppy work is no job at all. I personally consider that the knowledge that a child is malnourished and that it could have been different if proper nutrition were available is very important. Having lived in a situation of malnutrition for ages we have come to regard our retarded growth performance as a normal phenomenon. I have met fairly rich rural parents who on being told that their children were malnourished retorted that there was nothing wrong with their children and all would be alright in course of time.

In a society where more than 80 percent of the population are illiterate, it would be a difficult and pains-taking job to explain the meaning of the growth chart. Yet it is so very important. Without a serious program on nutrition education which would include the significance of the growth chart the investment in the program may not yield appreciable benefit. A program of weighing of children at intervals will provide opportunities for interaction between health workers and families to discuss nutrition and other health problems.

Again the interest in the program of growth chart must be sustainable. On occasions we take a program because some agencies advocate and support it, to be abandoned when the donors change their mind. So there must be a firm commitment with regard to the continuity of program from the Government.

---

\*Director, Institute of Nutrition and Food Science, University of Dhaka.

# Vote of Thanks

—Dr. S. F. Rubbi\*

Mr. Chairman, Hon'ble Chief Guest, Representative of UNICEF, Chairman Organizing Committee, Distinguished Guests, Participants, Ladies & Gentlemen,

We are now at the closing part of the inaugural session of this workshop organised by the National Nutrition Council, Bangladesh.

I feel it a great privilege on my part to offer the vote of thanks on behalf of the organising committee.

The workshop was organised to develop strategies for use and promotion of growth chart in primary health care delivery system.

You have been, well informed during this session about the problems in the Health Sector by our learned speakers and particularly the problem of malnutrition of the vulnerable group and how to face those problems. The importance of growth chart to monitor the growth of a child can hardly be over emphasised.

Mr. A. B. M. Ghulam Mostafa, Secretary, Ministry of Health and Population Control and Vice-Chairman, National Nutrition Council, inspite of his busy schedule of activities and pre-occupation, could make time to be present as chief guest on this occasion to inaugurate the workshop. We are indeed very thankful to him for this and also for his assurance of help and assistance on behalf of the Government in identified priority areas.

Dr. Minto J. Thapa, Representative of UNICEF, Bangladesh, has been kind enough to spare some time and address in this inaugural session. The UNICEF is providing necessary assistance to National Nutrition Council for organising such workshops. we are really grateful to him for sharing his knowledge and experience for the promotion of growth chart in this country.

Prof. K. Ahmad who is chairing this session took the pioneering role for the improvement of nutrition in this country and Prof. M. Q. K. Talukdar the keynote speaker took active interest in developing this growth chart. They are well known for their contributions and we offer our special thanks to them.

The interest taken and the guidance offered by Mr. Alamgir M. A. Kabir as a Chairman of the Organising Committee in organising this workshop is very much appreciated.

We also thank the authorities of Institute of Post Graduate Medicine and Research for providing us necessary facilities for holding this workshop and particularly to Prof. Nurul Islam who as a member of Standing Technical Committee of National Nutrition Council is a source of strength in our activities.

Thanks to the mass media, Deptt. of Information, Press, Radio, TV for taking trouble to be present and their keen interest to cover the proceedings of this workshop. On behalf of the Organising Committee, we assure them all necessary help.

Mr. M. A Mannan, Deputy Secretary, NNC, tried his best to organise this workshop inspite of manifold difficulties. He and his colleagues and volunteers deserve special thanks.

It is our pleasure to acknowledge with thanks the offer of Lunch by M/S, OPSONIN Pharmaceuticals and the afternoon tea by M/S. Shilpee Food Products Ltd., Dhaka.

Finally, it is a great honour for me to thank you all once again and look forward for your continued support and encouragement in these activities.

---

\*Director, IFST, BCSIR, and Member-Secretary, Workshop, Organizing Committee.

# **TECHNICAL SESSION**

# Health Care Implications of Growth Chart

—M. G. M. Rowland\*  
MBBS, DCH, DPM&H, FRCP

## Introduction

The central theme of UNICEF's James Grant's "State of the World's Children" report is that a few relatively simple and inexpensive methods could now enable parents themselves to bring about a revolution in child survival and development.

Though not all strictly in this category the major strategies invoked are covered by the acronym GOBI FFF standing for

- Growth Monitoring
- Oral Rehydration Therapy
- Breast-feeding
- Immunization
- Female Education
- Family Spacing
- Food Supplements.

Growth monitoring listed first in this context, usually involves regular monthly weighing of children recorded on some form of growth chart. This is the subject of the present Bangladesh National Nutrition Council workshop.

## Rationale

The original concept of the growth chart as widely used in developing countries today is I believe attributable to David Morley who originally launched it as the "Road to Health" Chart. This was essentially an aid detecting "growth faltering" at a stage before frank malnutrition intervened (sometimes called "invisible malnutrition") and management was too difficult to accomplish at a primary health care level. Implicit in this strategy, therefore is the element of early intervention in some form or other.

This latter point is important. Too often maintaining growth charts is done as an end in itself. The utter inadequacy of such an approach has led some to refer unkindly to the "Road to Death" Chart. It is what makes the difference between these two approaches that I shall attempt to analyse.

## Measurement Venue

The first requisite is that we can measure and record children's weights with reasonable accuracy and regular (usually monthly) frequency. This is typically carried out at some kind of central facility such as a Maternal and Child Health (MCH) Clinic. Indeed, unless some kind of spring scales such as those made by Salter are used there is no alternative; many of the beam scales in common use are not suitable for repeated resiting and transportation. There are advantages in such a venue; for example, the activity can be conveniently combined with

---

\*Associate Director, Community Services Research, ICDDR, B.

other aspects of health care including immunizations, which are of major importance in the same target age group of young children and, of course, their mothers. The problem is to provide enough centres in widely dispersed rural populations as to ensure that all people have one within a reasonable distance of their homes. Because of this problem there have been attempts to introduce home-based monitoring schemes but this is a much less common mode of operation.

### **Identifying Growth Faltering**

The next assumption is that we can, with the help of a suitable growth chart, identify the onset of weight-faltering. In practice, this usually relates to some kind of deviation in trajectory of weight-for-age from a curve following or paralleling those standards which are marked on the chart. On the Morley chart these were upper: 50th centile boys; lower, 3rd centile girls using the old Boston Harvard standards. The charts themselves often contain some diagrammatic indication of what constitutes faltering; usually based on at least 3 observations spanning a period of 2 months or more. The detection of deviation from a curve is most readily defined and achieved, to my mind, in the "rainbow-type" format currently in use in Indonesia.

There is one major problem inherent in almost all growth charts in current use; the shape of the curve during the first half of infancy is almost certainly wrong for the young breast-fed child. This has been borne out time and again by growth data published from developing countries, and indeed more recently in the industrialized countries, where mainly breast-feeding populations are being studied. How much importance is attached to this is a matter for central policy decision-makers. It is worth bearing in mind however, that this problem affects precisely the age range during which assessment of growth performance must be made to form the basis of advice to the individual mother regarding breast feeding and complementary feeding practices.

### **Interpreting growth faltering**

Just as we know that in many cases of childhood "malnutrition" the role played by infectious diseases may be as or more important than dietary causes, the same is true for growth faltering or "invisible malnutrition."

Sometimes, as in the case of persistent low grade diarrhoea, the infectious component may appear obvious, but this is certainly not always the case. This raises a number of questions, Who assesses the growth performance? How are they equipped diagnostically in terms of education and facilities for carrying out basic investigations (e.g. stool microscopy)?

MCH clinics and similar facilities in many developing countries suffer from overcrowding, understaffing, little scope for critical review of individual cases, and a very limited therapeutic armoury. In practice, very often no attempt at a diagnosis is made, or such as may be taken the form of crude and probably inaccurate assumptions.

### **Intervention in response to faltering**

On the assumption that true growth faltering is occurring, and that it represents either infection, dietary inadequacy or some combination of both, a range of therapeutic facilities may be indicated. They will include on the nutritional side:

Dietary advice, through limited food supplementation on an outpatient basis, to inpatient nutritional rehabilitation.

Similarly when dealing with infections, the options will be : simple non-specific supportive therapy for self-limiting illnesses, through specific therapy such as antibiotic or antiparasitic treatment as an outpatient, to hospitalization for more intensive or complicated regimens.

In practice it may not be possible to offer more than the first option in each group and this will tend to be done, understandably, in an uncritical, unconvincing fashion, often inappropriate and ineffective.

In this situation the growth chart becomes little more than a vehicle on which to mark weights and document immunization. Even at this level it may be a valuable document if a deteriorating subject is fortunate enough to be referred to a source of effective treatment. However, this is not the concept of the "Road to Health" nor I believe of this Society in considering how best to use the new growth chart.

### Summary

Our aims and objectives therefore should be to

1. Ensure weighing facilities accessible and attractive to mothers of rural children.
2. Place and train staff to measure adequately and to recognize growth faltering.
3. Motivate and train staff to consider critically the likely significance of growth faltering in a given individual.
4. Train and equip staff to respond with appropriate primary health care level treatment.
5. Provide staff with some kind of support and referral services for the more serious or complicated cases falling beyond their level of expertise and resources.

If this challenge is successfully met then there is real hope that the introduction of appropriately designed growth charts may contribute to improved health and nutritional status of young children.

### DISCUSSIONS ON THE PAPER

- Dr. S. Rahman ( BMRC ) : Considering the conditions prevailing in this country, non-availability of weight machine, maintenance of chart, lack of attitude, what in your opinion is the feasibility of such programme in this country ?
- Dr. M. G. M. Rowland : There is no doubt that the health care implications of this programme presents a massive challenge in terms of developing a network of centres with suitably trained and equipped health personnel. Nevertheless the growth chart are worthwhile and should provide useful information into some of the health problems of young children, I fully support the concept of a start on a trial basis in a limited number of areas and would urge that the three elements used i. e. chart, the manual and the scales, all be kept under very critical review.

# Longitudinal Study of Growth in Exclusively Breastfed Infants From 0—5 Months.

—C. A. Kawsar<sup>1</sup> MBBS, FCPS  
M. Q. K. Talukdar<sup>2</sup>, PHD, MRCP

## Introduction

Decreasing prevalence and duration of exclusive breast feeding are the contributing factor of high prevalence of protein energy malnutrition and infection. This may be the cause of persistent high infant mortality in developing countries specially in Bangladesh though there are improvement in various public health measure and extension of health services. Because of various eye catching advertisement and social changes prevalence of breastfeeding in our community is fast receding. Breast feeding practice was found in 95% in various study<sup>1,2</sup> only 5-8 years back but few recent study as done by Hoque<sup>3</sup>, Talukder<sup>4</sup>, Khan<sup>5</sup> showed the prevalence ranging from 12.2% to 45% on exclusive breast feeding in early infancy.

Breast milk is unique energy and nutrient source and provides optimum nutrition for the newborn infants upto 4-6 month of age. For the developing country however, this statement has been disputed and growth faltering have been shown to take place from 3rd month onward in the exclusively breast fed infants. In Bangladesh PEM is widespread and 60% of malnourished children are under the age of one year. Whereas Bangladesh is recognised as a breast feeding community. Therefore it seems important to findout the relationship between breast feeding practice and malnutrition in the infancy. The aim of the study is to examine the growth pattern of exclusively breast fed infants upto the age of 5 months. Secondly, we wanted to examine whether it is at all necessary to add extra water during the period of exclusive breast feeding to maintain hydration.

The breast milk is a low solute fluid so exclusion of plain water in an exclusively breast fed infant should not affect the body chemistry. The study also aims to see whether there is any adverse effect on body physiology by withholding extra water in exclusively breast fed infants.

## Material and Method

Two hundred newborn delivered in Azimpur Maternity Hospital were taken into the study. (A government maternity hospital in the city of Dhaka attended mainly by people of lower and middle class of old Dhaka. Regular antenatal checking is advised). Only the full term, normal delivered infant who stays within Dhaka city and willing to attend the follow up clinic for 5 month giving only breast milk to the child upto this limit were included in the study.

Within 6 hours of birth all the infants were selected by two visit a day and those agreeing to attend were motivated to feed the newborn immediately to breast and give breastmilk

- 
1. Assistant Surgeon IPGMR, Dhaka.
  2. Professor. IPGMR, Dhaka.

with increasing suckling frequency and on demand upto 5 month of age. Mothers were motivated not to give extra water. All newborn after examination for congenital anomaly or other health problem were assessed for gestational age by assessing the skin color, texture, vein, body, hair, ear cart, lobe and shape; nipple and areola; solar creases; genitalia and neurological assessment. The children were weighed by UNICEF supplied baby weighing scale; supine length measured in a locally made sliding scale, head circumference with nonstretchable tape. Mothers standing height and weight was taken similarly. All the anthropometric measurement was taken by the author and a research assistant who was trained and had research experience. Each mothers were given a card giving the information and advise for follow up visit date. The parents address/location; antenatal health; sibs, occupation, income etc. were noted.

One social worker was employed who visited the house every month to check for himself about feeding and also to inform the mother on follow up date.

At follow up visits the infants height, weight, OFC; overall health and morbidity in the last Month and one sample of urine of the infant was collected for osmolality. Mother was weighed at each visit. The urine osmolality was checked soon after collecting the sample by automated method.

The mean of the individual growth parameters at each month were compared with 50th centile of NCHS standard for that particular month.

Of 200 initial recording only 66 completed the 5 month follow up. Rest were either could not be contacted because of wrong address or some had left the said address without any traceable address. Of 66 completed follow up 44 were exclusively breast fed at 5 month of age and 22 were mixed fed group (Table 1). The date of mixed fed group was compiled as comparison group for morbidity.

## Result

Nearly all of the infants were from lower and lower middle class with monthly income less than 1500 taka (Table-1). There was 29 male and 15 female infant in exclusively breast fed group and sex was equally distributed in mixed fed group Birth weight, height and occiputofrontal head circumference was  $2728.8g \pm 330.9g$ ;  $47.8 \text{ cm} \pm 1.7 \text{ cm}$  and  $33.4 \text{ cm} \pm 1.2 \text{ cm}$  respectively. Mean maternal height and weight after delivery was  $4.60 \pm 7.2 \text{ kg}$  and  $152.3 \pm 6.18 \text{ cm}$  respectively (table-1).

The mean  $\pm$  SD of weight, height and OFC at different month is shown in Fig. 1, 2 and 3 respectively. The birth weight was found to be doubled by 3 to 4 month of age. During 5 month period overall weight gain was  $23.7 \text{ g/day}$  which was maximum, that is  $33.6 \text{ g/day}$  in 1st month and minimum of  $14.6 \text{ g/day}$  at 5th month. There was positive weight gain by 8th day in 31 of the 36 recorded cases with mean gain of  $18.18 \text{ g/day}$ . There was total gain of 15 cm in length and 14.88 cm in head circumference during the 5 month period.

Both Fig. 1, 2 and 3 showed the study value was around 25th centile. In weight parameter there was apparent catch up gain in 1st month and then growth was running parallel to 50th centile and from 3 month onward there was downward deviation from 50th centile of NCHS standard and persist all along. The OFC and height curve showed less significant changes.

when the growth achievement was expressed as percentage of 50th centile of NCHS standard it was found that growth was improving upto 3rd month from 83% of 50th centile to 93% but then it faltered upto around 85% and remained steady. ( Fig. 4 ).

Fig. 5 shows the change in weight of mother in exclusively breast fed and mixed fed group. It was found that weight lost at post partem is more marked who failed to successfully breastfeed exclusively.

Table 2 shows the diarrhoeal morbidity, skin infection and URTI in exclusively breast fed and mixed fed group. It is apparent from the table that morbidity was 3 times more common in mixed fed group though they can not be tested statistically due to small number in mixed fed group.

The urine osmolality did not show any marked variation all along the 5 month period ( Table 3 ). The range of osmolality at different month was 68.9 mosmol to 137.8 mosmol which was well within normal physiological range.

### Discussion

The socioeconomic status of the studied population and birth weight, height, and OFC are very much representation of the average Bangladesh as compared to other studies,<sup>6,7</sup>.

But weight gain in present study is more than that of Meheran<sup>7</sup> study which can be explained by the fact that in the present series mothers were motivated to breast feed at increasing suckling frequency. The present study doubling time was much earlier than text book teaching of 5 month.

The apparent deviation from 3rd month onward may lead to wrong conception of growth faltering. But it should be considered that NCHS standard is made from infants more than 90% of whom are formula feed naturally the NCHS curve, at least upto 1 year of age can be termed as artificial curve. Though Goldstein & Tanner<sup>8</sup> was skeptic about the use of growth curve of socioeconomically and nutritionally differing population but WHO accepted international standard for uniform comparison<sup>9</sup>. When comparing the percentage achievement in growth parameters ( Fig. 4 ) there was deviation from 3rd month upto 4th month and then steady. Rowland et al<sup>10</sup> in their study also found the similar trend in Gambian & Cambridge exclusively breast fed group. Though these mother were nutritionally and economically was much in better state still they have similar "faltering". This raises the question of validity of comparing exclusively breast fed infants growth with that of NCHS curve. When other growth parameters are compared ( Fig. 2, 3 ). The deviation was not that marked. But before any conclusion this need further study and construction of a different growth chart for exclusively breast fed infants.

The changes in mothers weight deserve explanation. The lactational adequacy depends upon maternal nutritional status. The rapid weight loss may be the cause of lactational failure in those mother who failed to feed exclusively at breast. Thus extra feed to mother from conception till lactation is necessary. Ahn et al<sup>12</sup> had found that healthy mother who are very much motivated could successfully breast feed for more than 6 month with growth above 50th centile of NCHS. The relationship of rapid weight loss and lactational inadequacy require further study.

It is well established that morbidity is less in exclusively breast fed infants. A.S. Cunningham et al<sup>13</sup>, Raulolph Paine et al<sup>14</sup>, M. Z Idris<sup>15</sup>, Kumar et al<sup>16</sup> and other author showed similar finding with significantly lower incidence of morbidity in exclusively breast fed child. They had diarrhoeal morbidity 2-3 time more in mixed feed group so also upper respiratory tract infection. Present study were comparable to those though statistical test can not be done.

**TABLE-1**  
Studied Children ( 44 )

Socioeconomy of the parents	Income <1500 Pm 94%
Male : Female	29 : 15
Birth weight ( Mean $\pm$ S D )	2728.8g $\pm$ 330.9g
Birth length ( Mean $\pm$ SD )	47.8 cm $\pm$ 1.7 cm
Occiputo frontal circumference ( Mean $\pm$ SD )	33.4 cm $\pm$ 1.2 cm
Mothers weight ( Mean $\pm$ SD )	46,0 Kg $\pm$ 7.2 Kg
Mothers height ( Mean $\pm$ SD )	152.3 cm $\pm$ 6.18 cm

**TABLE-2**  
Moribidity according to feeding practices ( per 100 visits )

Illnesses	Exclusive breastfed group	Mixed fed group
Diarrhoea*	4.37	11.66
Fever & Cough	7.11	18.33
Skin infection	2.18	10.00
Umbilical Sepsis	0.00	3.33

\*Diarrhoea : When mother complain of change in bowel habit with frequent passage of loose stool.

**TABLE-3**  
Urine osmolality of exclusively breastfed infants ( mosmol/L )

Age	No	Mean	S, D.
Within 3rd day	61	137.8	81.2
1 month	25	96.6	68.2
2 month	33	68.9	32.8
3 month	32	96.2	55.2
4 month	29	107.3	74.1
5 month	18	122.3	31.4

Fig-1

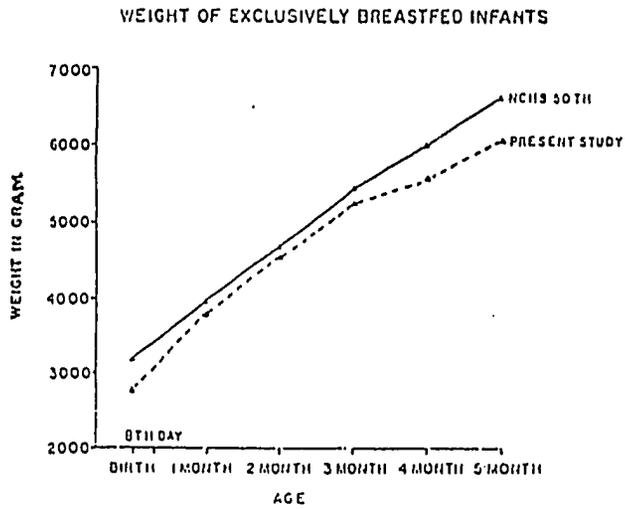


Fig-2

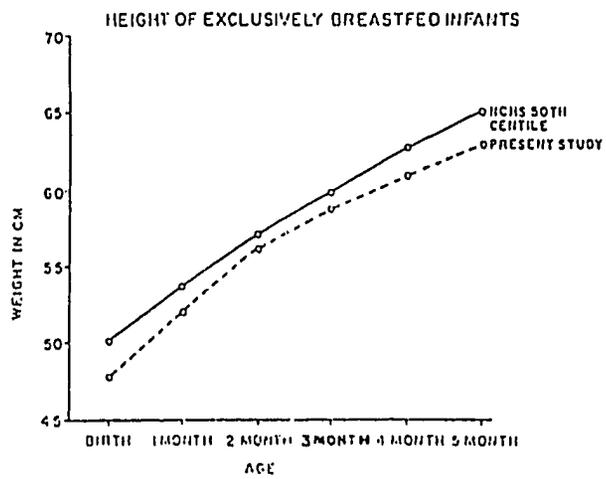


Fig-3

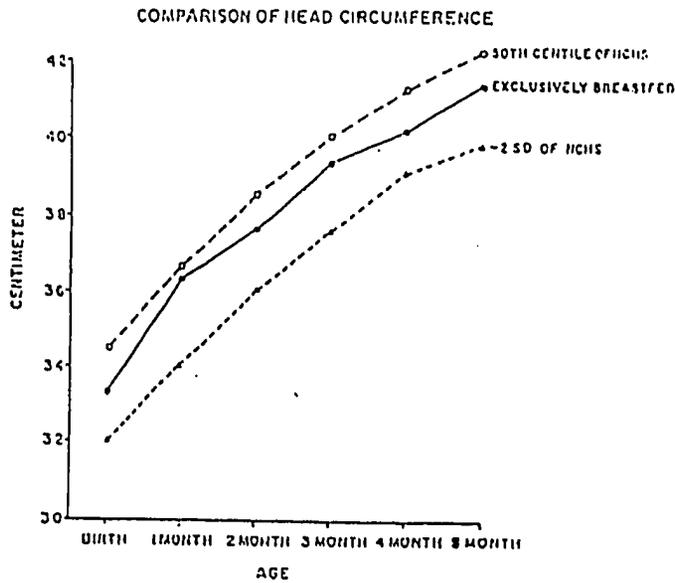


Fig-4

WEIGHT FOR AGE EXPRESSED AS PERCENTAGE OF NCHS STANDARD

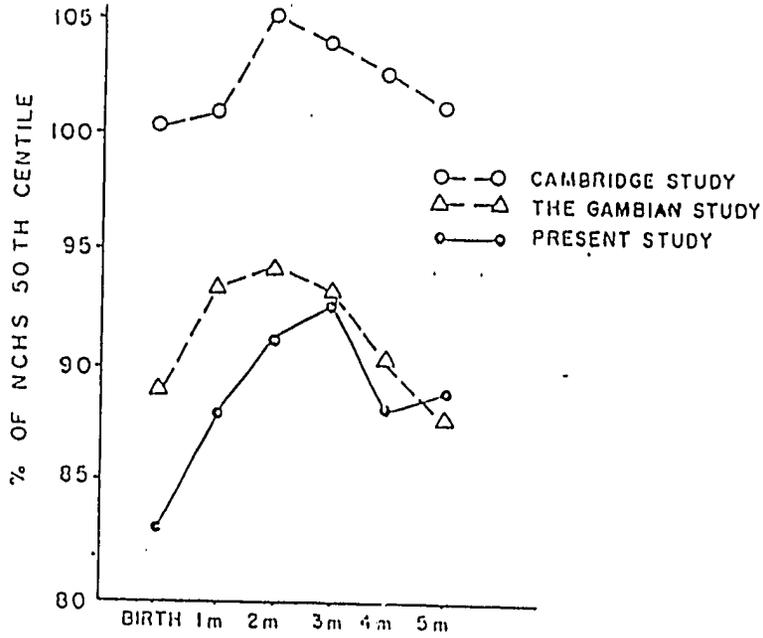
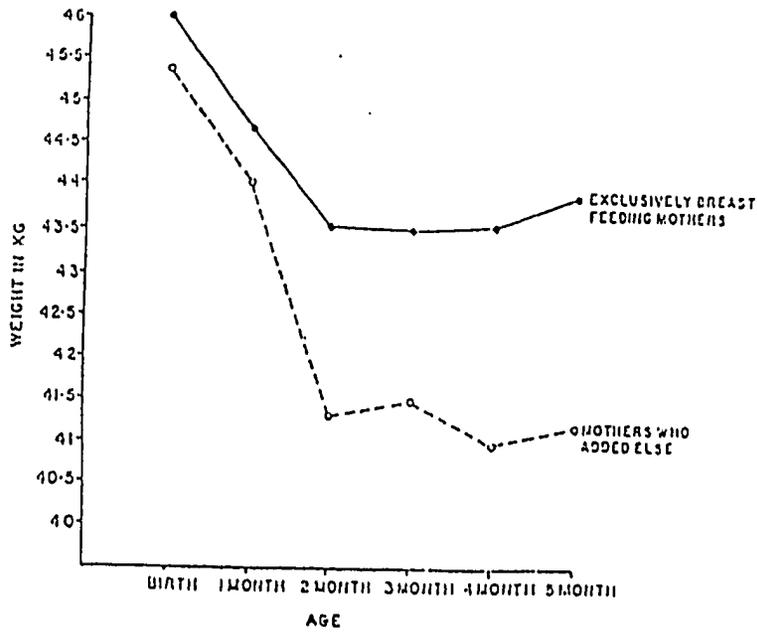


Fig-5

WEIGHT OF MOTHERS IN DIFFERENT MONTH



Because of high water content exclusively breast fed infants do not need extra water as shown by absence of change in urinary osmolality. Almroth<sup>17</sup> & Goldberg has similar finding in Jamaica and Israel. Thus plain water can be avoided which will prevent the water borne infection where safe water is scarce.

Thus it is concluded that exclusive breast feeding upto 5 month of age will give optimum growth of the child. The apparent deviation from 3rd month is physiological. The morbidity is less and there is no need of extra water. There is positive weight gain in first week of life. Relationship with maternal weight loss and lactational failure needs further study.

#### Reference :

1. Hoffman S, L. et al. Breast feeding pattern in rural Bangladesh. XI International Congress of Nutrition, Brazil, Aug. 27-31, 1978.
2. Nutrition survey of Bangladesh 1975-76. Ed. K. Ahmad, Published by Institute of Nutrition and Food Science, Dhaka University.
3. Haque N. Health and nutritional status of children attending an outdoor clinic in rural community (Dhamrai) Dissertation for F. C. P. S, curriculum Jan., 1983.
4. Talukder M, Q. K., Faroz ASM, Yusuf F. H., Noor-E-Hafza. Breast feeding trends in the Dhaka Urban affluents. *Bang. Med. Jour.*, 1983, 12 : 1
5. Naila Khan, Saleemul Haque, M. Q. K. Talukder. Infant feeding practices in Dhaka city. *Bang. Med. J.*, 1983, 12 : 162
6. Nahar N. et al, Birth weight, length and head circumference and haemoglobin level of newborn. *Bang. Med. Res. Coun. Bulletin* 1978, 4 (1) : 10-4
7. Khan MU, Gorge T. Curlin, Chakraborty J. Growth and development studies: Meheran ICDDR,B Publication 1979. Scientific Report No. 28.
8. Goldstein H. Tanner J. M. Ecological considerations in the creation and the use of child growth standards. *Lancet* 1980, 1 : 582
9. Keller W. Fillmore C. M. Prevalence of protein energy malnutrition. *World Health Statistics* 1983. 36 (2) : 129
10. Rowland M. G. M. Whitehead R. G. Lactation and infant nutrition. *Bri, Med, Bull.* 1981, 37 (1) : 77
11. Sosa R. Klaus M. Urrutia JJ. Feed the mother thereby the infants, *J. Pediat.* 1976, 88 : 668
12. Ahn CH. William C. Maclean. Growth of the exclusively breastfed infant. *Am. J. Clin. Nutr.* 1980, 33 : 183
13. Allan S. Cunningham, Morbidity in breastfed and artificially fed infants. *J. Pediat.* 1977, 90 (5) : 726
14. Raudolph Paine et. al, Breast feeding and infant health in Rural US Community, *Am. J. Dis. child.* 1982, 136 : 36
15. Idris MZ Saxena SC, Malik GK, Srivastava BC. Feeding practice and diarrhoeal episode among rural and urban infants of lucknow, India. *Pediat.* 1981, 18 : 311
16. Kumar V, Kumar L, Diwedi P. Morbidity related to feeding pattern in privileged urban and under privileged rural infants, *India Pediat.* 1981, 18 : 742
17. Stina G. Almroth, Water requirement of breastfed infants in a hot climate. *Am. J. clin. Nutr.* 1978, 31 : 1154

## DISCUSSION ON THE PAPER

- Dr. L. R. Talukdar (EPI) : EPI advocates initiating immunization at the age of 3 months and vaccination is available in your study area. Whether you have noted that the children under study had vaccin ?
- Dr. C. A. Kauser : All children under study were advised but only a small portion took that. We have tried to motivate parents on each visit and by 5 month most of the children were vaccinated. Moreover the centre where they were vaccinated the counselling by the staff to the parents were not upto the expectation.
- Dr. M. U. Khan (ICDDR,B) : 1. Who were the population ?  
2. How they were selected ?  
3. What was the reason of weight fall of mothers after delivery ?
- Dr. C. A. Kauser : 1. Two hundred full term, normally delivered children, whose mothers agreed to feed the newborn exclusively upto 5 months of age and will attend the following clinic were our subject.  
2. Within 6 hours after birth the mothers were approached, the infants were checked, mothers were motivated, explained on the study and when they gave the consent, they were included in the study. Institution was Azimpur Maternity Centre, Dhaka.  
3. I did not tried to find out detailed the cause. However, it seems that early involvement in domestic work and no additional food may be the possible causes.
- Dr. S. Rahman (BMRC) : 1. Considering the condition prevailing in this country, in your opinion, how far is the feasibility of implementation of growth chart in this country in respect of limitation of availability of weight machine, maintenace of chart, unusual attitude of community etc.  
2. Recent paper from Prof. H. Rahman brings out big differences of weight between birth weight of urban and rural children. More than 50 percent of this rural children are below 2500 grams. What is the pattern of growth for 0-5 month in rural children ? Is there any study on this ?
- Dr. C. A. Kauser : 1. My personal opinion is that if some motivated, hard working volunteers can be trained, then it will be possible. Moreover we have to start as a pilot project to see the drawbacks & benefits from which new strategy can be taken. I think it is possible.  
2. Dr. M. U. Khan has one study in Meheran, comilla. The growth pattern is similar to that of present paper, the pattern of findings is a bit lower than the present one.

- Dr. Shah Md. Keramat Ali (BIRDEM)** : 1. What was your sample size?  
2. What was socio-cultural background of the child?  
3. You need to correct your slides?
- Dr. C. A. Kauser** : 1. Sample size was 55 out of them 44 completed exclusively breast feeding for 5 months and remaining 11 infants had something else by 2nd or 3rd month but attended the follow-up clinic and we have studied them for comparison purpose.  
2. Parents are from middle socio-economic class families with income of Tk. 800-1500 per months. Residing around Azimpur Maternity Centre in old Dhaka city.  
3. Thanks for the suggestion.
- Dr. F. Henry (ICDDR,B)** : Is it possible that the deviation after 3 months could be explained by low birth weight of your study?
- Dr. C. A. Kauser** : Yes, it may be, but what I wanted to show is that it is not the inadequate breastmilk, rather it is physiological and one should not worry about it.
- Dr. M. M. Rahman (ICDDR,B)** : What was the infant mortality experience in your group of follow up children?
- Dr. C. A. Kauser** : We initially examined 200 infants but on 2nd visit only 67 children attended the follow up. And at 5 months only 55 children were attending. But at 2 months we have one report of sudden death. We do not know the fate of those who did not attend. So percentage would be difficult to say under these circumstances.
-

# Nutritional Impact of Diarrhoea and other Infections

Dr. A. Majid Molla<sup>1</sup>, M. D., Ph. D., D. C. H.

Dr. Ayesha Molla<sup>2</sup>, M. Sc., Ph. D.

## Introduction

Diarrhoea and its interaction with malnutrition is one of the most important health problems and a major cause of death in infants and young children in the developing world. Diarrhoeal diseases, worldwide, is estimated to kill at least 4 to 6 million people every year<sup>1,2</sup>. Children in the developing countries suffer from two to five episodes of diarrhoea every year and on an average they suffer 20-30 days from diarrhoea annually<sup>3,4</sup>. Most diarrhoea episode last only a short time, but enough become serious so that 10 percent of the children die from the effects of diarrhoea before they reach their fifth year<sup>5</sup>. The effect of acute diarrhoea on the host, specially a child is loss of fluid and electrolytes. With the discovery of oral rehydration solution (ORS), the treatment of dehydration and maintenance of the continued abnormal loss in acute diarrhoea has become easy and effective. But the delayed and more disastrous effect of diarrhoea is its nutritional cost. This nutritional injury is supposed to be mediated by several factors in acute diarrhoea. These are (i) anorexia or loss of appetite, (ii) withholding of food as a measure to control diarrhoea, (iii) loss of nutrients in the faeces, (iv) increased catabolism. In this presentation attempts will be made to establish the role of each of these factors in some of infectious diseases with particular emphasis on diarrhoeal condition in children. In doing this, existing published works will be cited along with works on diarrhoea diseases that has been carried out at the International Centre for Diarrhoeal Disease Research.

Some of the published works suggest that the "Nutritional Status" of a child may represent as much the effect of infection as of dietary intake<sup>6,7</sup>. Mata and Co-workers in their study in Guatemala demonstrated that the nutritional status of the Guatemala children was more related to infections than to the availability of food<sup>8</sup>. Martorell and Co-workers<sup>9</sup> studied food intake in 477 children aged between 15 months to 60 months during different illnesses. The authors calculated the effect of any common selected symptoms like cold, fever and other infectious diseases including diarrhoea on the food intake. The average reduction associated with these conditions is 175 kcal and 4.8 gm protein per day (Table 1). With each attack of an infectious disease, specially diarrhoea growth of the children is affected. One of the well documented case as studied by Leonardo J. Mata<sup>10</sup> is presented in Fig. 1. Recurrent attacks of any infection including diarrhoea has a tremendous negative effect on the growth of child. As presented in figure 2, the growth of a child not suffering from any infection or diarrhoea is compared with that of another child who suffers from recurrent attacks of diarrhoea and each attack causes growth faltering. In the longrun if the child survives, he will never be able to catch up the growth of his normal counter part.

---

1. Senior Scientist, International Centre for Diarrhoeal Disease Research, Bangladesh

2. Assoc. Scientist, International Centre for Diarrhoeal Disease Research, Bangladesh

TABLE 1: Average reduction in intake associated with the presence of specific symptoms

Symptoms	Energy ( kcal/day ) average		Protein ( gm/day ) average	
	Effect	PP	Effect	P
SC	- 175	0.001	-4.8	0.001
Respiratory illness	- 67	0.001	- 1.0	0.007
Diarrhoea	-160	0.001	-3.0	0.001
Apathy	- 175	0.001	-5.1	0.001

TABLE 2: Calorie intake in children with diarrhoea and age matched healthy controls

Source of calories	Healthy controls	Children with diarrhoea
Breast milk	53.6 ± 6.7	46.9 ± 5.5
Oral fluid	—	10.1 ± 2.9
Weaning foods	86.3 ± 21.1	33.3 ± 8.8
Total calories	129.9 ± 16.8	75.0 ± 8.3

Hoyle and Chen; Am. J. Clin. Nutr. 1980; 33:2365.

TABLE 3: Intake ( gm/kg/day ) of food in acute stage and after recovery from diarrhoea ( Mean ± SEM ), and effect of specific aetiology on the food intake.

Aetiology	Acute	Recovery	% reduced
Cholera	82 ± 8.5	110.4 ± 8.7	21
Rotavirus	87 ± 10.4	102.7 ± 11.0	15
ETEC	82.4 ± 7.8	106.0 ± 6.0	22
Shigella	73.2 ± 11.0	114.3 ± 8.0	36

Molla AM et al. 1981

## NUTRITIONAL COST OF DIARRHOEA

Each attack of diarrhoea causes its nutritional cost through all or any of the previously mentioned factors e. g. anorexia, withholding of food, malabsorption of nutrient and catabolism. These effects are even more pronounced when the diarrhoea attacks are recurrent. Rahaman et al<sup>11</sup> has shown that with increasing number of attacks duration of diarrhoea is also prolonged. Which means that the effect of the factors mentioned previously will also become even more prolonged. Many of our physicians placed their reliance on the appearance, volume and number of stools as the criteria for the success of treatment of diarrhoea. This was first challenged by Park in 1924<sup>12</sup> who maintained that the child rather than his stool should be taken as the criteria for evaluation of therapy. This concept was scientifically examined by Chung and Co-workers in 1948<sup>13</sup>. Chung studied two groups of children with diarrhoea. In one group he fed 100-120 kcal/kg of body weight and the other group was starved for the first 48 hours and then offered them 20 kcal/kg and increased by 20 kcal every day. The starved group was much slower in catching up weight and their weight gain was not sustained. In a field study in ICDDR, B Hoyle and Chen studied the food intake in a group of children with diarrhoea and their age matched healthy controls in a hospital situation (Table-2).

Table 3 shows their results that the food intake went down from 130 kcal/kg/day to 75 kcal/kg/day in the children with diarrhoea. The amount of food consumption could not be increased even by encouragement or forcing. But most important is that the reduction in the food intake was all from weaning feeds, no reduction took place from the breast milk. This study clearly suggests that breast milk should never be stopped in diarrhoea.

Recently, a metabolic balance study has been conducted by Molla AM and Molla A<sup>14,15</sup> in children below 5 years suffering from acute diarrhoea due to different aetiology. The objectives of this study was to see the followings:

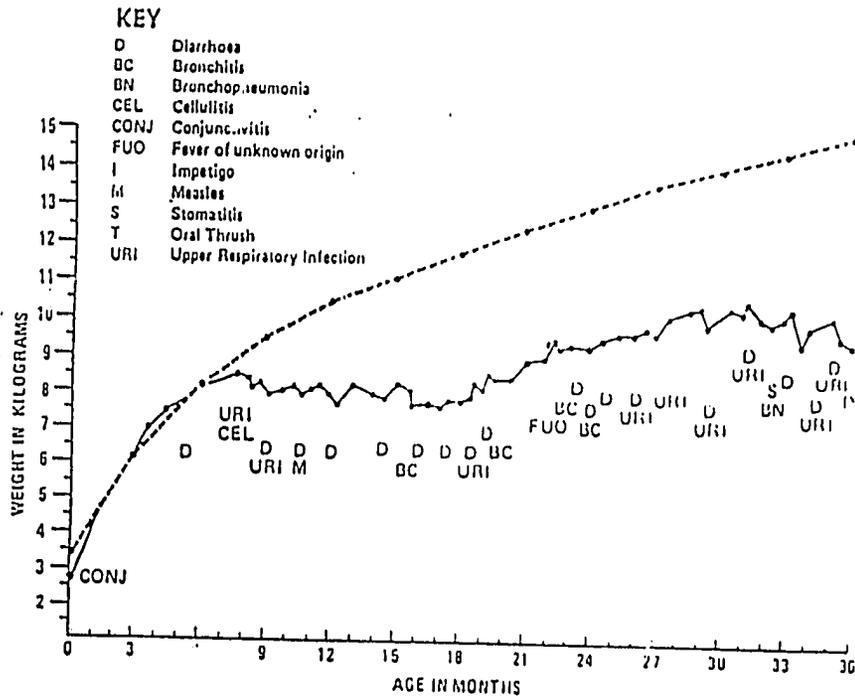
- ( i ) Quantitative intake of food during acute stage of diarrhoea and after recovery.
- ( ii ) Co-efficient of absorption of nutrients during acute stage of diarrhoea and after recovery.
- ( iii ) Effect of feeding on the stool volume.

A total of 66 children with acute diarrhoea were studied in ICDDR, B. After initial rehydration patients were fed a nonabsorbable charcoal marker followed by a familiar Bangladeshi food of known composition. Records of all food, fluid and breast milk intake was maintained for 72 hours after appearance of the first marker ( '0' hour ). At the end of the 72 hours another marker was fed to the patients. All stool, urine and vomit, if any, were collected throughout the period from the '0' hour until the appearance of the second marker. Samples were stored at -80°C until analysis. Aliquots from the homogenised samples of stool, urine, vomit and food-including breast milk were analysed for carbohydrate, calorie, nitrogen and fat. Intake of food and absorption of nutrients were calculated using the following formula.

$$\text{Co efficient of absorption} = \frac{\text{Intake} - \text{output}}{\text{Intake}} \times 100$$

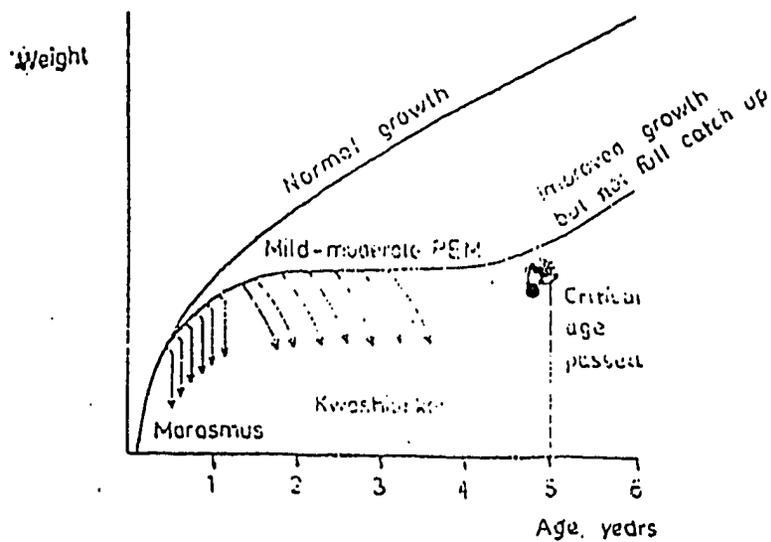
From the analysis of this study important information was obtained. Table 3 illustrates the quantitative intake of food in different aetiological diarrhoea. Percent reduction may be considered as the effect of anorexia due to specific aetiology. However it is important to note that on an average about 80 gm ( 80 kcal per kg/day ) food was consumed by the children. If food was not offered this amount of calorie would have been provided by burning the body stores. This is specially dangerous for a malnourished child. The absorption of calories, fat,

Fig. 1  
Diseases and Disabilities



LJ Mata et al. 1981

Fig. 2



Effects of protein-energy malnutrition (PEM) on growth.

nitrogen and carbohydrate is 4 studied in rotavirus diarrhoea. It is obvious that about 80% of the carbohydrate is absorbed in acute stage of the disease, whereas fat and protein absorption is low. The absorption improved within two weeks after recovery except protein absorption which remains low for a prolonged period. The same pattern has been seen in case of other aetiologies. In cholera the absorption of all nutrients were higher than in other aetiologies.

#### **PATTERN OF INTAKE OF NUTRIENTS**

Right from the first day the intake of nutrients and calories were quite substantial in all aetiologies which improved everyday. In cholera by the 7th day the calorie intake exceeded the recommended daily allowance of FAO/WHO. The calorie intake is 120 kcal/kg/day and remains at that level upto about 8-10 weeks after recovery from diarrhoea. This extra food intake may be a compensatory mechanism to make up for the loss incurred during acute stage.

#### **EFFECT OF FEEDING ON THE STOOL VOLUME**

The daily food intake and the daily stool output during the acute stage of diarrhoea illustrates due to different aetiology. It is clear that although food intake improved steadily the stool output decreased consistantly in all aetiology. This proves that feeding does not have any deliterious effects on the stool volume.

#### **CONCLUSION**

Based on the evidences presented in this short communication the following conclusion may be drawn :

1. Like any other infectious diseases diarrhoea also causes nutritional injury to the subject particularly children.
2. Growth faltering may be more due to infection than poor nutrient intake.
3. Anorexia affects consumption of mixed food in children but has very little effect on breast milk consumption. Therefore breast milk must be continued during diarrhoea.
4. There is a substantial amount of food intake during acute diarrhoea and this goes up much higher after recovery from diarrhoea. Therefore, extra foods should be allowed after recovery from diarrhoea.
5. Carbohydrate absorption remains unimpaired in acute diarrhoea due to any aetiology.
6. Thus during growth monitoring in the communities message should be disseminated to the mothers that continued feeding should be given during any disease particularly in diarrhoea.

#### **REFERENCES**

1. Walsh JA and Warren KS. Selective primary health care. An interim strategy for disease control in developing countries. *New Engl J Med* 1979; 301 ( 18 ) : 967-974.
2. World Health Organization Diarrhoeal Disease Control Programme. A discussion programme of the oral rehydration therapy component 1980, P. 13 ( Unpublished ).
3. Black RE, Merson MH, Brown KH, Rahman ASMM, Yunus M, Alim ARMA et al. Epidemiological studies of acute watery diarrhoea in Bangladesh. 13th joint conference on viral diseases, Atlanta Georgia, October 1979, P. 1.
4. Martorell R, Habicht JP, Yarbrough C, Lechtig A et al. Acute morbidity and physical growth in Guatemala children. *Am J Dis Child* 1975; 129 : 1296-1301.

5. Pierce NF and Hirschhorn N. Oral fluid a simple weapon against rehydration in diarrhoea: how it works and how to use it? WHO Chronicle 1977, 31 (3): 87-93.
6. Scrimshaw NS, Taylor CE and Gordon JE. Interactions of nutrition and infection. World Health Organization Monograph Series 57. WHO, Geneva, 1968.
7. Olson RE (ed). Protein calorie malnutrition. Academic press, New York and London, 1975.
8. Mata LJ, Urrutia JJ, Albertazzi C, Pellecer O, and Allerano E. Influence of recurrent infections on nutrition and growth of children in Guatemala. Am J Clin Nutr 1972; 25: 1267-1275.
9. Martorell R and Yarbrough C. The energy cost of diarrhoeal disease and other common illnesses in children. In diarrhoea and malnutrition, interactions, mechanisms, and interventions. ed by Le Chen NS Scrimshaw. Plenum Press, New York, 1982.
10. Mata LJ, Kromal RA, Urrutia JJ, and Garcia B. Effect of infection on food intake and the nutritional stage: perspectives as viewed from the village. Am J Clin Nutr 1977; 30: 1215-1227.
11. Rahaman MM et al. Does recurrent attacks of diarrhoea cause chronic diarrhoea. Proceedings of the international meeting "Malnutrition and diarrhoea in the children of the Commonwealth". London, Nov. 1984.
12. Park EA. Newer view points in infant feedings. Proc Conn State Med Soc. 1924, P 190.
13. Chung AW, and Viscorova, B. The effect of early oral feeding versus early oral starvation on the courses of infantile diarrhoea. J Pediatr 1948; 33: 14.
14. Molla AM, Molla Ayesha, Sarker SA and Rahman MM. Food intake during and after recovery from diarrhoea in children. In diarrhoea and malnutrition, interactions, mechanisms and interventions. ed by Lincoln C. Chen and Nevin S. Scrimshaw. Plenum Press, PP. 113-123. New York 1983.
15. Molla Ayesha, Molla AM, et al. Effects of acute diarrhoea on absorption of macronutrients during disease and after recovery. Ibid PP. 143-154.

#### DISCUSSIONS ON THE PAPER

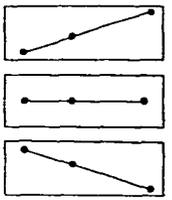
- Dr. F. H. Nazir (SSMC) : Has there been any study of intestinal enzyme in other etiologies save cholera?
- Dr. A. Mazid Molla : In Bangladesh there has not been any study on the enzymological status either in children or adult.
- Dr. M. H. Haidary (DMCH) : What kind of food do you think is ideal during acute stage of diarrhoea. Is there any harm to give faulty food during acute diarrhoea?
- Dr. A. Mazid Molla : Pre-diarrhoea food should be continued during acute diarrhoea. Always familiar food is the best. It is not advisable to change the type of food during diarrhoea. Extra food should be provided after recovery in order to compensate for loss during acute diarrhoea due to anorexia.



টিকা

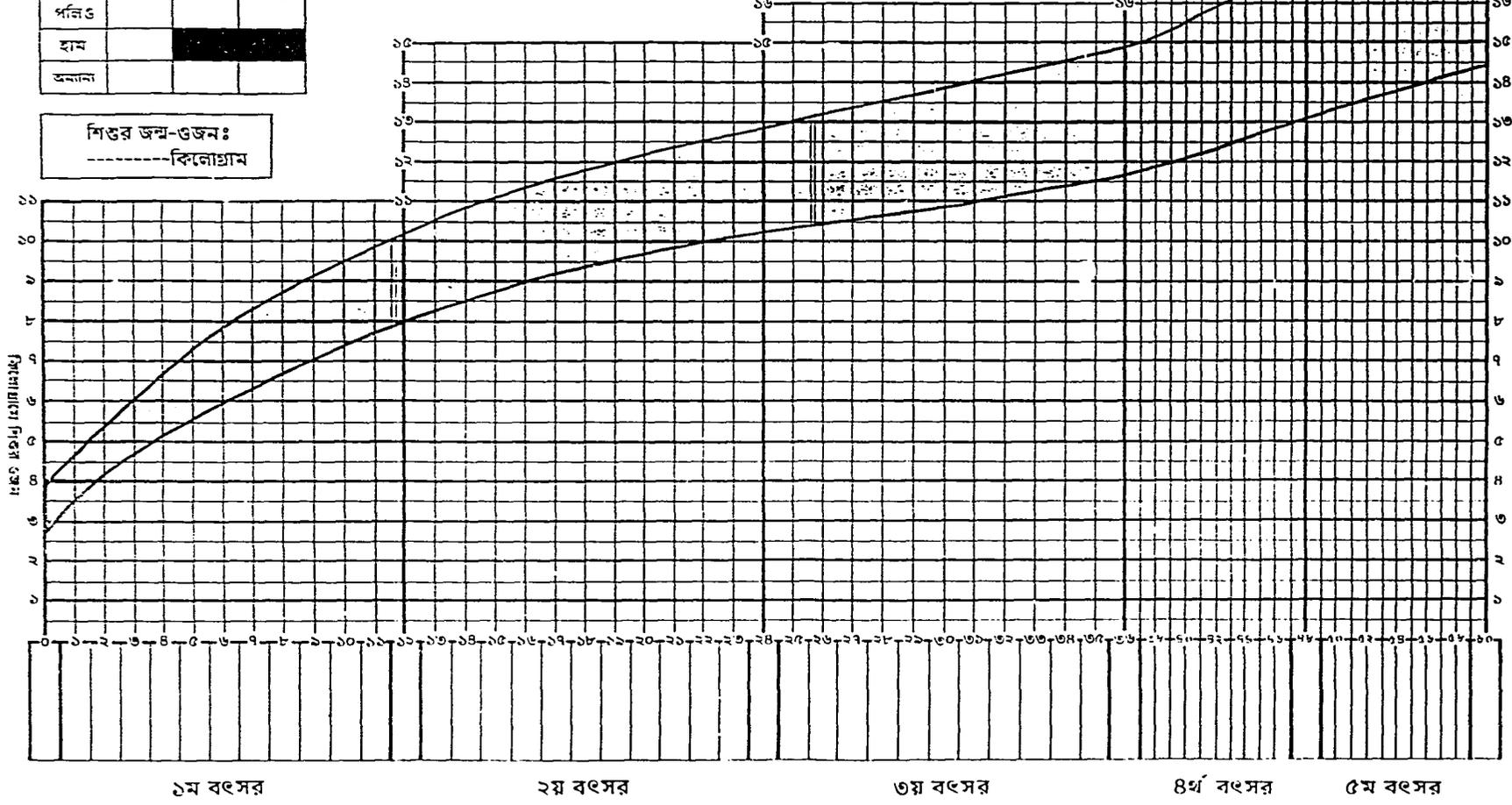
		মাস		
		১	২	৩
টিকা দেওয়ার তারিখ				
বি ডি টি				
ডি পি টি				
পনিও				
হাম				
অন্যান্য				

শিশুর জন্ম-ওজনঃ  
 ----- কিনোগ্রাম



শিশুর এই কাঠে' অন্তর্ভুক্তির দু'মান থেকে যদি রেখা উপরের দিকে যায় তাহলে শিশু ত্রিকমত বাড়ছে।  
 রেখাটি সমান অবস্থায় থাকলে শিশুকে দৈনিক অতিরিক্ত খাবার দিন।  
 রেখাটি নিচের দিকে গেলে শিশুকে ডাক্তার দেখান এবং দৈনিক অতিরিক্ত আয়োজক খাবার দিন।

পরিবার পরিকল্পনা সম্পর্কে জানতে হলে আপনার এলাকার স্বাস্থ্য ও পরিবার পরিকল্পনা কর্মীর পরামর্শ নিন।



কিনোগ্রামে শিশুর ওজন

১ম বৎসর

২য় বৎসর

৩য় বৎসর

৪র্থ বৎসর

৫ম বৎসর

## **Experience on the Use of Growth Chart in Jurain Nutrition Project, Dhaka**

**Dr. M. Kabirullah\***

Growth monitoring, oral rehydration, breast feeding and immunization has been accepted by the workers in health and nutrition as the four key element for child survival. Of all the parameters of assessing the health status of the children, body weight and growth is the most important one. Because body weight and growth rate indicate the actual condition of health and nutrition and forecasts the future health performance of the children. Body weight and growth rate can only be determined by weighing the children and the health and nutritional status may be ascertained by comparing the weight with that of a healthy child of the same age. Body weight is always proportional to the age. A child may apparantly look healthier but when compared with another child of the same age, the health status becomes clear. Normally this comparison is done with the help of a growth curve plotted age against body weight. Growth curve, also known as growth chart is being used as a tool of growth monitoring.

Applied Nutrition Project, Jurain now named as Bangladesh Institute of Research and Training on Applied Nutrition (BIRTAN) has been working on the solution of nutritional problems through self-help, since 1968. Growth monitoring of the children by weighing and comparing the body weight and growth rate with a growth chart designed by CORR, was being done as one of the point of intervention. The people were being taught how to improve the health and nutritional status through production and consumption of better and nutrient rich food, safe water, environmental sanitation, immunization, care of the vulnerable groups, growing nutrient rich fruits and vegetable at fields and kitchen garden, improving the poultry birds by cock exchange, giving vocational training to the unemployed or poorly employed people. And finally they were asked to attend the MCH of the institute to check the health and nutritional status of their children, pregnant and lactating mothers. Growth monitoring was being done at the MCH centre by the attending physician, nutritionists and MCH assistant. Up to 1980-81 about 600 (six hundred) children were registered for growth monitoring by weighing and plotting the body weight against their age on a growth chart designed by CORR. After the NNC has developed a growth chart use of the CORR growth chart was stopped and new one started, Uptill today 150 new children have been registered with the new NNC growth chart.

### **Method of growth monitoring at BIRTAN**

As a part of the package programme, mothers were taught about the nutrient need of the childrens and other related matters to maintain good health of their wards. Mothers were also advised about the importance of growth monitoring of their children. To find out whether their children were growing properly or not, they should measure the body weight of the chil-

dren and compare with the weight in the chart and take necessary steps where needed to improve the diet of the children, so that the children could catch up the right path on the growth chart which is called the "Road to health". To measure the children growth mothers were asked to bring their children at the MCH centre of the institute. The attending staff used to check up the health along with body weight gained during the interval of the last and the present visit and advised the mother accordingly. No mother was advised to measure the body weight of the children at home, as there were no such facilities available,

### **Background of the area**

The study was conducted at Jurain about 5km away from Dhaka and on the Dhaka-Narayanganj road. At the beginning of the study in 1968 the area was a rural village, affected by regular monsoon flood. Main means of transport was boat. Later on DND flood protection embankment was constructed and the area was saved from the flood and gradually people from the city-area moved here and the area changed its faces into a semi-urban area.

### **Background of the People**

The people of the area were mostly rural in nature in 1968 and with time the nature changed to semi-urban. The literacy rate was about 22%. About 55% was male and 45% was female. The size of a family was 4.6. The average marriage age for male was 18 years and for female it was 14 years. The infant mortality rate was 161. The main occupation of the working force was agriculture, labourers, service and small shop keeper.

### **Working Procedure at MCH Centre**

In general, mothers are requested to visit MCH centre, to check up their health if they are either pregnant and/or lactating, to check up their health if they are on any birth control devices and to check up the health of their children if their age fall between 0-5 years. The request is made when they visit MCH for any one of the above purpose and through other persons visiting the institute for other services. The second phase of request is made by the field staff visiting the houses regularly for various purpose in the form of personal approach and invitation to attend the MCH specially to check up the health of their wards. The third phase of request is again made by the field staff in the form and language of reminder. Recently a fourth phase has been introduced in the institute as a form of compulsion. If the mothers do not attend the MCH centre to check up the health of their wards, their names will be dropped from the list of the beneficiaries of the service delivered from the institute. A fifth approach is being attempted, where needed, to lift the child by the field staff to the MCH centre for growth measuring. Regular records are being maintained on the above process of maintaining regularity of growth monitoring through the use of growth chart in the MCH centre. After recording the response of one phase of approach, the second approach is made and so on.

### **Results.**

From the records it appears that about six hundred (600) growth cards were opened in the institute since 1976. Cards opened before that were lost or damaged or destroyed. Among those cards, about a couple of hundreds are still being currently in use. About 400 cards were discontinued. The results in this paper is being presented in two chapters (1) results of

the old discontinued cards and (II) results of the cards currently in use. Of the old discontinued cards about 290 was selected for this evaluation. Criteria of selection of the cards were (a) identification of the children so that socioeconomic aspects could be evaluated to correlate the regularity of attendance and other related matters, (b) illegibility of the cards; some of the cards have faded and could not be read properly. Cards currently in use are being taken up with the maximum motivational attempt to make the attendance of the children regular or reasonably regular. That is why these cards were evaluated separately. Further with the attempt, of rigorous motivation more people are coming to open new cards for their children.

Table-1 shows the age of the children at which they were registered for the growth card at the MCH centre and the length of period they attended the MCH for weighing to maintain the growth card. About 253 (100%) growth cards were analysed for this purpose. About 97 (38%) children were registered between the age of 1-6 months. But only 21 children continued upto 1-6 months and then discontinued and dropped out of the growth card maintenance programme. Only 15 children continued upto more than 48 months 89 (35.9%) children, registered at various ages had dropped out between the period of 1-6 months. Only 20 (8.1%) children continued upto the period of more than 48 months of their age. Only 6 (2.7%) children continued upto their age of 60 months.

Table-2 shows the duration of period, that the children followed the programme of growth and maintenance and the occasion they missed during that period. Only 289 (100%) card were analysed for the purpose. Of the 99 (34.6%) children who followed the growth card programme for only 1-6 months, 96 children did not miss any occasion. The number of children who did not miss any occasion during their stay with growth card programme were 189 (66.1%). Of those who continued for longest period, 48 months or more only 10 children did not miss any occasion and only 1 of them missed upto 25-30 occasions. The maximum number of occasion were missed by only 4 children about 1.4% of the total sampled children.

Attempts were made to analyse the data further to show the inherent causes that affected the age of registration of the children, the regularity of attendance of the children at MCH centre and the duration of their continuation with the growth card programme. The data are not presented here in a table form. The findings indicated that the concept of body weight as a means of health assessment is very new to the parent and they are yet to understand the importance properly. Extensive motivation and education of the parent to give them proper understanding of the importance of the body weight measurement and consequently growth card maintenance is needed on community and individual basis. Besides there are lot of misgivings to the children body weight measurement with scale. One example may be cited that a good number of mothers say that a children is not a commodity to weigh, doctor should follow his traditional method of health assessment as the other doctor outside this MCH centre used to do. This was reported by most of the mothers irrespective of the socio-economic and socio-cultural level in the society. So if all the doctors and health workers do not follow and advocate the method of body weight measurement as a means of assessing health status, it will be difficult to motivate the mothers for the purpose. The method of weighing of the children by a hanging balance do create an odd scene, as the children being afraid of the method use to cry and mother get frightened and refuse to weigh the baby even some times at the cost of free prescription and medicine usually supplied from the MCH centre for the sick children. Alternatively weighing with a beam balance or with a bath

**Table-1**  
**Age of registration of the children and length of period attended MCH for weighing ( months ).**

Age at registration for growth card ( months )	Period attended MCH for weighing ( months ).								Total	Percent
	1-6	7-12	13-18	19-24	25-36	37-42	43-48	48 +		
1- 6	21	22	17	8	5	4	5	15	97	38.3
7-12	27	8	7	3	1	3	4	5	58	22.9
13-18	13	6	6	1	0	3	4		33	13.0
19-24	11	4	3	3	1	3			25	9.9
25-30	5	1	1	2	2				11	4.3
31-36	4	5	3	4					16	6.3
37-42	3	2	2						7	2.8
43-48	4	0	1						5	2.0
48+	1								1	0.4
Total	89	48	40	21	9	13	13	20	253	100
Percent	35.9	19.3	16.1	8.5	3.6	5.2	5.2	8.1	100	

**Table-2**  
**Regularity of the attendance of the children in the MCH.**

Duration of the growth chart ( months )	Occasion missed to attend ( month )						Total	Percent
	0	1-6	7-12	13-18	19-24	25-30		
1- 6	96	3					99	34.6
7-12	30	6	3				39	13.6
13-18	21	13	6				40	14.0
19-24	12	5	7				24	8.4
25-30	13	4	3	1	1		22	7.7
31-36	1	4	2	0	1	1	9	3.1
37-42	6	4	2	1	0	1	14	4.9
43-48	4	5	2	2	2	1	16	5.6
48+	6	9	5	2	0	1	23	8.6
Total	189	53	30	6	4	4	286	100
Percent	66.1	18.5	10.5	2.1	1.4	1.4	100	

room scale did not always give a reasonably acceptable result. But on request mother allowed their children to be weighed with the bath room scale only. So a new scale psychologically, socially and scientifically acceptable needs to be developed. A chair or stool type balance with circular recorder or beam recorder with collapsible beam should be developed. For the babies who cannot stand, the beam balance with flat base is workable.

Mothers knowledge about the child health is limited to the sickness. They think if the baby is not sick, there is no need to consult the doctor and to assess the health status. For that reason mothers of all classes do not bring their babies only for weighing. Even when some of the mothers use to bring their children with some irregularity, the advice given to them on the relationship of diet and health status of the children do not make them always interested. Even some times they react saying "give some medicine instead of talking alone". They do not see the improvement of health of children due to good food by day and night as they could see the improvement of disease with medicine. They could not conceive the idea of the role of good diet on health that will be seen with time. All these indicate their total ignorance about food and nutrition. So there is a long way to be covered before one can successfully introduce the growth monitoring, through growth card. Mothers need total education and motivation irrespective of any class and cards.

With the introduction of the 4th and 5th approach listed above accompanied by vigorous motivation by various techniques, the registration of the children for growth monitoring and the regularity in attendance increased significantly compared to previous days with first 3 approaches. But still there remains a good number of irregularities. When asked for the irregularity they replied in a very casual manner, for example they have forgotten, children was away from home, mother was busy with other work etc. But on a good number of cases after the application of compulsion, the mother brought the children to the MCH at one week late. In some real problem cases like mothers sickness and so on, the children were lifted by staff to maintain the regularity. This is being done specially for 2nd and 3rd degree malnourished children.

Initially after giving an education, mothers were asked to keep the growth card at their home and bring it during their visit. The system failed. Because most of the mother used to forget to bring the card and a good number of mothers damaged the card either by themselves by mishandling or careless handling. In some cases the child himself damaged the card. At present the card is maintained in the MCH centre alphabetically in the name of the baby along with the treatment card. No mother could be asked to monitor the growth of their baby at home for want of balance.

A couple of mothers were interested but they could not afford to buy a balance. So it appears that growth monitoring of the children by mother themselves is still a long way.

In another attempt, field staff used to visit the children at their home and weigh. Only weighing of the children by the nonmedical person could not satisfy the mothers. Because their hope was to get treatment if and when needed. They reacted saying "If you cannot give medicine, then what is the use of weighing only". As a result the method was dropped and all the mothers were asked to bring the children to the MCH centre to get the package complete.

Recently on a trial basis, BIRTAN has started a big programme of growth monitoring of about 2000 children at Bhulta Union under Rupgonj Upazilla of Narayanganj district. Field staff used to visit the home and conducted weighing. After a couple of months the programme remained suspended and a project has been submitted to NNC for financial help.

The experience of the use of growth card at BIRTAN is not rich. Attempts are being made to make the programme success. At present after due arrangement has been made the programme is going smoothly with negligible irregularities and dropout.

#### DISCUSSIONS ON THE PAPER

- Dr. Jinnat Ara Begum ( BAU )
1. In my opinion the use of growth chart could be successfully promoted through trained family planning workers in the rural areas.
  2. The public awareness about the usefulness of growth chart could be created through various communication media and documentary films.
- Dr. M. Kabirullah
- : This is a good idea. The services of the existing Govt. field staffs should be utilised to promote the use of growth chart. F.P. staff has good background of health and nutrition. They may be engaged in the work.
- Dr. M. U. Khan (ICDDR,B)
1. Was a standard population used to develop growth chart?
  2. If so; what standards did you maintain?
- Dr. M. Kabirullah
- : I do not know, I was not involved in the process of development of the growth chart.
- Dr. Sadiqa Tahera Khanam (NIPSOM)
1. As your's study in BIRTAN has involved a pretty long time and you have used paramedics, I am interested to know whether you made any attempts to record opinion of the workers who did the weight recording i. e. did you have feed back from the workers regarding the use of growth charts?
  2. Why BIRTAN had so many records destroyed or damaged?
- Dr. M. Kabirullah
- : Yes, this paper is totally based on the observation of the field staff. The steps for regularising the attendance were taken depending on the experience of the field staff.
-

# Experience on the Use of Growth Chart in the Community

Dr. ( Mrs. ) M. Malakar\*

## Introduction

Bangladesh has one of the highest child mortality and morbidity rates in the world. We are not able to look after our children to raise them up as we ought to. Besides inadequate health facilities, ignorance, superstitions, illiteracy, economic and social deprivation, unplanned families and lack of very basic necessities of life are the many causes for such high loss of life.

Population explosion is one of the many problems in our country hampering our development. To be able to motivate couples to plan a small family in the absence of any old age security for the majority of the people in Bangladesh, one feels obligated to take up programmes or activities which would to a great extent, ensure healthy growth and survival of the children. Extensive and proper use of the growth charts could be of much help in this respect.

The Community Health Care Project ( CHCP ) previously known as the Christian Health Care Project ( CHCP ) took up the use of the Growth Charts about 8 years ago in collaboration with several rural, semi-urban and urban clinics and hospitals with extension services reaching the slum and village population.

CHCP's goal was to reduce the mortality and morbidity rates among children under 5 years of age in our working areas through proper and full use of the growth chart. The charts are used for the following purposes :

- (a) Recording and monitoring the growth pattern of each child.
- (b) Sharing the growth pattern at each visit with the mother to educate her about her child's growth and what it really means for the child as well as for her. e.g. if the child's weight suddenly shows a downward trend she must understand it and try to share with the health worker as to what has caused such a drop and how she can improve the situation by her own effort.
- (c) Vaccination schedule of the child.
- (d) Health and nutrition education to the mother.
- (e) Family Planning record, motivation and service delivery.
- (f) Record of illnesses, particularly diarrhoea, measles, TB including other chest infections, improper and inadequate feeding of the child and finally another child on the way.
- (g) To emphasise the importance of the mothers role in feeding her child in the right way and to demonstrate that it is not necessary to have expensive food to keep healthy.

---

\*Executive Director, Community Health Care Project ( CHCP ).

### **How are these charts introduced ?**

We started using these cards in 1978 in few areas first and then gradually increased the use in other parts, through field health workers at mixed MCH mobile clinics in the villages/wards and also through the base clinics. Village Health Workers trained by CHCP, a Nurse-midwife and a doctor usually run these clinics. Sometimes a mobile clinic is run without a doctor, but very sick children are referred to the nearest doctor or clinic. We first bought, the cards from Voluntary Health Association of India (VHAI) but later printed our own.

These mobile clinics are held once a week in different Wards of Dhaka city which are allocated to us by the Population Control Division of the Ministry of Health & Population Control. But in the villages they are run once a month. The location is kept fixed and if for any reason shifting is necessary, the notice is given out early so that they all know where to go. In all areas the place for holding the clinic is usually given to us by the local people. In Dhaka city we have been fortunate to have cooperation from school authorities, club members and community organisations who have willingly given us permission to use their facilities. This ensures local Participation. In the rural areas we sometimes use verandah of a house, courtyards and other facilities as available. Not only the local people but the U. C. Chairmen and members have cooperated happily by encouraging mothers to come to the mobile clinics.

The village health worker while visiting each home within her working area, would talk to mothers and motivate them to bring their children to be weighed, examined and to get necessary advice about their children's health status. Of course, large percentage of the mothers in the beginning would bring their children-not to be weighed but to get medicines and to be seen by a doctor or a nurse. Just simple weighing does not appeal to them, on the contrary, some think that by weighing a child she/he falls under the bad effect of an evil eye! Some believe that by simple weighing the child may get sick. If the child does not look sick to the mother, why should she take her to a clinic? It is not so easy to convince a mother to just come for weighing. If some food is given, they come in large numbers. We had started feeding of women and children under the Government's Vulnerable Group Feeding Programme with the WFP supplies in few of our areas, but had to give up because of various difficulties, the main being the fight over food, even for children who do not need extra feeding.

### **How is the mobile clinic run ?**

As the mothers come, a worker welcomes them and registers and weighs the children using a hanging scale (salter scale with a basket) and the weight is recorded. Then as they gather, another health worker would talk to the mothers. She would prepare her talk beforehand and often would use an example from among the children gathered there. Her talk is usually on scabies, worms, measles, other communicable diseases, importance of vaccination, feeding of children (starting of breast feeding, adding extra food at 5/12 etc.), diarrhoea, ORS, Vitamin 'A' deficient blindness, cleanliness in handling food, drinking water, disposal of waste products, family planning, etc etc. As far as possible demonstration of preparation of weaning food, use of attractive audio visual aids, display of various kinds of cheap yet nourishing food etc. are also undertaken. Mothers are usually in a hurry to return home, therefore talks need to be short and yet interesting. The crowd is sometimes unruly and needs to be organised and disciplined. We try to follow the pattern given by Dr. David Morley in running our under-5 clinic keeping it as much a preventive programme as possible, but often it ends up as a curative clinic. The food prepared for demonstration is served to the children while

waiting. This is done to prove to the mothers that if little time is taken and some thoughts are given to the preparation of the food, making it palatable, the children will eat it. The mothers often will say that the child refuses to eat it at home.

The children are usually seen by the nurse-in-charge. She first looks at the chart and explains to the mother-the state of health and growth of her child. Some mothers get very concerned about their children being malnourished but we also see mothers who could not be bothered or have many excuses. These would not come regularly with their children, nor would give the food she has purchased from us. We sell packets of mixture of ground rice, dal and soyabean at a subsidised rate so that everyone can buy.

Any sudden drop of the weight or delay in gaining weight is discussed with the mother and advice on feeding given. The nurse then checks the vaccination records, the family planning acceptance by the couple and refers her to the health workers assisting her in the clinic. Any mild illnesses is treated by the nurse or the doctor. A child needing special care or admission to a hospital would be advised to do so or even taken to the hospital by our field workers. Vaccination is given if the child is due for one and has no severe skin or other problems. Vitamin 'A' Capsules and worm medicines are regularly given out at these clinics. If a mother is pregnant she is looked at, advice given and T. T. administered.

If a mother is motivated and would decide on a particular method of family planning, it is given to her at the clinic, if the time was right to start the method. Others were visited at their homes by our field staff. The important point is that the dialogue of motivation and education starts at the clinic. We believe that referring a mother to another clinic for family planning advice and motivation does not work well-they often do not go there. The health workers follow up the acceptors.

The mothers are given a small ticket with the child's name and the number of the growth chart. She is advised to return on a definite date with her child. We usually weigh a child once a month unless otherwise indicated.

At the time of the registration on the first day, a fee of Tk. 2.00 is charged which includes any medicine that may be needed. At subsequent visits only 50 paisa is charged.

### **What have we achieved ?**

1. We have seen very malnourished children slowly recovering under careful guidance and follow up of the health workers with the use of simple but nourishing diet. The mother's cooperation in this matter is very vital. We have seen the deep concern of mothers at the state of health of their offsprings and also seen the joy and satisfaction on their faces when the children improved. We have also seen the women being transformed from a state of apathy and hopelessness because of loss of children from various illnesses, into a state of alertness and determination to fight for their children's lives.
2. Introduction of weaning food or extra food to the baby's diet at 4-5 months of age is more readily accepted by the mothers, although there are still many who is prevented from doing this by other family members.
3. Creating awareness among the rural folk in particular-that vaccination can save and prevent their children from dying or contracting a serious illness. Mothers are less scared now bring their children for vaccination. This has therefore, brought down the mortality and morbidity rates from tetanus and whooping cough in particular. Table I & II show the

**Community Health Care Project  
1 New Eskaton Dhaka-2**

**TABLE - 1**

MCH Activities through combined Mother & Child Care  
Mobile Clinics under the CHCP Tejkunipara Centre, Dhaka  
From January 1985—June 1985.

Month	Children visits					Ante-natal visits					Deliveries Other	Post-natal
	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total		
January '85	457	128	73	30	688	79	6	—	—	85	51	63
February '85	274	215	65	47	610	60	7	—	—	67	44	42
March '85	256	208	126	95	685	9	56	—	—	65	29	27
April '85	227	220	181	175	803	51	46	—	—	97	39	63
May '85	253	283	193	215	947	62	25	—	—	87	42	52
June '85	199	188	159	260	806	46	25	—	—	71	47	2
<b>TOTAL:</b>	<b>1669</b>	<b>1242</b>	<b>797</b>	<b>822</b>	<b>4530</b>	<b>307</b>	<b>165</b>	<b>—</b>	<b>—</b>	<b>472</b>	<b>252</b>	<b>249</b>

**Table-II**

**Percentage completing vaccination schedule**

Months	D T			D P T				Polio				TT-Pregnant			Others			Measles	BCG
	1st	2nd	Total	1st	2nd	3rd	Total	1st	2nd	3rd	Total	1st	2nd	Total	1st	2nd	Total		
January '85	52	46	98	58	44	26	128	58	44	26	128	21	15	36	64	44	108	21	97
February '85	74	23	97	53	31	33	117	53	31	33	117	15	16	31	62	25	87	8	68
March '85	68	30	98	76	46	26	148	76	46	26	148	17	20	37	50	24	74	6	86
April '85	96	55	151	71	44	48	163	71	44	48	163	14	13	27	42	29	71	—	76
May '85	84	63	147	68	48	29	145	68	48	29	145	32	12	44	54	23	77	15	123
June '85	62	34	96	48	29	27	104	48	29	27	104	20	17	37	38	18	56	22	96
<b>TOTAL:</b>	<b>436</b>	<b>251</b>	<b>687</b>	<b>374</b>	<b>242</b>	<b>189</b>	<b>805</b>	<b>374</b>	<b>242</b>	<b>189</b>	<b>805</b>	<b>119</b>	<b>93</b>	<b>212</b>	<b>310</b>	<b>163</b>	<b>473</b>	<b>72</b>	<b>546</b>
		<b>48%</b>			<b>65%</b>	<b>50%</b>			<b>65%</b>	<b>50%</b>			<b>78%</b>			<b>53%</b>			

vaccinations given and the percentage completed the schedule. Although the results are not so impressive, yet we are hopeful. In certain areas of our work where tetanus had been the number one killer (Kushtla district-Moherpur, Bollobhpur etc.) among neonatals, young children and post-partum women-the incidence is brought down sharply by TT & DPT. The pregnant mothers and other women receive TT at the under-5 clinic. We have started the use of the measles vaccine only recently.

BCG vaccine seems to be quite well accepted even in the villages. We have had very good co-operation from the Shyamoli TB Clinic and we are grateful for their help.

4. While talking to the waiting mothers about health and nutrition, often the discussions turn to the availability of safe water and latrines. Thus the clinics provide opportunities for the mothers to think about the importance of safe water and proper sanitation which would prevent several diseases from which the children suffer. The seed is sown here at the clinic and nurtured by the field workers through repeated visits and discussion and one day the fruits are seen. Families ask for tubewells and slab latrines. Use of tubewell water at least for drinking is therefore widely accepted and women would go through much difficulty and hardship to collect tubewell water in certain areas-having to wade through waist deep water in the rainy season. Similarly, use of latrines has also been taken seriously by many families and we receive request to assist with the procurement of the equipment. Villagers willingly pay for these.
5. ORS is familiar to most women and use the formula in diarrhoea.
6. The importance of planning the size of the family and also to space the birth of their children to keep them healthy are much better understood and practiced by many mothers,
7. Table III showing the mortality rates among infants and children in our working areas in 1983-84-is encouraging to us, although we believe there could be a small percentage of error on reporting.

**Table—III** **Child Mortality Rate During 1983-84**

Total Population in the Programme areas during 1983-84	=	2,16,059
Total Births in the Programme areas during 1983-84	=	4,590
Total Infant death (below 1 year) during 1983-84	=	332
Total Child death (1-5 years) during 1983-84	=	362

$$(1) \text{ Infant Mortality Rate} = \frac{332 \times 1000}{4590} = 72 \text{ per 1000 live births}$$

$$(2) \text{ Child Death Rate} = \frac{362 \times 1000}{4590} = 79 \text{ per 1000 live births}$$

$$(3) \text{ Child Death Rate if shown together from 0-5 years.} = \frac{694 \times 1000}{4590} = 151 \text{ per 1000 live births}$$

8. During discussions at the clinic the question of poverty, lack of food and money comes up and the possibilities of income-generating activities to help the families through group formation and saving are looked into. The mothers seek advice, loans and trainings to be able to do something to earn some money for the family. Thus interest is aroused to improve the economic condition of the family.

### Problems encountered

1. In the beginning in spite of repeated motivational effort to bring the mothers with their children to the clinics on a particular day met with despair. Often only few came or some came to see the fun. This has changed now.
2. Vaccines were wasted because few came or the fridge did not work (this happened mostly in the villages). Keeping the time schedule is difficult. The importance of completing the course is not easily understood by the mothers. In the beginning, we had much difficulty in motivating mothers to bring children for vaccination for fear of the pricks, but now there is greater awareness among the villagers. They usually do things in groups—so when few take the initiative, others would follow. Vaccination is now stopped in our rural areas because of difficulty in maintaining the cold chain—only the Dhaka children and children living in electrified areas are privileged.  
we did have vaccination programme in the villages before, using kerosine fridges. Cold boxes were used to carry the vaccines from Dhaka and small containers with cooling elements in the lid were used to carry the vaccines to the village clinics from the fridge. But there is wastage of vaccines because sometimes sufficient children do not come or the fridge goes out of order and spare parts are not available.
3. It takes several sessions and much patience to make the mothers understand the importance of vaccination and addition of other food to the child's diet. Very motivated and devoted workers are needed for this work.
4. Follow up of malnourished children is difficult, frustrating and disappointing. In the slums of Dhaka—often they can not be traced, because the families are always on the move.
5. It is quite difficult to admit a very malnourished child with complications into a hospital.
6. Proper motivation of workers is very important because they are often more curative minded and would quickly deal with the minor ailments and let the child go rather than take time to talk to the mother, explain and educate her about the child's condition.
7. Use of audio visual aids, demonstration of cooking and serving food or cleaning of scabies takes time and therefore not done daily by the workers.
8. Mothers are in a hurry to return home—so get impatient and create disturbance at the teaching session. If attractive audio visual aids are used the situation could be different, although at times it gets out of hand.
9. Drop out rate is high as seen in Table-II. Mothers expect miraculous weight gain in a short time.
10. As many mothers work (in Dhaka City) they find it difficult to attend the clinics. Breast feeding of children by these mothers is also affected. They are not even found in the home to discuss about their children's condition. Vaccinations are often not completed because of this. If the family members do not cooperate—mother face problems in attending the clinics as she has to be away from home for several hours.
11. The growth charts are lost or handled by everyone so much that they get dirty, worn out, torn and dusty inspite of providing a polythene cover. We first tried to keep the charts with the family—but we now keep these at our own base clinics and carry them to the under 5 clinic. This way the field workers could sort out the cards of very malnourished children to follow them up and the field supervisors could also check them with the other staff for discussion, special action and for teaching of the staff.

## Conclusion

The growth charts when properly and extensively used could be good indicators of our children's nutritional status in Bangladesh. Organising rural clinics for such a purpose (rural population 90%) is a gigantic task needing highly motivated field staff, required equipment, education and motivation of the mother as well as the whole family.

Demonstration in preparing cheap and yet nourishing food for growing children using locally available food should be a very important component of these clinics.

Availability of all vaccines with provision for maintenance of cold chain is another vital requirement for the use of the Growth Charts.

Through the use of this one card various aspects of the health status of the family could be ascertained.

## DISCUSSIONS ON THE PAPER

Dr. S. A. Rahman (DMCH) : What is the dropout rate with incentive and without incentive in your study ?

Dr. (Mrs.) Mina Malakar (Dr. Paul Baidya) : We do not give any incentive. Only 2nd degree malnourished children receive foods ( a gruel made by us ) at subsidised rates.

This is not incentive because not all children get it.

Dr. S. Ahmad (IFPN & PC) : Who are these health workers ? Whether they are paid employees ?

Dr. (Mrs.) Mina Malakar (Dr. Paul Baidya) : The Health Workers are :

- i. Nurses/Nurse midwives-trained in primary health care.
- ii. Village women-trained in primary health care ( grass root level training ) and family Planning.
- iii. All workers were paid employees.

# **Experience on the Use of Growth Chart in the Community**

**Dr. M. Abdullah\***

## **Introduction**

Use of growth chart and for that matter growth monitoring is a useful tool for early identification of nutritional 'at-risk' children. Monitoring is not an isolated activity nor it is an academic exercise. It is an integral part of an intervention programmes to improve the Health and nutritional status of children. Growth monitoring has no meaning unless prompted by actions. Growth monitoring is also very useful for evaluation of the impact of health and/or nutrition interventions.

## **Prospect of Growth Monitoring Through the Primary Health Care System**

Growth monitoring can not be meaningfully done unless it is integrated into programmes for providing some kind of service and/or material assistance to the beneficiaries. From that point of view it seems therefore logical that growth monitoring can be made operational within the frame work of Primary Health Care Delivery System. However, there are practical problems. We have built Rural Health Centres, Sub-Centres, MCH units etc. In many Rural Sub-Health Centres there is no qualified doctor. If the doctor is there, the supplies are inadequate. The MCH centres are there, but the Lady Health Visitors or the Paramedics are absent. The city-trained doctors and Lady Health Visitors are reluctant to stay in rural areas particularly those that are remote. As a result the people do not get the desired service from these programmes as designed. So far as these services remain limited in outreach and coverage, the scope of integrating growth monitoring into the Primary Health Care Delivery System, will also remain very limited. On the other hand growth monitoring at household level by peripheral workers has its own limitations. Instruments need regular servicing and adjustments which are often overlooked. Break-down of instruments is a frequent feature and servicing facilities are almost non-existent. Lack of adequate training and supervision may lead to recording spurious result.

## **Community Attitude Towards Growth Monitoring**

The usefulness of weight for age or weight for height or birth-weight as a predictor of nutritional status is beyond question. But it is extremely difficult to undertake continuous measurements of height and weight of under fives or birth weight of new borns especially on a national scale. Our experiences show that there are problems of doing this services on national scale.

Cultural prejudices and traditional beliefs of rural people are a major deterrent against growth monitoring. There is a general belief in rural Bangladesh that weighing of children is bad for their health. Weighing is believed to result in loss of weight and render the children vulnerable to diseases. Even the educated people in general are not immune to this. This kind of attitude is understandable in view of the fact that various infections are a common feature in rural Bangladesh and young children do frequently suffer from them. It is quite likely that a child may

---

\*Asstt. Professor, Institute of Nutrition & Food Science, University of Dhaka.

get sick after weighing. Under such circumstance people would immediately jump to the conclusion that the illness was caused by weighing. We have encountered this sort of situation on many occasions. To quote one example : in one community it is happened that a young boy was weighed and subsequently he became ill with typhoid. For lack of proper treatment the condition of the boy become so precarious that at one point every body gave up hope of his survival. A strong rumour spread in the community that the boy was forcibly weighed which made him fear-stricken and eventually he fell ill. On another occasion the mother of a young child vehemently opposed weighing her son. It was so amusing to hear the words of the mother who said, "spare my son and take my own weight as many times as you wish". This gives a clear idea of the mothers' great concern about weighing their children.

Frequently children themselves run away to avoid weighing. Not surprisingly often the parents ask the children to hide. Parents hardly allow weighing of sick children. Also they do not allow weighing of children who are asleep on the plea that if they are awoken they would cry. With regard to measuring supine length of infants and children under 2 years there is a strong superstition towards laying them down on the wooden platform of the measuring device. They often say that only bodies are carried to the graveyard on such a thing, pointing the length measuring instrument.

Cultural prejudices are more important with regard to measuring birth weights. People would not generally allow their new-borns to be weighed. In some areas the mother and the new-born are confined in a secluded house for a week or even for a fortnight during which nobody is allowed to enter the house. Birthweights can, however, be easily taken in clinics. But like other developing countries most deliveries in Bangladesh are not professionally attended and take place outside clinics.

These sorts of community resistances to growth monitoring are frequently encountered even at micro-level programmes where considerable motivational work to persuade people and make them understand the usefulness of growth monitoring are undertaken. It does seem that tangible achievements in growth monitoring on a national scale can be made through the primary Health Care Delivery System, at least in the short-run. Nevertheless Primary Health Care Delivery System is the only ideal platform where growth monitoring can be integrated. It would be advisable to undertake the programme initially on a limited scale and then gradually expand the same as experiences gained in the field and shortcomings of the programme identified.

## DISCUSSIONS ON THE PAPER

- S. A. Rahman (DMCH) : In spite of all the drawbacks which one you prefer domiciliary measurement or measurement at centre ?
- Dr. M. Abdullah : Growth monitoring is a continuous process and is not always appropriate to do in clinics/or centres. Because in the centre only these needing service turn up. To cover the whole community growth monitoring has to be done at household level (domiciliary). However, it depends on the objective fixed for the particular programme planning of growth monitoring.

- Dr. J. D. Sarma (RMCH): Can "Dai" be involved in measuring birth weight. ?
- Dr. M. Abdullah : Yes, They are to be taken as one of the groups of health worker to be involved at the moment that is the only way to do the work. However, mothers are to be registered and motivated for cosent right from the middle of pregnancy. Elders of the household including husband also need to be motivated.
- Dr. Sadiqa Tahera Khanam : I am afraid you are generalising from your old experiences. In a country where women (even teen age girls) are going in for "Garment Industries" leaving their Burqas and acceptibility to new practices, no matter how innovative and novel ?
- Dr. M. Abdullah : As more and more avenues are opened and as more and more women come out of their households, their attitude and cultural values will surely undergo changes and acceptibility to new practices will surely increase. But in our present situation cultural prejudices are an important deterrant which should not be overlooked.
- Dr. M. A. Hamid Sheikh : Inspite of prejudices in the society we have to find out some data regarding growth. What is your suggestion please ?
- Dr. M. Abdullah : I agree that we have to have some data on growth. This is absolutely important for preliminary planning purposes. We can do that by confining the activities in a few areas and putting considerable motivational work to overcome the cultural prejudices. Some kind of material assistance must also be given to the target population.
-

## **Address by the Chairman of the Technical Session**

**Prof. N. Islam\***

Learned Participants,

I am really glad to be here and very grateful to the Organisers of this workshop for inviting me to chair this technical session. Today, I have learned about the growth monitoring of our under-five children in Bangladesh. This is very important, a necessity and requires implementation in our country at all level.

It is my pleasure to note that the National Nutrition Council has organised this workshop on growth chart which is first of its kind in the country. This workshop will give guidelines for use and promotion of growth chart in Primary Health Care Delivery System. The authors have nicely presented their Scientific papers, openly expressed their views, experiences and highlighted the importance of growth monitoring in this session. They have pointed out the effect of growth faltering, various factors responsible for effecting the growth, effect of exclusive breast feeding upto 5 months of age, weaning and supplementary feeding, use of ORS and effect of diarrhoea, importance of immunization, difficulties in growth monitoring and also suggested measure to attain the implementation of growth chart in our situation. The participants have given their learned views on wide range of different important issues. I believe, the discussions on implementation of growth monitoring so far held in this session will also continue upto the afternoon sessions particularly in group discussions for framing pragmatic recommendations.

Ladies and Gentlemen, we have also heard that growth monitoring is new to us but not to all developing countries and components of GOBI-FFF (where 'G' stands for Growth monitoring; 'O' for Oral rehydration; 'B' for Breast feeding; 'I' for Immunization; 'F' for Food supply; 'F' for Family Planning and 'F' for Female education) which are very important and felt need at present in our country. People from different walks of life are now a days demanding for various health and nutrition services like food, medicine, vaccine, treatment etc. No doubt, we have lots of bottle necks and difficulties but yet we shall have to go ahead by using our own skills and experiences. I hope this workshop will give a definite direction to develop an action programme for the development of the younger children of the country.

I would like to mention that the NNC has developed a growth chart, a manual and a weighing scale. These needs to be field tested in the community before wider implementation. I am sure NNC will take this responsibility and the recommendations of this workshop will be duly considered by the Government for their implementation.

Before I conclude, I want to thank you again Ladies and Gentlemen, for your patient hearing, participation in discussions and co-operation in conducting the session.

Thank you all.

---

\*Director, Institute of Post Graduate Medicine and Research, Dhaka.

# **CLOSING SESSION**

## **Group Discussion And Recommendation**

The participants in one day workshop deliberated on the growth monitoring in children and expressed their views on the importance of growth chart in the community. After the technical session the participants were divided into 6 relevant groups for pragmatic recommendations. The recommendations of the groups were then placed in closing session for final approval. It was the consensus that the growth chart, the growth chart manual and the weighing scale developed by National Nutrition Council, Bangladesh be used throughout the country for development of health status of the under five children. The workshop concluded with the following recommendations :—

### **GROUP—1 : Practice of Growth Monitoring**

1. Eight areas in 4 administrative divisions of the country ( Two from each division ) will be selected for field testing the growth monitoring system.
2. Personnel of all categories who are responsible for the implementation of growth chart shall be trained by the NNC.
3. Growth monitoring system must be taken in association of the other components of the growth chart as a comprehensive health package for children.
4. Growth will be monitored under 4 year ( 48 months ) of age for a period of one year and it must be longitudinal.
5. The community leaders and community as a whole should be motivated by disseminating appropriate nutrition education through series of discussions and by providing health care for illness.
6. The longitudinal weighing of the children shall be done at institutional as well as at domiciliary level. The effort will be made by health workers to train the mothers to weigh their children.
7. Evaluation of workers activities both formative and summative as well as evaluation of the programme including evaluation of all aspects of initial training, equipments & manuals and the use of different components of the growth chart shall be a part of this programme.

### **GROUP—2 : Prevention and Treatment of Diarrhoea**

1. Mother should have minimum health education including hand washing throughly after toileting and specially before food preparation and food handling. If no soaf is available ashes can be used instead.
2. Safe water ( Preferably tube-well water ) should be procured, collected and preserved in clean utensils.
3. Once the child is attacked with diarrhoea, care should be taken so that person to person contact is prevented specially by proper disposal of feces.
4. Freshly cooked or heated food preferably should be provided to the children.



(d) From 6 months onward in addition to breast feeding, the infant should gradually be introduced to the family food so that the baby is habituated to eat the usual family food by the age of one year.

**GROUP - 5 : Treatment of Common Childhood Illness in the Community.**

1. Common childhood illnesses can be enumerated as follows :-
  - i. Respiratory tract infection.
  - ii. Malnutrition.
  - iii. Diarrhoea-watery and invasive.
  - iv. Helmintheasis.
  - v. Skin infection,
  - vi. Infectious diseases.
  - vii. Tuberculosis.
  - viii. Ear infection.
2. Emphasis should be given in undergraduate and other paramedical institutes to impart exposure of the students on the common childhood problem in the community. They should be fully conversant with these problems and is capable of managing these problem in actual situation keeping in mind the meagre facilities in the community and the economic constraints.
3. Treatment should be broadly divided into two heading :
  - a. Preventive and
  - b. CurativePreventive aspect will be solely looked after by the primary health worker.
4. Preventive aspect should be given the highest priority with health education and immunization topping the list. The regular weighing session can be best time for health education and other preventive measures.
5. Curative aspect got two wing-first step is at have to be covered by primary health worker and next step is hospitals.
6. The primary health worker, who is adequately trained in identifying diseases should identify and institute therapy at earliest possible time. He should be equipped with some common medicines which includes :
  - a. Antibiotics-penicillin preparation only-Syruap and Tablet chloramphenicol
  - b. Antehelminth
  - c. Antihistamine
  - d. Metromidazane
  - e. Chloroquinine
  - f. Gention violet and Mycostatia suspension.
  - g. High potency Vit. 'A'
  - h. Benzyl Bengoate and unj. whilfield,
  - i. Iron preparation
  - j. Riboflavin or vitamin 'B' complex drop
  - k. Chloramphenicol eye drop and oint, etc.
  - l. Anticonvalsant-diazepam.So that all first line medicines for common health problems are at hand.

7. Facilities should be developed for referral system. Primary Health Worker as soon feels some problem beyond his capability ( which should be taught ) should refer the case to appropriate person.
8. Referral cases should be treated in the hospital or outdoor dispensary runned by medical professionals.

**GROUP—6 :**

**Birth Spacing**

1. If growth monitoring becomes a part of the MCHFP programme and the mothers are aware about the health of their children, she will definitely be motivated and more encouraged for adopting family planning methods. So, growth monitoring should be an integral part of family planning.
2. The same family planning and health workers can simultaneously advice the mothers about growth monitoring along with other family planning measures. So, both the works may be performed at a time.
3. Successful breast feeding for 2 years will help by and large birth spacing in natural way. This will help maintaining good health of mothers and babies.
4. Birth spacing is essential for maintaining good health of both mothers and babies. Considering the state of malnutrition existing in our country, a mother will require at least two to three years to recoup her health after giving birth to a child. So, birth spacing of at least 3 years is essential for good health of both mothers and her babies.

---

## **Address by the Chairman of the Closing Session**

**Major General M. R. Chowdhury\***

**Learned Participants,  
Ladies and Gentlemen,**

It is indeed a great pleasure for me to be present and chair the closing session of this important workshop on growth monitoring children.

I congratulate all the distinguished participants who have put their wisdom and experience together to make this workshop so rewarding. Ladies and Gentlemen, we have heard the important recommendations presented in this session by the group leaders and resource persons of the six component groups of the growth chart viz. (1) Practice of growth monitoring by rural mothers and women; (2) Promotion of maternal nutrition, breast-feeding and supplementary feeding; (3) Prevention and treatment of diarrhoea; (4) Immunization; (5) Care of common illness and (6) Birth spacing vis-a-vis family planning. All these issues, you will agree with me, are very important. Learned participants have given their considered views on each problem. These, as a member of medical profession, I feel, if successfully implemented will have profound beneficial effects on the state of national health.

Among the recommendations, use of growth charts, Growth chart manual and NNC-weighting scale in the community, selection of 8 field testing areas in 4 divisions for growth monitoring as pilot projects, provision of safe drinking water, education and training of health workers, motivation of mothers for immunization etc. are important too. Mothers should be advised to take safe drinking water. Health workers can play an important role in this regard.

I am confident that the integration of the components of growth chart and their promotion through the primary health care system will certainly be very useful. In order to implement the recommendations made in this workshop, close co-ordinations of all relevant agencies are necessary.

Before I conclude, I want to thank the rapporteurs, all employees of the National Nutrition Council (NNC) for their hard work. Finally, I am grateful to the organisers of this workshop for providing me this opportunity of presiding over this session. I once again convey my heartfelt gratitude to you all, distinguished participants, Ladies and Gentlemen for giving me a patient hearing. I hope, the National Nutrition Council will be able to help implement the useful recommendations for effective growth monitoring in this country with a view to health for all by the year 2000 A. D.

**Thank you all.**

— — —

---

\*Comdt. Armed Forces Institute of Pathology and Transfusion, Dhaka Cantonment, Dhaka.

## ANNEXURE

### Participants of the Workshop on Growth Monitoring in Children

Name	Designation/Organisation
Mr. Alamgir M. A. Kabir	President, FPAB, 618B, Road-18 ( old ), Dhanmondi R/A Dhaka.
Major General M. R Chowdhury	Comdt. AFIPT. Dhaka Cantt., Dhaka.
Prof. K. Ahmad	Director, INFS., University of Dhaka., Dhaka.
Prof. N. Islam	Director, IPGMR., Shahbag, Dhaka.
Prof. M. Q. K. Talukdar	Professor, IPGMR., Shahbag, Dhaka.
Dr. M. Mujibur Rahman	Assoc. Director, ICDDR,B., Mohakhali, Dhaka.
Prof. M. H. Rahman	Member STC, NNC.
Dr. S. F. Rubbi	Director, IFST, BCSIR., Mirpur Road, Dhaka.
Dr. C. A. Kawsar	Asstt. Surgeon, Deptt. of Child Health, IPGMR, Shahbag, Dhaka.
Mr. M. A. Mannan	Deputy Secretary, NNC., Mohakhli. Dhaka.
Mrs. Noor-E-Hafza	Nutritionist, NNC., Mohakhali, Dhaka.
Dr. Jinnat Ara Begum	Assoc. Professor, Deptt. of food Technology and Rural Industries, B. A. U., Mymensingh.
Mr. M. Hazari	Senior Programme Officer, CCDB., 26/A, Senpara Parbatta, Mirpur, Section No. 10, Dhaka.
Lt.Col.Dr. Shahabuddin Ahmad (Retd.)	Project Director, IFPN & PC., Road No 3, House No. 28, Dhanmondi R/A., Dhaka.
Dr. Md. Tojammul Haque	Clinical Nutritionist, IPHN., Mohakhali, Dhaka.
Dr. A. I. Begum	Incharge, Planning Cell, M/O. Health & Population Control., Dhaka.
Mr. A. K. M. Ashraful Alam	Programme Officer, UNICEF, Dhaka.
Mr. M. Baquer	Programme Officer, UNICEF, Dhaka.
Dr. Abdul Majid Molla	Scientist, ICDDR,B., Mohakhali, Dhaka.
Dr. Fitzroy Henry	Research Scientist, ICDDR,B., Mohakhali, Dhaka.

Name	Designation/Organisation
Mr. Hasan Sarwar	Assoc. Instructor, BARD, Kotbari, Comilla.
Dr. M. Kabirullah	Director, BIRTAN, Medical Road, Jurain, Dhaka.
Dr. A. K. M. Siddiqur Rahman	Lecturer in Community Medicine, Mymensingh Medical College, Mymensingh.
Dr. A. J. M. Omar Faraque	Principal Scientific Officer, IFST., BCSIR., Mirpur Road, Dhaka.
Dr. M. Abdullah	INFS., University of Dhaka, Dhaka.
Dr. Majharul Haq. Chowdhury	Asstt. Prof. INFS., University of Dhaka, Dhaka.
Dr. A. K. M. Lutfar Rahman Talukdar	Project Director, EPI., Mohakhali Health Complex, Dhaka.
Md. Rezaul Islam	Director, VHSS., 23/4, Khilji Road, Shyamoli, Dhaka.
Dr. Q. M. Iqbal Hossain	Sr. Research Officer, Save the Children Fund ( U. K. ) 91, New Eskatan Road, Dhaka
Dr. Syed Altafur Rahman	Assoc. Professor, Community Medicine, Dhaka Medical College, Dhaka.
Mr. Md. Nazrul Islam	Nut. Section Incharge RDRS, Health Programme, Lalmonirhat, Kurigram.
Dr. Jamal Ahmed Khan	Lecturer, Community Medicine, Sylhet Medical College,
Dr. Jhulan Das Sarma	Registrar, Paediatrics, Rajshahi Medical College, Rajshahi,
Dr. Abdul Mokit Sarker	Lecturer, Community Medicine, Rajshahi Medical College, Rajshahi.
Dr. Pravat Chandra Barua	Lecturer of Community Medicine, Chittagong Medical College, Chittagong.
Dr. S. M. Abdullah-Al-Momen	Jr. Clinician, IPHN, Mohakhali, Dhaka.
Dr. M. H. Haidary	Asstt. Surgeon, Dhaka Medical College, Dhaka.
Dr. A. K. M. Tarek	Lecturer, Community Medicine, Chittagong Medical College, Chittagong.
Dr. Sirajul Islam	Asstt. Professor, Paediatrics, Bangladesh Institute of Child Health, Dhaka Shishu Hospital, Sher-e-Bangla Nagar, Dhaka.
Mr. Kamal Faruque	Sr. Scientific Officer, ( Nutrition ) BARC, Farmgate, Dhaka.
Dr. Belal Ahmed	Scientific Officer (Medical ) BIRTAN, Jurain, Dhaka.
Dr. Moslem Uddin Mia	Scientific Officer ( Nutrition ) BARC., Dhaka.
Dr. Shah Md. Keramat Ali	Consultant, BIRDEM, Shahbag. Dhaka.

Name	Designation/Organisation
Dr. Muhammed Musa	Medical Consultant, Care Bangladesh, 63, Road No. 7/A., Dhanmondi R/A., Dhaka.
Dr. M. A. Hamid Shaikh	Assoc. Professor, Paediatrics, Mymensingh Medical College, Mymensingh.
Ms. Majeda Begum	Scientific Officer, IFST, BCSIR., Mirpur Road, Dhaka.
Mr. Husain Khan	Asstt. Chief, Bureau of Health Education, Mohakhali, Dhaka.
Mr. Dolwar Hossain	Sr. Correspondent, B. S. S. 68/2; Purana Paltan, Dhaka.
Dr. A. F. M. Salim	Asstt. Professor, Bangladesh Institute of Child Health, 7, North Road, Dhanmondi R/A., Dhaka.
Dr. M. G. M. Rowland	Assoc. Director, ICDDR,B., Mohakhali, Dhaka.
Mr. Andue Briend	Scientist, ICDDR,B., Mohakhali, Dhaka.
Dr. N. Ishikawa	Consultant, NATAB, 24, Bangobandhu Avenue, Dhaka.
Dr. Md. Monimal Haque	Asstt. Professor, IPGMR, Shahbag, Dhaka.
Ms. Louisa B. Gomes	Programme specialist, USAID, Jiban Bima Bhaban, 10, Dilkusha C/A., Dhaka.
Dr. M. U. Khan	Scientist, ICDDR,B., Mohakhali, Dhaka.
Dr. S. Rahman	Director, BMRC., Mohakhali, Dhaka.
Dr. Md. Nurul Islam	Assoc. Professor, IPGMR, Shahbag, Dhaka.
Mr. Md. Manajjir Ali	Asstt. Register, IPGMR, Shahbag, Dhaka.
Dr. H. S. Roy	Medical Officer, Radda Barnen, Mirpur, G. P. O. Box. No. 2124, Dhaka.
Dr. M. A. Muttalib	President, CHRA, 90, Bijoy Nagar, Dhaka.
Lena Backdahl	FWL Co-ordinator: New life centre, Shaha para Road, Keshabpur, Jessore.
A. J. M. Mizanur Rahman	Professor of Epidemiology, NIPSOM, Mohakhali, Dhaka.
Dr. Sadiqa Tahera Khanam	Assoc. Professor, & Child Health, NIPSCM, Mohakhali Dhaka.
Dr. Paul S. Baidya	Assoc. Executive Director, CHCP, 1 New Eskatan, Dhaka.
Mr. Md. Arif Mian	Research Officer, Health Wing, Planning Cell, M/O. Health and Population Control.
Dr. A. Bari	Sr. Medical Officer, ICDDR,B., CTP., Chandpur.
Dr. M. Rahman	Research Officer, Planning Cell, M/O. Health and Population Control.

Name	Designation/Organisation
Mr. Syod Azlzur Rahman	Research Officer, Planning Cell, M/O. Health & Population Control.
Mr. Moshiur Rahman	Reporter, The ITTEFAQ, 1, Ramkrishna Mission Road, Dhaka,
Mr. Torben V. Paterson	Director, RDRS, House-16, Road-16 ( New ), Dhanmondi, Dhaka-9.
Mr. Peter A, Gomes	Govt. Relations, RDRS, House-16, Road-16 ( New ) Dhanmondi, Dhaka.
Dr. M. Ekhlasur Rahman	Asstt. Registrar, ICHR, IPGMR, Shahbag, Dhaka.
Dr- Afiqui Islam	Assistant Registrar, ICHR, Shahbag, Dhaka.
Dr. Md. Fazlul Haque Nazi	Assoc. Professor, of Paediatrics, Sylhet Medical College Sylhet.
Dr. Zahid Hossain	Asstt. Professor, IPGMR, Shahbag, Dhaka.
Dr. M. S, Akbar,	Professor of Paediatrics, Dhaka Shishu Hospital, Sher-e-Bangla Nagar, Dhaka.
Mr. Hilary A. Baroi	Health Teachers Training Course Supervisor, New life Centre, S-21/A., Noorjahan Road, Mohammadpur, Dhaka,

## Abbreviations

- AFIPT** : Armed Forces Institute of Pathology and Transfusion.
- BAAS** : Bangladesh Association for the Advancement of Science.
- BARC** : Bangladesh Agricultural Research Council.
- BARD** : Bangladesh Academy for Rural Development.
- BAU** : Bangladesh Agricultural University.
- BCSIR** : Bangladesh Council of Scientific and Industrial Research.
- BIRDEM** : Bangladesh Institute of Research and Rehabilitation on Diabetes, Endocrine and Metabolic Disorders.
- BIRTAN** : Bangladesh Institute of Research and Training on Applied Nutrition.
- BMRC** : Bangladesh Medical Research Council.
- BSS** : Bangladesh Songbad Sangsta.
- CARE** : Co-operative American Relief Everywhere.
- CCDB** : Christian Commission for Development in Bangladesh.
- CHCP** : Community Health Care Project.
- CHRA** : Community Health Research Association.
- CORR** : Christian organisation for Relief & Rehabilitation.
- CTP** : Community Training Project.
- DMCH** : Dhaka Medical College Hospital.
- DND** : Demra Narayangonj Dam.
- DPT** : Diphtheria, Pertussis, Tetanus.
- DU** : Dhaka University.
- EPI** : Expanded Programme on Immunization.
- FAO** : Food and Agricultural Organisation.
- FPAB** : Family Planning Association of Bangladesh.
- GOBI-FFF** : Growth Monitoring, Oral Rehydration Therapy, Breast-Feeding, Immunization, Female Education, Family Spacing, Food Supplements.
- HFA** : Health For All.
- ICDDR,B** : International Centre for Diarrhoeal Disease Research, Bangladesh.
- ICHR** : Institute of Child Health and Research.
- IDD** : Iodine Deficiency Disorders.
- IFPN & PC** : Integrated Family Planning, Nutrition and Parasite Control.
- IFST** : Institute of Food Science and Technology.

INFS : Institute of Nutrition and Food Science.  
IPGMR : Institute of Post Graduate Medicine and Research,  
IPHN : Institute of Public Health Nutrition.  
JGUAG : Joint Government UNICEF Advisory Group.  
MCH : Maternal and Child Health.  
MCHFP : Maternal Child Health and Family Planning.  
MMCH : Mymensingh Medical College Hospital,  
NATAB : National Anti-Tuberculosis Association of Bangladesh.  
NCHS : National Centre for Health Statistics.  
NIPSOM : National Institute of Preventive and Social Medicine.  
NNC : National Nutrition Council.  
OFC : Occiputo Frontal Circumference.  
ORS : Oral Rehydration Solution.  
PEM : Protein Energy Malnutrition.  
PHC : Primary Health Care.  
RDRS : Rangpur Dinajpur Rehabilitation Society.  
RMCH : Rajshahi Medical College and Hospital.  
SSMC : Sir Salimullah Medical College.  
STC : Standing Technical Committee.  
TT : Tetanus Toxioid.  
UNICEF : United Nations Childrens Fund  
URTI : Upper Respiratory Traet Infection,  
USAID : United States Agency for International Development.  
VHAI : Voluntary Health Association of India.  
VHSS : Voluntary Health Services Society.  
WFP : World Food Programme.  
WHO : World Health Organisation.

---